

ANNAMALAI UNIVERSITY – AFFILIATED COLLEGES
102 B.A. TAMIL

Programme Structure and Scheme of Examination (under CBCS)
 (Applicable to the candidates admitted in Affiliated Colleges from
 the academic year 2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours/Week	Credit	Maximum Marks		
					CIA	ESE	Total
SEMESTER – I							
22UTAML11	I	Language Course – I : Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course – I : Communicative English I	5	3	25	75	100
22UTAMC13	III	Core Course – I : இக்கால இலக்கியம்	5	4	25	75	100
22UTAMC14		Core Course – II : நன்னூல்-எழுத்து-காண்டிகையுரை	5	4	25	75	100
		Allied Course – I	5	3	25	75	100
22UTAMS16	IV	Skill Based Course – I: தமிழரின் சித்த மருத்துவம்	3	2	25	75	100
22UENV18		Environmental Studies	2	2	25	75	100
Total			30	21			700
SEMESTER – II							
22UTAML21	I	Language Course – II : Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course – II : Communicative English II	5	3	25	75	100
22UTAMC23	III	Core Course – III : சிற்றிலக்கியம்	5	4	25	75	100
22UTAMC24		Core Course – IV: நன்னூல்-சொல்-காண்டிகையுரை	5	4	25	75	100
		Allied Course – II	4	3	25	75	100
22UTAMS26	IV	Skill Based Course – II: மனித உரிமைகள்	2	2	25	75	100
22UVALE27		Value Education	2	1	25	75	100
22USOFS28		Soft Skill	1	1	25	75	100
Total			30	21			800

List of Allied Courses (Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22UTAMA15-1	தமிழக வரலாறும் பண்பாடும் - 1	5	3	25	75	100
	22UTAMA15-2	தமிழ் இலக்கண வரலாறு	5	3	25	75	100
	22UTAMA15-3	தமிழ்மொழி வரலாறு	5	3	25	75	100
II	22UTAMA25-1	தமிழக வரலாறும் பண்பாடும் - 2	4	3	25	75	100
	22UTAMA25-2	தமிழர் நாகரிகமும் பண்பாடும்	4	3	25	75	100
	22UTAMA25-3	இந்திய இலக்கியம்	4	3	25	75	100

கற்றலின் நோக்கங்கள் (LEARNING OBJECTIVES)

தரப்புள்ளி - 4, மணி - 5

1. காலந்தோறும் தமிழிலக்கிய வளர்ச்சியின் அடிப்படையில் தற்கால தமிழ் இலக்கிய வளர்நிலையை அறிதல்.
2. சமகாலத்துக் கவிதை, உரைநடையின் தலையாய பண்புநலன்களை உணர்தல்.
3. நடைமுறை சமுதாயத்தின் பிரச்சனைகளையும் அதன் தீர்வுகளையும் அறிவதற்கும் அது தொடர்பான சிந்தனை மேம்பாட்டிற்கும் வழி ஏற்படுத்துதல்.
4. சமுதாய படிநிலை பகுப்புகளையும் சிக்கல்களையும் அறிதல்.
5. இலக்கிய படைப்பாக்கத்தின் புதிய உத்திகளை உணர்ந்து படைப்பாற்றலை ஊக்குவித்தல்.

பாடத்தின் வெளிப்பாடுகள்: (COURSE OUTCOME)

1. கவிதைகள் காலந்தோறும் கட்டமைப்பை மாற்றிக்கொள்ள வேண்டியதன் அவசியத்தையும் அதன் உருவாக்க உத்திகளின் மாறுபாட்டையும் தெரிந்துகொள்ளல்.
2. கதை இலக்கியங்கள் சமுதாய இயங்குதளத்துடன் கொண்டிருக்கும் தொடர்பை விளங்கிக்கொள்ள வைத்தல்.
3. சிறுகதை, புதினம் போன்ற இலக்கியவடிவங்கள் மேலைநாடுகளின் வருகையாக இருப்பினும் இன்றைய இலக்கிய உலகில் மேலைநாடுகளுக்கே சவால் விடுகின்ற நிலையில் வளர்ச்சி பெற்றிருப்பதை ஆய்ந்தறிய வைத்தல்.
4. உரைநடை இலக்கியங்கள் மக்களோடு கொண்டிருக்கும் மிகநெருக்கமான உறவை பாடப்பகுதிகளால் புரியவைத்தல்.
5. இக்கால இலக்கியங்கள் இன்றைய சமுதாயப் பிரச்சனைகளை முன்வைப்பதற்கும் முடிவுகாண்பதற்கும் சிறந்த வழித்தடங்கள் என்பதை உணரவைத்து அதன்வழி படைப்பாக்கத்திறனை ஊக்குவித்தல்.

III-Core Course -I இக்கால இலக்கியம் (22UTAMC13)

அலகு -1 மரபுக்கவிதை

1.பாரதியார் - 3 பாடல்கள்

- 1.காலைப்பொழுது - 1-10 (கவிதைகள் மட்டும்)
- 2.நிலாவும் விண்மீன் காற்றும் - (1இ 2 கவிதைகள்)
- 3.மழை (முதல் -10 அடிகள் மட்டும்)

2.பாரதிதாசன் - 3 பாடல்கள்

1. இயற்கை - இருசுடரும் என்வாழ்வும் (தலைப்புக் கவிதை)
2. பெண்ணுலகு - கைம்மை பெண்நிலை(தலைப்புக் கவிதை)
3. திராவிடம் - இசைத்தமிழ் (தலைப்புக் கவிதை)

3.சுரதா - 3 பாடல்கள்

- 1.துறைமுகம் - (தலைப்புக் கவிதை மட்டும்)
- 2.வென்றவனை வென்றவன் (துறைமுகம் நூல்)
- 3.பெருந்தலைவர் காமராசர் (துறைமுகம் நூல்)

4.முடியரசன் கவிதைகள் - 3 பாடல்கள்

- 1.குழந்தை இன்பம் (தலைப்பில் அமைந்த கவிதை)
- 2.தொழிலாளி (தலைப்பில் அமைந்த கவிதை)
- 3.துறைதோறும் தமிழே காண்பீர் (தலைப்பில் அமைந்த கவிதை)

5.வாணிதாசன் கவிதைகள் - 3 பாடல்கள்

- 1.பரவட்டும் தீயே (தொகுதி - 2)
- 2.புதிய உலகம் (தொகுதி - 2)
- 3.வறுமை (தொகுதி - 2)

அலகு -2 புதுக்கவிதை

- 1.மேத்தா - உயிர்ப்பாடும் ஒப்பாரி (நூல்: ஆகாயத்துக்கு அடுத்தவீடு)
- 2.அப்துல் ரகுமான் - போட்டி (நூல்: ஆலாபனை)
- 3.வைரமுத்து - மரங்களைப் பாடுவேன் (இந்த பூக்கள் விற்பனைக்கு அல்ல)
- 4.இன்குலாப் - எழுக மனிதனே (நூல்: ஒவ்வொரு புல்லையும்)
- 5.இரா.மீனாட்சி - காற்றோ காற்று (நூல்: சுடுபூக்கள்)

அலகு -3 சிறுகதை:

- 1.அன்பளிப்பு - கு.அழகிரிசாமி.
- 2.நினைவுப்பாதை - புதமைப்பித்தன்
- 3.நாற்காலி - கி.ராஜநாராயணன்.
- 5.மனிதாபிமானம் - தி.ஜானகிராமன்.
- 6.வலை - பாவண்ணன்.
- 7.அந்தி - பாமா.
- 8.காகித உறவு - சு.சமுத்திரம்.

* பாடநூல்: உதயம்-சிறுகதைத்தொகுப்பு, பிரசாடப்பளிகேஷன்ஸ், சென்னை-14 (விலைரூ.60.00)

அலகு - 4 புதினம்

- 1.ச.தமிழ்ச்செல்வி - கீதாரி. (நாவல்) (டீர்இ ஊாநயெயை - 98)

அலகு - 5 உரைநடை

- 1.வள்ளுவர் வகுத்த இல்லறம் - நாமக்கல் கவிஞர்.
- 2.சங்க நெறிகள் - வ.சுப.மாணிக்கம்.
- 3.நட்பு காலம் - வேதாத்திரி மகரிஷி.
- 4.தமிழர் பண்பாடு ஒரு விளக்கம் - டாக்டர் சோ.நா.கந்தசாமி.
- 5.சமயங்கள் வளர்த்த தமிழ் - மயிலை சீனி வேங்கடசாமி.
- 6.சமூக மதிப்பீடுகளை உயர்த்தும் கல்வி - டாக்டர் கா. மீனாட்சி சுந்தரம்.
- 7.தீரன் சின்னமலை - முனைவர் செ.இராசு.
- 8.புதிர் எதிர்காலம் - சிற்பி பாலசுப்பிரமணியம்.

பாடநூல் :

1. புதிர் எதிர்காலம் (கட்டுரைகள்-8 கட்டுரைகள்தொகுப்பு), அறிவுப்பதிப்பகம்,சென்னை-14.

OUTCOME MAPPING:

CO/PO	P01	P02	P03	P04	P05
C01	3	2	2	2	3
C02	2	1	2	1	2
C03	3	2	2	2	2
C04	1	2	2	3	2
C05	2	3	2	2	3

1-LOW , 2-MEDIUM , 3-HIGH

முதலாம் ஆண்டு - முதற்பருவம்

Part-III-Core Course -II - (22UTAMC14)

தாள்-இலக்கணம்-1 : நன்னூல்- எழுத்ததிகாரம் (காண்டிகையுரை)

(முதன்மைப் பாடம்)

கற்றலின் நோக்கங்கள் (LEARNING OBJECTIVES)

தரப்புள்ளி - 4, மணி -5

- நன்னூலின் எழுத்திலக்கணம், சொல்லிலக்கணத்தின் சிறப்பியல்புகளைக் கற்பித்தல்
- தொல்காப்பிய எழுத்தியல், சொல்லியல் பார்வையுடன் ஒப்பிட்டுக் கற்பித்தல்
- பதத்தின் இலக்கண வகையை அறிதல்
- புணர்ச்சியின் இலக்கணத்தை முழுமையாக கற்பித்தல்
- கல்வி கற்கும் முறை போன்ற தலைப்புகள் அடங்கிய பாயிரவியல் முழுமையும் கற்பித்தல்

பயன்:

- நன்னூலின் தமிழ் இலக்கண அமைப்பைக் கற்றல்
- தொல்காப்பியத்துடன் ஒப்பிட்டு நன்னூலின் சிறப்பியல்புகளை அறிதல்
- பதத்தின் இலக்கண வகையைக் கற்றல்
- புணர்ச்சியின் இலக்கணத்தை முழுமையாக உணர்தல்
- கல்வி கற்கும் முறை போன்ற தலைப்புகள் அடங்கிய பாயிரவியல் முழுமையும் உணர்ந்து கொள்ளல்

அலகு 1. பாயிரவியல்

பாயிரவகை - உத்தியின் இலக்கணம் - முப்பத்திரண்டு உத்திகள் - நூலின் இலக்கணம்- ஆசிரியர் இலக்கணம் - மாணவர் இலக்கணம் - நூலைக் கற்கும் முறை - ஆசிரியரிடம் மாணவர் பழகும் முறை - நூல் இயற்றும் முறை - கல்வி கற்கும் முறை போன்ற தலைப்புகள் அடங்கிய பாயிரவியல் முழுமையும்.

அலகு 2. எழுத்தியல்

எழுத்துக்களின் எண்ணிக்கை - எழுத்துக்களின் பிறப்பு - மொழி முதல் எழுத்துக்கள் - மொழி இறுதி எழுத்துக்கள் -போலி எழுத்துக்கள் - உயிர்மெய் எழுத்து- அளபெடைகள்- குற்றியலுகரம் - ஐ,இ, ஓன குறுக்கங்கள் -மகரக்குறுக்கம் -ஆய்தக்குறுக்கம் முதலிய தலைப்புகள் அடங்கிய எழுத்தியல் முழுமையும்.

அலகு 3. பதவியல்

பதத்தின் இலக்கணமும் வகையும்-பகுபத உறுப்புகள்-வடமொழியாக்கம்-ஓரெழுத்து ஒருமொழி-தொடர் எழுத்து ஒருமொழி-காலம் காட்டும் இடைநிலைகள் - தமிழ் மொழியின் சிறப்புகள் முதலிய தலைப்புகள் அடங்கிய பதவியல் முழுமையும்.

அலகு 4. உயிரீற்றுப் புணரியல்

புணர்ச்சியின் இலக்கணம் - உயிரீற்றுச் சொற்களின் புணர்ச்சி - எண்ணுப் பெயர் புணர்ச்சி - இயல்புப் புணர்ச்சி - விகாரப் புணர்ச்சி - செய்யுள் விகாரம் - மரபுப் பெயர்ப் புணர்ச்சி - திசைப் பெயர்ப் புணர்ச்சி தலைப்புகள் அடங்கிய உயிரீற்றுப்புணரியல் முழுமையும்.

அலகு 5. மெய்யீற்றுப் புணரியல், உருபுப் புணரியல்

தொழிற் பெயர், ஏவல், வினைமுற்றுப் புணர்ச்சி- மெய்யீற்றுச்சொற்களின் புணர்ச்சி - வேற்றுமை உருபுகள் புணருதல் ண, ன, ஈற்றுப் புணர்ச்சி-மகர ஈற்றுப் புணர்ச்சி - ல, ள ஈற்றுப் புணர்ச்சி-வகர ஈற்றுப் புணர்ச்சி- சாரியைகள் - இடப்பெயர்கள் உருபு ஏற்றல் - அவ் முதலிய சுட்டுப் பெயர்கள் உருபு ஏற்றல் - சாரியைகளைக் கண்டறியும் முறை முதலிய தலைப்புகள் அடங்கிய மெய்யீற்றுப் புணரியல், உருபு புணரியல் முழுமையும்.

பாட நூல்:

1. நன்னூல் - எழுத்ததிகாரம் - காண்டிகையுரை.

பார்வை நூல்கள்:

1. நன்னூல் மூலமும் உரையும், புலவர் கோ.வில்வபதி, பழனியப்பா பிரதர்ஸ், சென்னை.
2. நன்னூல் எழுத்ததிகாரம் - தேவிரா உரை (இரா.இராசேந்திரன்) நந்தினி பதிப்பகம், சென்னை.
3. வெள்ளைவாரணன். க., தொல்காப்பியம் நன்னூல் - எழுத்ததிகாரம், மெய்யப்பன் பதிப்பகம், சிதம்பரம் : 2001.
4. சாமுவேல் பிள்ளை, தொல்காப்பிய நன்னூல், கிறிஸ்து மதக்கியான விளக்கச் சங்கத்தார் அச்சுக்கூடம், சென்னை : 1858.
5. சண்முகம். சே.வை., எழுத்திலக்கணக்கோட்பாடு, உலகத்தமிழாராய்ச்சி நிறுவனம், சென்னை.
6. இளங்குமரன். இரா., இலக்கண வரலாறு, மணிவாசகர் பதிப்பகம், சென்னை: 2009.

OUTCOME MAPPING:

CO/PO	P01	P02	P03	P04	P05
C01	3	1	1	2	3
C02	3	2	1	2	2
C03	2	1	2	2	3
C04	3	1	2	2	2
C05	2	1	1	2	3

1-LOW , 2-MEDIUM , 3-HIGH

முதலாம் ஆண்டு- முதற்பருவம்

Part-IV-Skill Based Course - I - (22UTAMS16)

திறன்சார் விருப்பப்பாடம் - தாள் 3 - முதல் பருவம்

தமிழரின் சித்த மருத்துவம்

தரப்புள்ளி - 2,மணி - 3

கற்றலின் நோக்கம்:

1. தமிழரின் மரபு மருத்துவ அறிவில் சிறந்து இருந்துள்ளதை இளையருக்கு உணர்த்துதல்.
2. மறைந்து கொண்டிருக்கும் சித்த மருத்துவத்தை மாணவர்கள் அறிந்து கொள்ளச் செய்தல்.
3. இயற்கைசார் வாழ்வியல் நோய்வராமல் வாழவும், வந்த நோயிலிருந்து மீளவும் பல வழிகளைக் கொண்டுள்ளமையை உணர்த்துதல்.
4. காய்,கனி ,தளிர் மற்றும் மலர்களில் உள்ள மருத்துவத் தன்மையை தெளிவித்தல்.
5. உணவும் வாழ்வியல் நல்லொழுக்கலாறுகளும் நோய் வராமல் காக்கும் காரணிகள் என விளங்கச்செய்தல்.

கற்றலில் விளை பயன்கள்:

1. தமிழரும் தமிழ்நூல்களும் மருத்துவ மூலங்கள் என்பதை தெளிதல்.
2. சித்த மருத்துவம் குறித்து அறிதல்.
3. நோய்க்கான காரணத்தை தாமே அறியும் திறனை அறிய செய்தல்.
4. நோய் நீக்கும் மருந்துகள் குறித்தும் இயற்கையோடு இயைந்து வாழ்வு குறித்தும் அறிதல்.
5. மூலிகைகளின் மகத்துவம் உணர்தல்.
6. பருவ காலங்களுக்கேற்ப வாழ்வியல் முறைகளை அமைத்துக்கொள்ள அறிதல்.

அலகு - 1 சங்க இலக்கியத்தில் மருத்துவம்

நோய் - பிணி - மருந்து - மருத்துவர்கள் - மருத்துவ அறம் - மருந்தாகப் பயன்படும் மரங்கள் - நோய் வகைகளும் தீர்வுகளும் - பசிப்பிணி - குட்ட நோய் - சுரம் - வேது பிடித்தல் - புண்களுக்கான மருத்துவம் - அறுவை மருத்துவம் - வயா நோய் - பூக்கள் வழி மருத்துத்துவம் - கனிகளும் மருத்துவ குணமும்.

அலகு - 2 அறஇலக்கியங்களில் மருத்துவம்

திருக்குறளில் மருத்துவச் செய்திகள் - நாலடியாரில் மருத்துவச் செய்திகள் - திரிகடுகத்தில் மருத்துவச் செய்திகள் - ஆசாரக்கோவையில் மருத்துவம் சார் ஒழுக்கலாறுகள் - உடல் தூய்மை - உள்ளத்தூய்மை - சிறுபஞ்சமூலம் - ஏலாதி - நூல்களில் மருத்துவச் செய்திகள் - ஓளவை நூல்களில் மருத்துவச் செய்திகள்.

அலகு - 3 இடைக்கால இலக்கியங்களில் மருத்துவம்

சித்தர்களும் மருத்துவ முறைகளும் - திருமந்திரத்தில் மருத்துவச் செய்திகள் - திருக்கருவியல் வெளிப்படுத்தும் மருத்துவச் செய்திகள் - சிற்றிலக்கியங்களில் மருத்துவம் - சதக இலக்கியங்களில் மருத்துவச் செய்திகள்.

அலகு - 4 இக்கால இலக்கியங்களில் மருத்துவம்

கவிதைகளில் மருத்துவச் செய்திகள் - புதினங்களில் மருத்துவச் செய்திகள் - சுருந்தீ புதினத்தில் மருத்துவச் செய்திகள் - திரைப்படப் பாடல்களில் மருத்துவச் செய்திகள்.

அலகு – 5 நாட்டுப்புற வழக்காறுகளில் மருத்துவம்

நாட்டுப்புறப் பாடல்களில் மருத்துவச் செய்திகள் - நாட்டுப்புற மருத்துவம் - மந்திர சமய மருத்துவம் - இயற்கை மருத்துவம்.

பாட நூல்கள் :

1. முனைவர் செ. காளிமுத்து, 2021, தமிழ் இலக்கியங்களில் மருத்துவம், அரசு பதிப்பகம், கும்பகோணம் - 1
2. முத்துநாகு. 2018, சுளுந்தி, ஆதி பதிப்பகம், பவித்திரம், திருவண்ணாமலை - 2
3. சு.சக்திவேல், 1993, நாட்டுப்புற இயல் ஆய்வு, மணிவாசகர் பதிப்பகம், சிதம்பரம் -

பார்வை நூல்கள்:

1. மருத்துவர் கு.சிவராமன், - நலம் காக்க வாங்க வாழலாம் நியூ செஞ்சுரி புக ஹவுஸ் (பி) லிட், சென்னை-98.
2. டாக்டர் கோ.மா.கோதண்டம் - இயற்கை உணவும் இயற்கையால் தீரும் நோய்களும் ,கற்பகம் புத்தகாலயம், சென்னை.
3. மருத்துவர் கு.சிவராமன் - ஆறாம் திணை- ஏழாம் அறிவு
4. டாக்டர் ஏ.இராமலிங்கம் - சித்த மருத்துவம் -நோயும் மருந்தும், கற்பகம் புத்தகாலயம், சென்னை.
5. மாதர் நோயும் மருத்துவமும்,டாக்டர் சி.இராமகிருஷ்ணன்,NBH,சென்னை.
6. ஊட்டம் அளிக்கும் உன்னத உணவுகள் - பேரா.செ.நெ.தெய்வநாயகம், பாவை பப்ளிகேஷன்,சென்னை.
7. உணவே மருந்து(நிலமும் திணையும் உணவும்) - டாக்டர் எல்.மகாதேவன்,காலச்சுவடு பதிப்பகம்,சென்னை.
8. சு.திருஞானம், 2003, - மூலிகை மருத்துவம், செல்வி பதிப்பகம், திருச்சி.
9. இரா.முத்துநாகு, 2022, குப்பாமுளி அனுபவ வைத்திய முறை, உயிர் பதிப்பகம்.

OUTCOME MAPPING:

CO/PO	P01	P02	P03	P04	P05
C01	3	2	2	2	2
C02	3	3	2	3	2
C03	2	3	3	2	2
C04	2	3	3	1	1
C05	3	3	2	2	3

1-LOW , 2-MEDIUM , 3-HIGH

முதலாம் ஆண்டு- இரண்டாம் பருவம்-(II- Semester)
Part -III- Core Course -III சிற்றிலக்கியங்கள்; (22UTAMC23)

தரப்புள்ளி- 4 ,மணிநேரம்- 5

கற்றலின் நோக்கங்கள் (LEARNING OBJECTIVES)

- L.O.1.காலந்தோறும் தமிழிலக்கிய வளர்ச்சியின் அடிப்படையில் நாயக்கர்கால தமிழ் இலக்கிய வளர்நிலையை அறிதல்.
- L.O.2.பேரிலக்கியகால நிலைக்கும் சிற்றிலக்கியகால நிலைக்குமான அரசியல் மாற்றங்களை உணர்தல்.
- L.O.3.பேரரசுகளின் உடைபாடுகளில் முளைத்தெழுந்து சிற்றரசுகள் தமிழ்மொழி வளர்ச்சிக்கு எந்நிலையில் துணைநின்றன என்பதை சான்றுகளின் தெளிவித்தல்.
- L.O.4.சமுதாய வர்க்க மற்றும் இனப்பகுப்புப் படிநிலை பகுப்புகளையும் சிக்கல்களையும் அறிதல்.
- L.O.5.இலக்கிய படைப்பாக்கத்தின் புதிய வகைகளையும் உத்திகளை உணர்வித்தல்.

பாடத்தின் வெளிப்பாடுகள்: (COURSE OUTCOME)

- ஊ.மு.1.சிற்றிலக்கியங்கள் காலந்தோறும் கருத்தமைப்பை மாற்றிக்கொள்ள வேண்டியதன் அவசியத்தையும் அதன் உருவாக்க நோக்கத்தின் மாறுபாட்டையும் தெரிந்துகொள்ளல்.
- ஊ.மு.2.சிற்றிலக்கியங்கள் சமுதாய பிரதிநிதிகளின் நேர்மை பண்பாட்டை புகழ்வதற்கு உகந்த ஊடகம் என்பதை விளங்க வைத்தல்.
- ஊ.மு.3.பேரிலக்கியங்களின் சிறுசிறு உள்உறுப்புகளில் சிற்றிலக்கியங்கள் வளர்ச்சி பெற்றிருப்பதை ஆய்ந்தறிய வைத்தல்.
- ஊ.மு.4.அறிவுறுத்தும் இலக்கியங்களைவிட இன்புறுத்தும் இலக்கியமான சிற்றிலக்கியங்களில் அழகியல் தன்மை மிகநெருக்கமான உறவை பெற்றிருப்பதைப் பாடப்பகுதிகளால் புரியவைத்தல்.
- ஊ.மு.5.திரைப்படப் பாடல்களின் படைப்பிற்குச் சிற்றிலக்கியங்கள் அடித்தளம் அமைத்துத் தரக்கூடியவை என்பதை உணரவைத்து அதன்வழி படைப்பாக்கத்திறனை ஊக்குவித்தல்.

தாள்: சிற்றிலக்கியம் (22UTAE 23)

அலகு - 1

1. மீனாட்சியம்மை பிள்ளைத்தமிழ் - அம்புலிப் பருவம் (10 பாடல்கள்)
2. தமிழ் விடுதாது - 1-60 கண்ணிகள் (பிறப்பும், சிறப்பும் உணர்துவன)

அலகு -2

1. திருவரங்கக் கலம்பகம் - பிள்ளைப் பெருமாள் (முதல் 10 பாடல்கள்)
2. சிறிய திருமடல் - முழுவதும்

அலகு -3

1. முக்கூடற்பள்ளு- விடுதலைவிளக்கம்(இளையபள்ளி-மாடுகள்வகைகள்வரை)
2. திருக்குறறாலக் குறவஞ்சி - மலைவளம் பகுதி முழுவதும் (10 பாடல்கள்)

அலகு -4

1. கலிங்கத்துப் பரணி - பேய்பாடியது மட்டும்.
2. மூவருலா - விக்ரமன்சோழன் உலா (1-220 வரிகள்இ முதற்பகுதி மட்டும்)

அலகு -5

1. வீரமாமுனிவர் - திருக்காவலூர் கலம்பகம் - ஊசல் (21 பாடல்கள்)
2. குணங்குடி மஸ்தான் சாகிபு - முஹைதீன் சதகம் (1-10 பாடல்கள்)

பாடநூல்கள் :

1. அலகுகளில் சுட்டப்பட்டள்ள நூல்கள்

பார்வை நூல்கள்:

1. தமிழில்சிற்றிலக்கியவரலாறு,முனைவர்தா.ஈஸ்வரப்பிள்ளை, தமிழ்ப்பல்கலைக்கழகம்,தஞ்சை.
2. தமிழிலக்கியவகைகள்(தொ-2)சா.கிருஷ்ணமூர்த்தி,உலகத்தமிழாராய்ச்சி நிறுவனம்,சென்னை
3. சிற்றிலக்கிய வகைகள்,மு.சண்முகம்பிள்ளை,மணிவாசகர் பதிப்பகம், சென்னை.

OUTCOME MAPPING

CO/PO	P01	P02	P03	P04	P05
C01	3	1	1	2	3
C02	2	2	2	2	3
C03	2	2	1	2	2
C04	3	2	2	2	3
C05	2	1	2	1	2

1-LOW , 2-MEDIUM , 3-HIGH

முதலாம் ஆண்டு- இரண்டாம் பருவம் - (II- Semester)

Part -III-Core Course -IV - (22UTAMC24)

தாள் - இலக்கணம் - 2 நன்னூல் - சொல்லதிகாரம் (காண்டிகையுரை)

(முதன்மைப் பாடம்)

தரப்புள்ளி - 4, மணி - 5

நோக்கம்:

1. நன்னூலின் சொல்லதிகார அமைப்பின் நுட்பங்களை விரிவாகக் கற்பித்தல்
2. தொல்காப்பியச் சொல்லதிகாரப் போக்குடன் ஒப்பிட்டு விளக்கல்
3. பொதுவியல் வழி இலக்கணத்தின் பொது நிலையைக் கற்றல்
4. பெயரியல் அடிப்படையில் பல்வேறு வகையான பெயர்களை கற்பித்தல்
5. வினையின் அடிப்படையில் வினையியல் முழுமையும் கற்பித்தல்

பயன்:

1. சொல்லதிகார அமைப்பின் சிறப்பியல்புகளைக் கற்றல்
2. தொல்காப்பியத் தொன்மை மரபுடன் ஒப்பிட்டு ஒற்றுமை வேற்றுமைகளை அறிதல்
3. பொதுவியல் வழி இலக்கணத்தின் பல்வேறு பொது தன்மைகளை அறிதல்
4. வினை பற்றிய பல்வேறு தகவல்களை கற்றல்

அலகு - 1: பெயரியல்

சொல்லின் பொது இலக்கணம் - மூவகை மொழி - மூவிடம் சொற் பாகுபாடு- இயற் சொல் - திரிசொல் - திசைச்சொல் - வடசொல்; பெயர்ச்சொல்லின் பொது இலக்கணம் -இருதிணைப் பொதுப் பெயர் - தொழிற் பெயரும் வினையாலணையும் பெயரும் - ஆகுபெயர் - வேற்றுமை - உருபு ஏலாப் பெயர்கள் -விளி ஏலாத பெயர்கள்; உருபு மயக்கம் - முதல், சினைப் பெயர்களில் வேற்றுமை உருபு நிற்கும் நிலை போன்ற தலைப்புகள் அடங்கிய பெயரியல் முழுமையும்.

அலகு - 2.: வினையியல்

தெரிநிலை வினையின் பொது இலக்கணம் - குறிப்பு வினையின் பொதுஇலக்கணம் - வினைமுற்றின் இலக்கணம் - தெரிநிலை வினைமுற்றின் பாகுபாடுகள் - இருதிணைப் பொதுவினை - தன்மை ஒருமை வினைமுற்று - தன்மை பன்மை வினைமுற்று - முன்னிலை ஒருமை வினைமுற்று - முன்னிலை பன்மை வினைமுற்று - வியங்கோள் வினைமுற்று - பெயரெச்சத்தின் இலக்கணம் போன்ற தலைப்புகள் அடங்கிய வினையியல் முழுமையும்.

அலகு - 3: பொதுவியல்

ஒன்றொழிப் பொதுச்சொல்- தொகை நிலைத் தொடர் மொழிகள் - வேற்றுமைத் தொகை- வினைத்தொகை- பண்புத்தொகை- உவமைத்தொகை- உம்மைத்தொகை- அன்மொழித்தொகை- தொகாநிலைத்தொடர்கள்- வழு- வழாநிலை - வழுவமைதி- திணைவழுவமைதி- பால் வழுவமைதி - இடவழுவமைதி - கால வழுவமைதி-அறுவகை வினா-அறுவகை விடை- மரபு வழா நிலையும் வழுவமைதியும் - சிறப்புப் பெயர்களின் முன் இயற்பெயர் வருதல் - சுட்டுப்பெயர் வரும் இடம் - அடுக்குத்தொடர் போன்ற தலைப்புகள் அடங்கிய பொதுவியல் முழுமையும்.

அலகு - 4: இடையியல்

இடைச்சொல்லின் பொது இலக்கணம் - இடைச்சொல்லின் பொருள்கள் - ஏகார இடைச் சொல் ஓகார இடைச்சொல் - என, என்று என்னும் இடைச்சொல் - உம் இடைச்சொல் - தில் என்னும் இடைச்சொல்- மன் என்னும் இடைச்சொல் -மற்று தில் என்னும் இடைச்சொற்கள் - கொல் என்னும் இடைச்சொல் - அம்ம என்னும் இடைச்சொல் போன்ற தலைப்புகள் அடங்கிய இடையியல் முழுமையும்.

அலகு - 5: உரியியல்

உரிச்சொல்லின் பொது இலக்கணம் - பண்பின் இலக்கணம் - உயிருடைய பொருள் - உயிர்ப் பொருள்களின் தொழிற் பண்பு - உயிரல் பொருள்களின் குணப்பண்பு - ஒரு குணம் தழுவிய பல உரிச்சொல் - பல குணம் தழுவிய ஓர் உரிச்சொல் போன்ற தலைப்புகள் அடங்கிய உரியியல் முழுமையும்.

பாடநூல்

1. நன்னூல்-சொல்லதிகாரம் (காண்டிகையுரை)

பார்வை நூல்கள்

1. நன்னூல் மூலமும் உரையும், புலவர் கோ.வில்வபதி, பழனியப்பா பிரதர்ஸ், சென்னை.
2. நன்னூல் சொல்லதிகாரம் - தேவிரா உரை (இரா.இராசேந்திரன்) நந்தினி பதிப்பகம், சென்னை.
3. நன்னூல் சொல்லதிகாரம் - ச.திருஞானசம்பந்தம் கதிர் பதிப்பகம், திருவையாறு.
4. வெள்ளைவாரணன். க., தொல்காப்பியம் நன்னூல் - எழுத்ததிகாரம், மெய்யப்பன் பதிப்பகம், சிதம்பரம் : 2001.
5. சாமுவேல் பிள்ளை, தொல்காப்பிய நன்னூல், கிறிஸ்து மதக்கியான விளக்கச் சங்கத்தார் அச்சுக்கூடம், சென்னை : 1858.
6. சண்முகம். சே.வை., எழுத்திலக்கணக்கோட்பாடு, உலகத்தமிழாராய்ச்சி நிறுவனம், சென்னை.
7. சண்முகம். சே.வை., சொல்லிலக்கணக் கோட்பாடு, , உலகத்தமிழாராய்ச்சி நிறுவனம், சென்னை.

OUTCOME MAPPING:

CO/PO	P01	P02	P03	P04	P05
C01	3	1	1	2	3
C02	3	2	1	2	2
C03	2	1	2	2	3
C04	3	1	2	2	2
C05	2	1	1	2	3

1-LOW , 2-MEDIUM , 3-HIGH

மனித உரிமைகள்

பாட நோக்கம்:

தனி மனிதனுடைய உரிமைகள் பற்றி மாணவர்களை அறியச் செடநுதல்.

பயன்கள்:

1. மனித உரிமை பற்றிய புரிதல்.
2. மனித உரிமை வரலாறும் பண்புகளும் அறிதல்.
3. மனித உரிமை ஆணையம் குறித்து அறிதல்.
4. ஒவ்வொரு மனிதர்களுக்கும் உள்ள உரிமைகளைத் தெரிந்து கொள்ளுதல்.
5. போட்டித் தேர்வுகளில் பங்கேற்கும் வாடநுப்பினைப் பெறுதல்.

அலகு-1

மனித உரிமைகள் பொருள் விளக்கம் - இயல்பும் தன்மைகளும் - மனித உரிமைக் கோட்பாடுகள் - மனித உரிமைகளின் வகைகள்.

அலகு-2

மனித உரிமைகளின் வரலாறும் பண்புகளும் - பன்னாட்டு மனித உரிமைகள் பிரகடனம் - வாடிநவியல் மற்றும் அரசியல் உரிமைகள் சார்ந்த பன்னாட்டு உடன்படிக்கை - பொருளாதார, சமூக மற்றும் கலாச்சார உரிமைகள் பற்றிய பன்னாட்டு உடன்படிக்கை.

அலகு-3

தேசிய மனித உரிமைகள் ஆணையம் - மாநில மனித உரிமைகள் ஆணையம் அமைப்பும் செயல்பாடுகளும் - கைது, வாரண்ட் விளக்கம் - கைது செய்யப்பட்டவரின் உரிமைகள்.

அலகு-4

குழந்தைகளின் உரிமைகள் - இளங்குற்றவாளிகள், கொத்தடிமைகள் மற்றும் அகதிகளின் உரிமைகள் - இனப்பாகுபாடு ஒழிப்புக்கான பன்னாட்டு உடன்படிக்கை - சித்ரவதை, பிற கொடுமான மனிதத்தன்மையற்ற நடத்தை மற்றும் தண்டனைகளுக்கு எதிரான உடன்படிக்கை.

அலகு-5

இந்திய மனித உரிமைகள் பாதுகாப்பும் சட்டம் - பெண்ணுரிமை - அகதிகள் உரிமைகள் - மனித உரிமை ஊடகங்களும் சுற்றுச் சூழலும்.

பாடநூல்:

1. முனைவர் ஜே.தியாகராஜன் - 'மனித உரிமைகள்', நிர்மலா பதிப்பகம், மதுரை-1.

பார்வை நூல்கள்:

1. பேரா. இராஜ.முத்திருளாண்டி - 'மனித உரிமைகள்', நியூ செஞ்சரி புக ஹவுஸ் (பி) லிட், 41-பி, சிட்கோ இண்டஸ்டிரியல் எஸ்டேட், அம்பத்தூர், சென்னை-600 098.

2. சு.பொ.அகத்தியலிங்கம் - `மனித உரிமைகள்' , தமிழ்நடுப் புத்தகாலயம், ப்ளாட் எண்:03/8, மாசிலாமணி தெரு, தி.நகர். சென்னை-600 017.

3. வ.நா. விஸ்வநாதன் - `மனித உரிமைகள்' , பாவை பப்ளிகேசன்ஸ், 142, ஜானிஜான்கான் சாலை, இராயப்பேட்டை சென்னை-14.

OUTCOME MAPPING:

CO/PO	P01	P02	P03	P04	P05
C01	3	3	2	3	3
C02	3	2	3	2	3
C03	2	2	2	2	3
C04	3	2	2	1	3
C05	2	3	3	2	3

1-LOW , 2-MEDIUM , 3-HIGH

ANNAMALAI UNIVERSITY
BACHELOR OF ARTS
DEGREE COURSE
B.A. TAMIL
CBCS PATTERN
(With effect from 2021 – 2022)

The Course of Study and the Scheme of Examination

		<i>Course Title</i>								
SEMESTER III								CIA	Uni. Exam	T
1.	I	Language	Paper-3	6	4	தமிழ்/பிறமொழிகள்	25	75	1	
2.	II	English	Paper-3	6	4	ஆங்கிலம்	25	75	1	
3.	III	Core Theory	Paper-5	3	3	இலக்கியம் 3 சமயப்பாடல்களும் சிற்றிலக்கியங்களும்	25	75	1	
4.	III	Core Theory	Paper-6	3	3	இலக்கணம் - 3 யாப்பருங்கலக்காரிகை	25	75	1	
5.	III	ALLIED - 2	Paper-3	7	3	தமிழ் இலக்கிய வரலாறு - 1	25	75	1	
6.	IV	Skill based Subject	Paper-1	3	2	பயன்பாட்டுத் தமிழ்	25	75	1	
7.	IV	Non-major elective	Paper-1	2	2	தமிழ்மொழி - அடிப்படை இலக்கணம்	25	75	1	
Sem. Total				30	21		175	525	7	
SEMESTER IV								CIA	Uni. Exam	T
8.	I	Language	Paper-4	6	4	தமிழ்/பிறமொழிகள்	25	75	1	
9.	II	English	Paper-4	6	4	ஆங்கிலம்	25	75	1	
10.	III	Core Theory	Paper-7	3	3	இலக்கியம் 4 காப்பியங்கள்	25	75	1	
11.	III	Core Theory	Paper-8	3	3	இலக்கணம் - 4தண்டியலங்காரம் (பொருளணியியல் மட்டும்)	25	75	1	
12.	III	ALLIED - 2	Paper-4	7	5	தமிழ் இலக்கிய வரலாறு - 2	25	75	1	
13.	IV	Skill based Subject	Paper-2	3	2	படைப்பிலக்கியமும் மொழிபெயர்ப்பும்	25	75	1	
14.	IV	Non-major elective	Paper-2	2	2	இணையம்	25	75	1	
Sem. Total				30	23		175	525	7	

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Electives	3	3	9	100	300
	Core	15	(3-5)	54	100	1500
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension	1	1	1	100	100
	Total	43		140		4300

அண்ணாமலை பல்கலைக்கழகம்
இளங்கலைப் பட்டப்படிப்பு
தமிழ்

2021-2022 ஆம் கல்வியாண்டு முதல் நடைமுறைப்படுத்தப்படும்

பாடத்திட்டம் (CBCS)
B.A. Tamil Syllabus (CBCS)

இரண்டாம் ஆண்டு
மூன்றாம் பருவம்
சிறப்புப்பாடம்

தாள் - 5

இலக்கியம் - 3

சமயப்பாடல்களும் சிற்றிலக்கியங்களும்

அலகு 1	:	திருஞானசம்பந்தர்	-	கோளறு திருப்பதிகம் (10)
மலைப்பதிகம்		சுந்தரர்	-	திருவதிகை - நொடித்தான்
முன்படைத்தான் (1-10)				தானனை
அலகு 2	:	திருப்பாணாழ்வார்	-	கொண்டல் வண்ணனை (1-10)
		ஆண்டாள்	-	திருப்பாவை (1-10)
அலகு 3	:	பிள்ளைத்தமிழ்	-	மீனாட்சியம்மைப் பிள்ளைத்தமிழ் -
		கலம்பகம்	-	தாலப் பருவம்
			-	திருக்காவலூர்க் கலம்பகம் (1-10)
அலகு 4	:	குமரகுருபரர்	-	சிதம்பர மும்மணிக்கோவை (1-5)
		சிவப்பிரகாசர்	-	சோணசைலமாலை (1-10)
அலகு 5	:	வேதநாயக சாஸ்திரியார்	-	ஞான நொண்டி நாடகம்
			-	பெத்லேகம் குறவஞ்சி
		குணங்குடியார் பாடல்கள்	-	தியானநிலை (1-10)

தாள் - 6

இலக்கணம் - 3

யாப்பருங்கலக்காரிகை

- அலகு 1 : உறுப்பியல் - எழுத்து, அசை, சீர்
அலகு 2 : உறுப்பியல் - தளை, அடி, தொடை
அலகு 3 : செய்யுளியல் - வெண்பா, ஆசிரியப்பா
அலகு 4 : செய்யுளியல் - கலிப்பா, வஞ்சிப்பா, மருட்பா
அலகு 5 : ஒழிபியல்

சார்புப்பாடம் - 2

தாள் - 3

தமிழ் இலக்கிய வரலாறு - 1

- பாடநூல் :** தமிழ் இலக்கிய வரலாறு,
ச. ஈஸ்வரன்
நிர்மலா பதிப்பகம், சென்னை.
- அலகு 1 : சங்க காலம் & சங்க இலக்கியங்கள் (1 – 42)
அலகு 2 : பதினெண்கீழ்க்கணக்கு நூல்கள் முதல் காப்பியங்கள் வரை (43 – 54)
அலகு 3 : இரட்டைக் காப்பியங்கள் முதல் பக்தி இலக்கியங்கள் வரை (65 – 97)
அலகு 4 : இடைக்கால இலக்கிய இலக்கணங்கள் முதல் சிற்றிலக்கியங்கள் வரை (98 – 155)
அலகு 5 : சைவத் திருமடங்களின் தமிழ்த்தொண்டு முதல் வைணவர்களின் தமிழ்த்தொண்டு (159 – 163)

பார்வை நூல்கள் :

1. முனைவர் அ. ஜெயம், : தமிழ் இலக்கிய வரலாறு
சந்திரலேகா வைத்தியநாதன் ஜனகா பதிப்பகம்,
63, தம்பையா சாலை, மேற்கு மாம்பலம்,
சென்னை – 600 003.
2. எம்.ஆர். அடைக்கலசாமி : தமிழ் இலக்கிய வரலாறு,
பால்நிலா பதிப்பகம்,
லயோலா நகர், சென்னை – 600 024.
3. முனைவர். கி. ராசா : தமிழ் இலக்கிய வரலாறு
நியூ செஞ்சுரி புக் ஹவுஸ்
சென்னை – 98

திறன் அடிப்படையிலான விருப்பப்பாடம்

தாள் 1

பயன்பாட்டுத் தமிழ்

- பாடநூல் :** கா. பட்டாபிராமன் - மொழிப் பயன்பாடு,
நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்.,
41-பி, சிட்கோ இன்டஸ்ட்ரியல் எஸ்டேட்,
அம்பத்தூர்.
- அலகு 1 : ஆசிரியர் கடிதம்
- அலகு 2 : அலுவலகம் கடிதம்
- அலகு 3 : விளம்பரத் தமிழ், பதிப்பாசிரியர்
- அலகு 4 : மெய்ப்புத் திருத்தலும் நூலாக்கப் பணியும்
- அலகு 5 : வானொலி, தொலைக்காட்சி நிகழ்ச்சிகளில் பங்குபெறல்,
ஆவணங்கள் வரைதல்.

துறை சாரா விருப்பப்பாடம்

தாள் - 1

தமிழ்மொழி - அடிப்படை இலக்கணம்

- பாடநூல் :** தவறின்றித் தமிழ் எழுத,
மருதூர் அரங்கராசன்,
ஐந்திணைப் பதிப்பகம்,
279, பாரதி சாலை, திருவல்லிக்கேணி, சென்னை-5,
போன் : 044 – 28549410
- அலகு 1 : எப்படி எழுதினால் என்ன (பக். 16 முதல் 39 வரை)
- அலகு 2 : அளவான இலக்கணம் (பக். 40 முதல் 60 வரை)
- அலகு 3 : தொடர் இலக்கணம் (பக். 60 முதல் 95 வரை)
- அலகு 4 : வலிமிகும் இடங்கள் (பக். 97 முதல் 127 வரை)
- அலகு 5 : வலிமிகா இடங்கள் (பக். 128 முதல் 174 வரை)

நான்காம் பருவம்

சிறப்புப்பாடம்

தாள் - 7

இலக்கியம் 4 காப்பியங்கள்

- அலகு 1 : சிலப்பதிகாரம் - புகார்க்காண்டம் - மனையறம்படுத்த காதை, வழக்குரை காதை
- அலகு 2 : மணிமேகலை - பாத்திரம் பெற்ற காதை உதயணகுமார காவியம் (1-40 பாடல்கள்)
- அலகு 3 : பெரியபுராணம் - இளையான்குடி மாறநாயனார் புராணம் முழுவதும்
- அலகு 4 : கம்பராமாயணம் - கும்பகர்ணன் வதைப்படலம்
- அலகு 5 : தேம்பாவணி - பாலமாட்சிப் படலம் முழுவதும் சீறாப்புராணம் - மானுக்குப் பிணை நின்ற படலம்

தாள் - 8
இலக்கணம் - 4
தண்டியலங்காரம்

- பாடநூல்** : தண்டியலங்காரம் (பொருளணியியல் மட்டும்)
- அலகு 1** : தன்மையணி மற்றும் உவமை அணி (1&2 அணிகள்)
- அலகு 2** : உருவக அணி முதல் முன்ன விலக்கணி முடிய (3-6 அணிகள்)
- அலகு 3** : வேற்றுப்பொருள் வைப்பணி முதல் தற்குறிப்பேற்ற அணி முடிய (7-12 அணிகள்)
- அலகு 4** : ஏது அணி முதல் அவநுதி அணி முடிய (13-23 அணிகள்)
- அலகு 5** : சிலேடையணி முதல் பாவிக அணி முடிய (24-35 அணிகள்)

சார்புப்பாடம் - 2

தாள் - 4

தமிழ் இலக்கிய வரலாறு - 2

- பாடநூல்** : தமிழிலக்கிய வரலாறு,
ச. ஈஸ்வரன்
நிர்மலா பதிப்பகம்,
சென்னை.
- அலகு 1** : சித்தர் இலக்கியம் முதல் தமிழகத்தில் வேற்றரசர் ஆட்சி
(164 முதல் 192 வரை)
- அலகு 2** : இஸ்லாமியரின் தமிழ்த்தொண்டு முதல் மறுமலர்ச்சிக்கால
இலக்கியம்
(193 முதல் 207 வரை)
- அலகு 3** : ஐரோப்பியர்களின் தமிழ்ப்பணி முதல் கிறிஸ்தவர்களின்
தமிழ்ப்பணி
(208 முதல் 214 வரை)
- அலகு 4** : இக்கால இலக்கியம் முதல் புலம்பெயர் இலக்கியம்
(215 முதல் 311 வரை)
- அலகு 5** : இணையத்தமிழ் முதல் தமிழும் சாகித்திய அகாடமி விருதுகளும்
(301 முதல் 320 வரை)

திறன் அடிப்படையிலான விருப்பப்பாடம்

தாள் - 2

படைப்பிலக்கியமும் மொழிபெயர்ப்பும்

- அலகு 1 : மரபுக்கவிதை - வெண்பா அல்லது ஆசிரியப்பா
- அலகு 2 : புதுக்கவிதை - 20 அடிகள்
- அலகு 3 : சிறுகதை - குறிப்பிட்ட பொருளில் மூன்று
பக்கங்களில் அமைதல்
- அலகு 4 : ஓரங்க நாடகம் - கொடுக்கப்படும் தலைப்பை ஒட்டி
நான்கு அல்லது ஐந்து பக்கங்களில்
அமைதல்.
- அலகு 5 : மொழிபெயர்ப்பு - 100 சொற்கள் அடங்கிய ஆங்கிலப்
பகுதியைத் தமிழில் மொழிபெயர்த்தல்.

(பொதுவாக மரபுக்கவிதை, புதுக்கவிதை, சிறுகதை, ஓரங்கநாடகம் இவற்றின் இலக்கணம் - அமைப்பு - பாடுபொருள் போன்றவற்றைக் கற்பித்து அதன் பிறகு படைப்புகளுக்கான பயிற்சி அளித்தல் வேண்டும். மொழிபெயர்ப்பின் நுட்பங்கள் மொழிபெயர்ப்பின் வகைகளைக் கற்பித்தல் வேண்டும்)

துறை சாரா விருப்பப்பாடம்

தாள் - 2

இணையம்

- பாடநூல் : இணையமும் இனிய தமிழும்,
முனைவர் க. துரையாசன்,
இணைப்பேராசிரியர் தமிழ்த்துறை,
அரசினர் கலைக்கல்லூரி (தன்னாட்சி), கும்பகோணம்-1.
- இசை பதிப்பகம்,
24,சபரிநகர், டாக்டர் குருமுர்த்தி சாலை,
கும்பகோணம் - 1,
அலைபேசி : 9442426552, தொலைபேசி : 0435 – 2402501.
- அலகு 1 : இணையம் - அறிமுகமும் வரலாறும் - செய்திகளைத் தேடிப் பெறுதல்
-
இணையம் - சொற்பொருள் - தொலைபேசிக் கம்பி வழித் தகவலறியும்
சேவை - வலைப்பின்னல் - முதல் இணையதளம் - தமிழில் முதல்
இணையதளம் - இணையமுகவரி - இணையத்தின் பயன்கள் -
இணைய மாநாடுகள்.
- அலகு 2 : இணையவழித் தமிழ் கற்றலும் கற்பித்தலும் - மரபுசார் கற்பித்தல்
முறைகள் -
ஆசிரியரை மையமாகக் கொண்ட கல்விமுறை - மாணவரை
மையமாகக் கொண்ட கல்வி முறை - இணையவழிக் கற்றலும்
கற்பித்தலும் - பயன்கள் - இணையவழி தமிழ் கற்றல் - கற்பித்தல் -
தமிழ் இணையப் பல்கலைக்கழகம் - கல்வித்திட்டம் - மழலைக்கல்வி
- சான்றிதழ்க்கல்வி - மேல்நிலை -மேற்சான்றிதழ்கள் கல்வி - பட்டயக்
கல்வித்திட்டங்கள் - பட்டப்படிப்பு - இணையவழித் தேர்வு - பாட
வடிவமைப்பு - கணினித்தமிழ்ப் பணிகள் - தொடர்பு மையங்கள்.
- அலகு 3 : மின்னஞ்சலும் மின்நூலகமும் - மின்னஞ்சல் - மின்னஞ்சல் முகவரி -
கடவுச்சொல்
- மின்னஞ்சல் உருவாக்கம் - கவனத்தில் கொள்ள வேண்டியவை -
கலந்துரையாடல் - மின்நூலகம் - தமிழ் இணையப் பல்கலைக்கழக
மின்நூலகம் - இலக்கண நூல்கள் - இலக்கிய நூல்கள் - சமய
இலக்கியங்கள் சிற்றிலக்கியங்கள் - பிற இலக்கியங்கள் - இருபதாம்
நூற்றாண்டு இலக்கியங்கள் (உரைநடை) - கவிதை - மதுரைத்திட்டம்
- இந்திய மொழிகளின் நடுவண் நிறுவனம் போன்றவை.
- அலகு 4 : ஒருங்கு குறியீட்டுமுறை-குறியாக்கமுறை -பிட்முறை - தமிழில் ஒருங்கு
குறியீட்டு
முயற்சிகள் - தமிழ்நெட் 97 - தமிழ்நெட் 99 - எழுத்துருக்கள் - தமிழ்
எழுத்துருக்கள் - இணைய இதழ்கள் - திண்ணை - தமிழ்த்திணை

போன்றவை - இணைய இதழ்களின் நிறை குறைகள் - வலைப்பூ வலைப்பூவும் இணையதளமும் - உருவாக்கம் - தமிழில் வலைப்பூக்கள் தமிழ்ப்பூக்கள் - மானிடன் - திரட்டிகள் - போன்றவை.

அலகு 5 : தமிழ்ப் பல்கலைக்கழகங்கள் - கல்விசார் இணைய தளங்கள் -
கற்பிப்பவை -

நூலகங்கள் - தகவல்களை வழங்குபவை - விக்சிபீடியா - தமிழ்விக்கிபீடியா - மனிதவள மேம்பாட்டுத்துறை - தமிழ்நாடு மாநில உயர்கல்வி மன்றம் - தமிழ்நாடு அறிவியல் மற்றும் தொழில்நுட்ப மன்றம் - உயர்கல்வித்துறை - தமிழ் வளர்ச்சித்துறை - வேலைவாய்ப்பு இணைய தளங்கள் - தமிழ்நாடு அரசுப் பணியாளர் தேர்வாணையம் - மத்திய அரசுப் பணியாளர் தேர்வாணையம் - இந்திய ஆட்சிப்பணி - ஆசிரியர் தேர்வு வாரியம் - இணைய வேலை வாய்ப்பு மையங்கள் வேலை வாய்ப்பகத் தகவல்கள்.

பார்வை நூல்கள் :

1. முனைவர் மு. இளங்கோவன் : இணையம் கற்போம், வயல்வெளிப் பதிப்பகம், இடைக்கட்டு உள்கோட்டை (அஞ்சல்), கங்கைகொண்ட சோழபுரம் (வழி), அரியலூர் மாவட்டம் - 612 901.
2. மு. பழனியப்பன் : கணினியும் இணையமும், மீனாட்சி நூலக வெளியீடு, புதுக்கோட்டை - 622 003.
3. மு. பழனியப்பன் : இணைய உலகம், எஸ்.ரவிச்சந்திரன் பாமா பதிப்பகம், சென்னை - 24.
4. பவானி : இன்றைய வாழ்க்கையின் இணையம், ஜெய்சங்கர் பப்ளிகேஷன்ஸ், 38, நடேச அய்யர் தெரு, தி.நகர், சென்னை - 17.

விரிவாக்க செயல்பாடுகள்

ஆய்வேடு

ஆய்வேடு பணிக்க மேற்கொள்ள வேண்டிய நெறிமுறைகள்:

- ❖ ஆய்வு பற்றிய விளக்கம் அறிதல்
- ❖ ஆய்வுத் தலைப்பு தேர்வு செய்தல்
- ❖ முதன்மைத் துணை ஆதாரங்களைத் திரட்டுதல்.
- ❖ ஆய்வு நெறிமுறைகளை அறிந்து ஆய்வேடு எழுதுதல்.
- ❖ மேற்கோள்களைத் தேர்ந்தெடுத்தல்,
- ❖ ஆய்வுப் பயனை வெளிப்படுத்துதல்,
- ❖ களஆய்வினை மேற்கொள்ளுதல்
- ❖ துணை நூற்பட்டியல் தயாரித்தல்.

THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

DEGREE COURSE

B.A. TAMIL

CBCS PATTERN

(With effect from 2022 – 2023)

PROGRAMME OBJECTIVES:

1. தமிழ் இலக்கியம் படிப்பதால் தாய்மொழி உணர்வு மேம்படும்.
2. தமிழ் பண்பாட்டை மாணவர்களிடம் வளர்க்கவும் மேம்படுத்தவும் முடியும்.
3. தமிழ் இலக்கியம் படிப்பவர்கள் ஆசிரியர், பத்திரிக்கையாளர் முதலான பணிகளுக்கு அதிக வாய்ப்பு கிடைக்கும்.
4. அரசின் போட்டித் தேர்வுகளில் தமிழ் படித்த மாணவர்கள் அதிகம் வெற்றிபெற வாய்ப்பு உருவாகும்.
5. பல வகையான தமிழ் இலக்கியங்களை படிப்பதன் மூலம் நல்ல ஒழுக்கங்களை பின்பற்ற முடியும்.

PROGRAMME EDUCATIONAL OBJECTIVES:

1. தமிழ் இலக்கியம், இலக்கணம் தொடர்பான அறிவை வளர்த்துக் கொள்ளமுடியும்.
2. பிழையில்லாமல் பேசவும், எழுதவும் படைப்பாக்கத்திறனை வளர்த்துக் கொள்ளவும் முடியும்.
3. மேற்படிப்புகளான முதுகலை, கல்வியியல், முனைவர் போன்ற பட்டங்களைப் பெற்று பல்வேறு பணியில் சேர வாய்ப்புகள் உருவாகும்.
4. மாணவர்களின் திறனை மேம்படுத்தவும், சமூக நலனில் அக்கறைக்கொள்ளவும் தேச வளர்ச்சியில் பங்குக் கொள்ளவும் வாய்ப்புகள் உண்டாகும்.
5. உயர்படிப்பிற்கும், பதவிக்கும் தமிழ் படித்தவர்களுக்கு முன்னுரிமை வழங்குவதால் தமிழ் இலக்கியத்தை மாணவர்கள் விரும்பி கற்றுக்கொள்வார்.

PROGRAMME SPECIFIC OUTCOMES:

1. பழந்தமிழர் பண்பாட்டை இளையத் தலைமுறைக்கு எடுத்துரைக்க முடியும்.
2. கல்வெட்டுகள் பற்றிய அறிவைப் பெறுவதால் அந்தத் துறையில் மேற்கொண்டு பயணிக்க முடியும்.
3. தொல்லியல் தொடர்பான ஆழ்ந்த அறிவை பெற்று, அத்துறையில் பணியாற்ற முடியும்.

4. கவிதை, கதை, கட்டுரை போன்ற படைப்பாக்க இலக்கியங்களை விரும்பி கற்பதன் மூலம் படைப்பாளர்களாக மாற்றுவதற்கு வாய்ப்புகள் உருவாகும்.
5. பேச்சுகளை, எழுத்துக்களை, கவிதைகளை போன்றவற்றில் ஆர்வம் அதிகமாகும்.
6. தமிழ் இலக்கிய, இலக்கண நூல்களை விரும்பிக் கற்பதனால் தமிழாந்த அறிஞர்களாக உருவாக முடியும்.
7. தமிழ் புலமை அதிகரிப்பதனால் பல தமிழ் அறிஞர்களிடம் மொழி குறித்த விவாதங்கள் செய்ய முடியும்.
8. சமூக ஊடகங்களான செய்தித்தாள், தொலைக்காட்சி போன்ற துறைகளில் தங்களை ஈடுபடுத்திக் கொள்ள முடியும்.
9. தமிழ் இலக்கியங்கள், இலக்கணங்கள் தொடர்பான கோட்டுபாட்டு அடிப்படையில் ஆய்வுகள் செய்ய முடியும்.
10. தமிழின் மேன்மையை தமிழ் கூறும் நல் உலகிற்கு எடுத்துரைக்கலாம்.

PROGRAMME OUTCOMES:

1. தமிழில் அடிப்படை இலக்கணத்தைக் கற்றுக் கொள்ள முடியும்.
2. பத்திரிக்கை துறையில் வல்லுனராக பணியாற்ற முடியும்.
3. திரைத்துறைகளில் பங்கேற்று புகழ்பெற முடியும்.
4. தமிழ் அறிவை கற்பதனால் நல்ல கவிஞராக வலம் வரலாம்.
5. சிறுகதை, நாவல் போன்ற இலக்கியத் துறைகளால் எழுத்தாளராக வரலாம்.
6. கல்வித்துறையில் ஆசிரியர், பேராசிரியர் போன்ற பணிகளில் திறம்பட செயல்பட முடியும்.
7. அரசுத்துறைகளில் தமிழ் கற்றதனால் பணிகளில் சேர வாய்ப்புகள் அதிகம் கிடைக்கும்.
8. மொழியியல் அறிஞராக பல ஆய்வுகளை மேற்கொள்ள முடியும்.

SEMESTER V						CIA	Uni. Exam	Total	
31.	III	Core Theory	Paper-9	5	4	சங்க இலக்கியம் (அகம்)	25	75	100
32.	III	Core Theory	Paper-10	6	5	இலக்கணம் 5 (அகம்)	25	75	100
33.	III	Core Theory	Paper-11	6	4	தமிழ்மொழி வரலாறு	25	75	100
34.	III	Core Theory	Paper-12	6	4	இலக்கியத் திறனாய்வு	25	75	100
35.	III	Elective	Paper-1	4	3	(கீழ்க்கண்ட மூன்றில் ஏதேனும் ஒன்றைத் தெரிவுசெய்துகொள்ளலாம்) அ. தகவல் தொழில்நுட்பம் ஆ. நாட்டுப்புறவியல் இ. விளம்பரக்கலை	25	75	100
36.	IV	Skill based Subject	Paper-2	3	2	தொல்லியல்	25	75	100
TOTAL				30	22		150	450	600

S. No.	Part	Study Components		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER VI									
37.	III	Core Theory	Paper-13	5	4	சங்க இலக்கியம் (புறம்)	25	75	100
38.	III	Core Theory	Paper-14	5	4	இலக்கணம் 6 (புறம்)	25	75	100
39.	III	Core Theory	Paper-15	5	4	திராவிட மொழிகளின் ஒப்பிலக்கணம்	25	75	100
40.	III	Compulsory Project	Paper-16	5	5	Group / Individual Project	25	75	100
41.	III	Elective	Paper-2	4	3	(கீழ்க்கண்ட மூன்றில் ஏதேனும் ஒன்றைத் தெரிவுசெய்துகொள்ளலாம்) அ. இதழியல் ஆ. புத்தக பதிப்பியல் இ. தமிழ் உரைநடை வரலாறு	25	75	100
42.	III	Elective	Paper-3	4	3	(கீழ்க்கண்ட மூன்றில் ஏதேனும் ஒன்றைத் தெரிவுசெய்துகொள்ளலாம்) அ. தமிழர் அழகுக் கலைகள் ஆ. பெண்ணியம் இ. சுற்றுலாவியல்	25	75	100
43.	IV	Skill based Subject	Paper-3	2	2	தகவல் தொடர்பியல்	25	75	100
44.	V	Extension Activities		0	1	விரிவாக்கச் செயல்பாடுகள்	100	-	100
45.		NMSDC III : Employability Readiness		0	0	(choose any one) • Naandi • Unnati • Quest • Izpay • IBM Skills build	-	-	
TOTAL				30	26		250	450	700

ஐந்தாம் பருவம்

சிறப்புப்பாடம் - தாள் 9

இலக்கியம் - 5 சங்க இலக்கியம் (அகம்)

- அலகு 1 : நற்றிணை - 1 - 15 வரை
- அலகு 2 : குறுந்தொகை - 1 - 25 வரை
- அலகு 3 : கலித்தொகை - பாலைக்கலி - முதல் 5 பாடல்கள்
மருதக்கலி - முதல் 5 பாடல்கள்
- அலகு 4 : அகநானூறு - களிற்றியானை நிரை 1 - 10 வரை
- அலகு 5 : பத்துப்பாட்டு - நெடுநல்வாடை

தாள் 10

இலக்கணம் - 5

பாடநூல் : நம்பியகப்பொருள்

- அலகு 1 : அகத்திணையியல்
- அலகு 2 : களவியல் - பாங்கியற்கூட்டம் முடிய
- அலகு 3 : களவியல் - பகற்குறி முதல் வரைவிடை வைத்துப்
பொருள்வயிற் பிரிவு முடிய
- அலகு 4 : வரைவியல்
- அலகு 5 : கற்பியல், ஒழிபியல்

தாள் 11

தமிழ்மொழி வரலாறு

பாடநூல் : தமிழ்மொழி வரலாறு,
டாக்டர் சு. சக்திவேல்,
மணிவாசகர் பதிப்பகம்,

8/7, சிங்காரத்தெரு, பாரிமுனை,
சென்னை – 600 108.

- அலகு 1 : தோற்றுவாய்
பழங்காலத் தமிழ்
- அலகு 2 : இடைக்காலத் தமிழ்
- அலகு 3 : தற்காலத் தமிழ்
கல்வெட்டுத் தமிழ்
- அலகு 4 : தமிழில் பிறமொழிக் கலப்பு
தமிழ்க் கிளைமொழிகள்
தமிழ்ச் சொற்பொருள் மாற்றம்
- அலகு 5 : தமிழ்த் தொடரியல்
தமிழ் வரிவடிவம்

தாள் 12

இலக்கியத் திறனாய்வு

பாடநூல் : இலக்கியத் திறனாய்வியல்,
தா.ஏ. ஞானமூர்த்தி,
ஐந்திணைப் பதிப்பகம்,
279, பாரதி சாலை மாடியில்,
திருவல்லிக்கேணி, சென்னை – 600 005.

- அலகு 1 : இலக்கிய ஆய்வு முதல் இலக்கியக்கலை வரை
- அலகு 2 : இலக்கிய உணர்ச்சி முதல் மானிட உண்மை வரை
- அலகு 3 : வடிவம் முதல் பாட்டு வரை
- அலகு 4 : காப்பியம் முதல் நனவோடை புதினம் வரை
- அலகு 5 : சிறுகதை முதல் இலக்கிய இயக்கங்கள் வரை

பார்வை நூல்கள் :

1. டாக்டர் சு. பாலச்சந்திரன் : இலக்கியத் திறனாய்வு, நியூ செஞ்சரி புக் ஹவுஸ் பி. லிட்., 41-பி, சிட்கோ இன்டஸ்ட்ரியல்ஸ் லிமிடெட், அம்பத்தூர், சென்னை.
2. டாக்டர் மு. வரதராசன் : இலக்கியத்திறன், பாரிநிலையம், 184, பிராட்வே, சென்னை.
3. அ.ச. ஞானசம்பந்தம் : இலக்கியக்கலை, கழக வெளியீடு, சென்னை - 600 108.
4. முனைவர் கே. பழனிவேலு : கோட்பாட்டியல் திறனாய்வுகள், அகரம், மனை எண்-1, நிர்மலா நகர், தஞ்சாவூர் - 613 007.

விருப்பப்பாடம் - 1

தாள் 1

- அ. தகவல் தொடர்பியல்
ஆ. நாட்டுப்புறவியல்
இ. விளம்பரக்கலை

குறிப்பு : மேற்கண்ட மூன்று விருப்பப் பாடங்களில் ஏதேனும் ஒன்றைத் தெரிவு செய்து கொள்ளலாம்.

தகவல் தொடர்பியல்

பாடநூல் : முனைவர் கி. இராசா - மக்கள் தகவல் தொடர்பியல் அறிமுகம், பாவை பப்ளிகேஷன்ஸ், 142, ஜானிஜான்கான் சாலை, இராயப்பேட்டை, சென்னை - 600 014.

- அலகு 1 : கொள்கைகளும் கோட்பாடுகளும்

- அலகு 2 : தகவல் தொடர்புச் சாதனங்கள்
- அலகு 3 : வானொலி
- அலகு 4 : தொலைக்காட்சி, திரைப்படம்
- அலகு 5 : விளம்பரம்

ஷ
பார்வை நூல்கள் :

1. வே. தயாளன், வ. ஜெயா மக்கள் தகவல் தொடர்பியல், ஜெயா பதிப்பகம், கோயம்புத்தூர் - 1998.
2. முனைவர் மு. கோமதி, தகவல் தொடர்பு ஊடகங்களில் இலக்கியச் செல்வாக்கு மோகன் முகில் பதிப்பகம், 10, தண்டபாணி நகர், கோண்டூர், கடலூர்-2.
3. வெ. கிருஷ்ணமூர்த்தி, தகவல் தொடர்பியல், மணிவாசகர் பதிப்பகம், சென்னை, 1991.
4. வெ. நல்லதம்பி, தொலைக்காட்சியும் பிறதகவல் துறைகளும், வள்ளுவன் வெளியீட்டகம், திருவான்மியூர், சென்னை - 41, 1990.

ஆ. நாட்டுப்புறவியல்

- அலகு 1 : நாட்டுப்புறவியல் வரலாறு - விளக்கம் - நாட்டுப்புறவியல் - சமூகவியல் - மானுடவியல் - உளவியல் நோக்கு - நாட்டுப்புற இலக்கியமும் ஏட்டிலக்கியமும் - பழமொழிகள் - விடுகதைகள் - புராணக்கதைகள்.
- அலகு 2 : நாட்டுப்புறவியல் வளர்ச்சி வரலாறு - தொல்காப்பியம் குறிப்பிடும் பண்ணத்தி, பிசி, புலன் சங்க இலக்கியங்களின் வள்ளைப்பாட்டு முதலியன. சிலப்பதிகாரத்தின் வரிப்பாடல்கள் - குரவைப்பாட்டு - திருவாசகத்தின் திருப்பொற்சுண்ணம் முதலானவை - சிறநிலக்கிய வகைகளின் வளர்ச்சி - தாயுமானவர் - இராமலிங்கர் - பாரதியார் - பாரதிதாசன் ஆகியோர் பாடல்களில் நாட்டுப்புறப் பாடல்களின் வடிவங்கள்.
- அலகு 3 : ஏட்டிலக்கியத்திற்கும் வாய்மொழி இலக்கியத்திற்கும் இடையே உள்ள ஒற்றுமை
- வேற்றுமைகள் - பழக்க வழக்கங்கள் - நாகரிகமும் பண்பாடும் - சமய உணர்ச்சி - வாழ்க்கைநெறி போன்றவை - நாட்டுப்புறக் கலைகள் - கூத்து - ஆட்டம் - நடனம் - கும்மி - கோலாட்டம்.

அலகு 4 : நாட்டுப்புறப் பாடல்கள் - வகைகள் - குழந்தைப் பாடல்கள் - தொழில் பாடல்கள் - விளையாட்டுப் பாடல்கள் - கொண்டாட்டப் பாடல்கள் - உணர்ச்சிப் பாடல்கள் - இழவு - சடங்குப் பாடல் முதலானவை.

அலகு 5 : நாட்டுப்புறப் பாடல்கள் பாடும் நேரமும் இடமும் - வடிவங்கள் - மெட்டுகள் - இசையொலிகள் - பாநலம் - வருணனை - உவமை - கற்பனை - நீதிகள் முதலியன - நாட்டுப்புறக் கதைகள் - வகைகள் - கதைப்பாடல்கள் முதலியன.

பாடநூல் :

சு. சக்திவேல் : நாட்டுப்புற இயல் ஆய்வு, மணிவாசகர் பதிப்பகம், 12-ஆ, மேலசன்னதி வீதி, சிதம்பரம்-1.

பார்வை நூல்கள்

1. சு. சண்முக சுந்தரம் : நாட்டுப்புற இயல், மணிவாசகர் பதிப்பகம், 8/7, சிங்கர் தெரு, பாரிமுனை, சென்னை-108.
2. ஆறு. அழகப்பன் : நாட்டுப்புறப் பாடல்கள் - திறனாய்வு, கழக வெளியீடு, 79, பிரகாசம் சாலை, சென்னை-1.
3. ஆறு. இராமநாதன் : நாட்டுப்புறவியல் ஆய்வுகள், மணிவாசகர் பதிப்பகம், சிதம்பரம் - 608 001.

இ. விளம்பரக்கலை

பாடநூல் : விளம்பரக்கலை, ச. ஈஸ்வரன், இரா. சபாபதி.

அலகு 1 : விளம்பரம் - விளக்கங்கள் - விளம்பரத்தின் இயல்புகள் - அறிவிப்பும் விளம்பரமும் - விளம்பரத்தின் தன்மைகள் - விளம்பர எல்லை - விளம்பர நோக்கங்கள் - விளம்பர வரலாறு - குறிக்கோள்கள்.

அலகு 2 : **விளம்பர வகைகள், விளம்பரத்தின் பயன்கள்**

- 1) விளம்பரங்களின் வகைகள்
- 2) விளம்பர தளங்களைத் தேர்ந்தெடுக்கும் பொழுது கவனிக்கப்பட வேண்டியவை
- 3) விளம்பரத்தினால் உற்பத்தியாளர்கள் அடையும் நன்மைகள்
- 4) விளம்பரத்தினால் நுகர்வோர் அடையும் நன்மைகள்
- 5) விளம்பரத்தினால் அரசும் பிற நிறுவனங்களும் அடையும் நன்மைகள்

6) விளம்பரத்தினால் சமூகம் அடையும் நன்மைகள்

அலகு 3 : விளம்பர நெறிகள்

- 1) விளம்பர ஒழுக்க நெறிகள்
- 2) தடை செய்யப்பட்ட விளம்பரங்கள்
- 3) விளம்பரத்திற்கான சில விதிமுறைகள்
- 4) விளம்பர வரைவின் அடிப்படைத் தத்துவங்கள்

அலகு 4 : விளம்பரப் பணிகள், விளம்பரத்தின் தாக்கம்

- 1) விளம்பரத்தின் பணிகள்
- 2) விளம்பர நிறுவனங்கள்
- 3) விளம்பர அறங்கள்
- 4) விளம்பரத்தின் தாக்கம்
- 5) அகநிலை

அலகு 5 : விளம்பர மேம்பாடு

- 1) விளம்பரங்களின் மொழிநிலை
- 2) விளம்பர உத்திகள்
- 3) விளம்பரம் தொடர்பான சட்டங்கள்

தாள் 3

திறன் அடிப்படையிலான விருப்பப்பாடம் - 3

தொல்லியல்

பாடநூல் : தொல்லியல்
டாக்டர் ஜே. தியாகராஜன்
பாவை பதிப்பகம், மதுரை.

அலகு 1 : தொல்லியலின் பொருள் விளக்கம் - தொல்லியலும் பிற பாடங்களும் - தொல்லியல் பிரிவுகள் - தொல்லியலாரின் பணிகள் - தொல்லியலின் பயன்கள்.

அலகு 2 : தொல்லியலின் வரலாறு - தொல்லியல் கோட்பாடுகள் - இந்தியாவில் தொல்லியல் - இந்தியாவின் தொன்மைக்காலம் - மேற்பரப்புக் கள ஆய்வு - ஆய்வு நோக்கங்கள் -இடத்தேர்வு - வழிமுறைகள்- மேற்பரப்புக் கள ஆய்வுக்குறிப்புகளைப் பதிவு செய்தல் - மேற்பரப்புக் குள ஆய்வும் அறிவியலும்.

- அலகு 3 : அழகாய்வுப் பணியாளர்கள் - அகழாய்வுக்கான கருவிகளும் துணைக் கருவிகளும்- அகழாய்வு நெறிமுறைகள் - அகழாய்வு முறைகள்- ஆய்வுப் பொருட்கள் பதிவு முறைகள் - காலக்கணிப்பு முறைகள்.
- அலகு 4 : அகழாய்வும் அதன் தொடர்புடைய பிற அறிவியல்களும் - தொல் பொருட்கள் பாதுகாப்பு வழிமுறைகள் தொல்லியல் துறை அருங்காட்சியகங்கள் - தொல்லியல் ஆய்வினைத் தொகுத்து எழுதுதல் - ஆய்வு முடிவினை வெளியிடுதல்.
- அலகு 5 : தொல் எழுத்துக்கள் - இந்தியப் பிராமி கல்வெட்டுகளின் தோற்றம் - தமிழ் பிராமி எழுது பொருட்கள் - கல்வெட்டாய்வாளர்கள் - கல்வெட்டுகள் கல்வெட்டின் வகைகள் - நாணயங்களின் தோற்றம் - இந்திய நாணயங்கள் - தமிழக கோயிற் கட்டடக் கலை.

ஆறாம் பருவம்

சிறப்புப்பாடம் - தாள் 13

இலக்கியம் - 6 சங்க இலக்கியம் (புறம்)

- அலகு 1 : பதிற்றுப்பத்து - மூன்றாம் பத்து
- அலகு 2 : புறநானூறு - பாடல் எண். 51 முதல் 65 வரை (மொத்தம் 15 பாடல்கள்)

- அலகு 3 : பரிபாடல் - 2 பாடல்கள்
1. மாயோயே மாயோயே எனத் தொடங்கும் பாடல்
மூன்றாம் பாடல் - திருமால்
2. பாயிரும் பனிக்கடல் பார்த்துகள் படப்புக்கு எனத் தொடங்கும் ஐந்தாம் பாடல் (செவ்வேள் 81 அடிகள்)
- அலகு 4 : பத்துப்பாட்டு - சிறுபாணாற்றுப்படை
- அலகு 5 : திருக்குறள் - 10 அதிகாரங்கள்
அறத்துப்பால் 11 முதல் 15 வரை
பொருட்பால் 51 முதல் 55 வரை

தாள் 14

இலக்கணம் - 6

பாடநூல் : புறப்பொருள் வெண்பாமாலை – பாடாண் படலம் முடிய

அலகு 1 : வெட்சிப்படலம், கரந்தைப்படலம்

அலகு 2 : வஞ்சிப்படலம், காஞ்சிப்படலம்

- அலகு 3 : நொச்சிப்படலம், உழிஞைப்படலம்
அலகு 4 : தும்பைப்படலம், வாகைப்படலம்
அலகு 5 : பாடாண்படலம்

தாள் 15

திராவிட மொழிகளின் ஒப்பிலக்கணம்

பாடநூல் : திராவிட மொழிகளின் ஒப்பிலக்கணம்,
திராவிட மொழிகள் - 1 & 2
டாக்டர் ச. அகத்தியலிங்கம்,
மணிவாசகர் பதிப்பகம்,
31, சிங்கர்தெரு, பாரிமுனை, சென்னை – 600 108.

- அலகு 1 : திராவிட மொழிகள் (5-ஆம் பகுதி நீங்கலாக) முதல் திராவிட மொழிக்

கல்வெட்டுகள் வரை

- அலகு 2 : திராவிடமொழி இலக்கணங்கள்
தமிழ்மொழி இலக்கணங்கள் முதல் முத்துவீரியம் வரை
- அலகு 3 : திராவிடமொழிகள் - 2ஆம் பகுதி
1) மொழியும் மாற்றங்களும் முதல் ஒப்பியல் வரை
- அலகு 4 : திராவிடமொழியியல் வரலாறு முதல் ழ வரை
- அலகு 5 : பெயர்ச்சொல் முதல் திராவிடமொழிகளில் எண்ணுப்பெயர்கள் வரை

விருப்பப்பாடம் - 2

தாள் 2

- அ. இதழியல்
ஆ. புத்தகப் பதிப்பியல்
இ. தமிழ் உரைநடை வரலாறு

குறிப்பு : மேற்கண்ட மூன்று விருப்பப் பாடங்களில் ஏதேனும் ஒன்றைத் தெரிவு செய்து கொள்ளலாம்.

அ. இதழியல்

- அலகு 1 : இதழியல் : விளக்கம் - இதழ்களின் பணிகளும் பொறுப்புகளும் - இதழ்கள் வகைகளும் இயல்புகளும் - மக்களாட்சியில் இதழியல் - இதழ்களின் சுதந்திரம் - இதழ்களின் நடத்தையறக் கோட்பாடுகள் - இதழியல் தொழில் வாய்ப்புகள்
- அலகு 2 : இதழியல் வளர்ச்சி வரலாறு - தமிழகத்தில் இதழியல் வளர்ச்சி - பத்திரிகைச் சட்டங்கள் - பத்திரிகை மன்றம் - இதழ்கள் தொடங்குவதற்குரிய வழிமுறை செய்தித்தாள் நிர்வாக அமைப்பு.
- அலகு 3 : செய்தியாளர் - செய்தி - செய்தியின் உள்ளடக்கங்கள் - செய்தி திரட்டுதல் - செய்தி நிறுவனங்கள் - பேட்டி - குற்றச் செய்திகள் - பல்வேறு வகையான செய்திகள் - செய்திகளும் சிறப்புத் தனி இயல்புகளும் - படங்களும் இதழ்களும்.
- அலகு 4 : செய்திகளைச் செப்பனிடுதல் - நுட்பங்கள் - ஆசிரியர் - செய்தி ஆசிரியர் - துணை ஆசிரியர்கள் - செய்தியின் கட்டமைப்பு - பக்க வடிவமைப்பு - அச்சுப்படி திருத்துதல் - பக்க வடிவமைப்பு - அச்சுப்படி திருத்துதல் - அச்சுப்பிழை திருத்தக் குறியீடுகள் - இதழியல் கலைச் சொற்கள்.
- அலகு 5 : இதழியல் மொழிநடை - தலையங்கம் - சிறப்புத் தனிக் கூறுகள் - திறனாய்வு - இதழ்களில் எழுதுவது எப்படி? - இதழ்களில் விளம்பரம் - தற்காலத் தமிழ் இதழ்களின் எழுச்சியும் வீழ்ச்சியும் - நல்ல இதழ்கள் : எவை, எப்படி?.

பார்வை நூல்கள் :

1. டாக்டர் கு. முத்துராசன் : இதழியல் வளர்ச்சியும் மொழிபெயர்ப்பும், ஐந்திணைப் பதிப்பகம், அஞ்சல் பெட்டி எண்.2989, 279, பாரதி சாலை மாடியில், (பைகிராப்ட்ஸ் சாலை), திருவல்லிக்கேணி, சென்னை - 600 005.
2. இரா. கோதண்டபாணி : இதழியல், கற்பக நூலகம், 21 அ. ஆசாரி தெரு, தல்லாகுளம், மதுரை - 625 002.
3. முனைவர் வி.தமிழ்ச்செல்வன் : இதழியல்
4. டாக்டர் தங்கமணியன் : பத்திரிகையியல், மாணிக்கம் பதிப்பகம், மாணச கங்கோத்தரி, மைசூர் - 570 006.

ஆ. புத்தகப் பதிப்பியல்

பாடநூல் :

புத்தகக் கலை - முனைவர் அ. விநாயகமூர்த்தி,
பாலமுருகன் பதிப்பகம்,
63, புதுத்தெரு, செங்குட்டை, காட்பாடி - 632 007,
வேலூர் மாவட்டம், போன் : 0416 - 2295247

அலகு 1

: புத்தகம் - வகைகள் - பதிப்பு - வகைகள் - தழுவலும் மொழிபெயர்ப்பும் -
மலிவுப்பதிப்பு - அகராதிகள் - கலைச்சொல் அகராதி - கொள்ளைப் பதிப்பு.

அலகு 2

: ஏட்டுச் சுவடிப் பதிப்பு - புத்தகம் பெயர்க்காரணம் - சில சிறப்பு நூலகங்கள் -
எழுது கருவிகள் - ஏட்டுப் பிரதிகளின் வகைகள் - மூலத்தை முடிவு செய்தல்
- பாடத்திருத்தம்.

- அலகு 3 : பதிப்பாசிரியர் - பதிப்புக்குழு - பதிப்பாசிரியரின் பொறுப்புகள் - தகுதிகள் - சுருக்கக் குறியீட்டு விளக்கம் - நிறுத்தக்குறிகள் - சந்தி பிரித்தல் - அகர நிரல் - மொழி நடை படங்கள் - பதிப்பும் சட்டமும்.
- அலகு 4 : அச்சகம் - அச்சத் தொழில் வரலாறு - ஈ புக்ஸ் இன்டர்நெட் பத்திரிகை - அச்சகங்களின் வகைகள் - அச்ச எழுத்துகளின் வடிவம் - அச்சக் கோத்தல் - அச்சடித்தல் - அச்சிடும் முறைகள் - காகிதம் - காகிதச் சோதனை - அச்ச மைகள் - பட அச்ச - கணினி அச்ச.
- அலகு 5 : புத்தக உறுப்புகள் - பதிப்புரிமைப் பக்கம் முதலாயின - புத்தக வடிவம் - பக்க
எண்கள் - மெய்ப்புப்படி திருத்துதல் - திருத்தக் குறியீடுகள் - பைண்டிங் வகைகள் - வெளியிடுபவர் - புத்தகத் தயாரிப்பு நிர்வாகம் - எழுத்துரிமைத் தொகை - ஒப்பந்தம் - பதிப்புரிமை - விற்பனையாளர் வாணிக நிபந்தனைகள் - பன்னாட்டுத் தரப்புத்தக எண் (ISBN) பொது நூலக இயக்ககம் - விற்பனை வழிகள் கண்காட்சிகள் - பொருட்காட்சிகள்.

பார்வை நூல்கள் :

1. மா.சு. சம்பந்தன், : அச்சுக்கலை, தமிழர் பதிப்பகம், சென்னை, 1960.
2. அ. ஆலிஸ், : மக்கள் தகவல் தொடர்பியல் கலைச்சொல் அகராதி, மதுமதி பப்ளிகேஷன்ஸ், திருச்சி, 1955.
3. மா.பா. குருசாமி : இதழியல் கலை, குருதேமொழி பதிப்பகம்,
4. எஸ். ராஜம் (பதி) : சந்தி குறியீட்டு விளக்கம், மர்ரே அண்டு கம்பெனி, சென்னை, 1958.
5. ஜெ. பெர்னான்டஸ், : கம்ப்யூட்டர் புரோக்ராம்மிங் & அப்ளிகேஷன்ஸ், என். வெங்கடசாமி மூன் பப்ளிஷர்ஸ், மதுரை, 1998.

இ. தமிழ் உரைநடை வரலாறு

பாடநூல் : தமிழ் உரைநடை வரலாறு
வி. செல்வநாயகம்,
குமரன் புத்தக இல்லம்,
குமரன் காலனி, சென்னை- 26,
மறுபதிப்பு, 2000.

- அலகு 1 : **சங்க காலம்**
1. தமிழ்ச் செய்யுளின் ஆரம்பநிலை
 2. உரைநடை ஆரம்பம்
 3. சிலப்பதிகாரத்திலுள்ள உரைநடை
 4. இசைநாடகத் தமிழும் உரையும்

5. தொல்காப்பியம் குறிக்கும் உரைநடை வகை

அலகு 2 :

களவியலுரைக் காலம்

1. களவியலுரைக் கால நூல்கள்
2. களவியலுரையிலுள்ள இருவகை நடை
3. பாரத வெண்பாவிலுள்ள உரைநடை
4. சாசனத் தமிழ் உரைநடை
5. மணிப்பிரவாள நடையின் தோற்றம்

அலகு 3 :

உரையாசிரியர்களின் காலம்

1. உரை வளர்ச்சிக்குரிய காரணம்
2. உரை வகுத்த ஆசிரியர்கள்
3. உரையாசிரியர்கள் கையாண்ட நடைவகை
4. சாசனத்தமிழ் உரைநடை
5. மணிப்பிரவாள நடை

அலகு 4 :

ஐரோப்பியர் காலம்

1. உரைநடையில் உண்டான மாற்றம்
2. ஐரோப்பியர் வகுத்த உரைநடை
3. பழைய மரபு தழுவிய உரைநடை
4. ஆறுமுக நாவலரும் இக்கால உரைநடையும்
5. 19-ஆம் நூற்றாண்டிலிருந்த பிற உரைநடை வகைகள்

அலகு 5 :

இருபதாம் நூற்றாண்டு

1. தனித்தமிழ் நடை
2. மறுமலர்ச்சி நடை
3. உரையும் நடையும், உரைநடையும்

ஆறாம் பருவம்

விருப்பப்பாடம் - 1

தாள் 1

அ. தமிழர் அழகுக் கலைகள்

ஆ. பெண்ணியம்

இ. சுற்றுலாவியல்

குறிப்பு : மேற்கண்ட மூன்று விருப்பப் பாடங்களில் ஏதேனும் ஒன்றைத் தெரிவு செய்து கொள்ளலாம்.

அ. தமிழர் அழகுக் கலைகள்

பாடநூல் : தமிழர் வளர்த்த அழகுக் கலைகள்,
மயிலை சீனி. வேங்கடசாமி,
NCBH
41, பி, சிட்கோ இண்டர்ஸ்ரீஸ்,
அம்பத்தூர், கிண்டி, சென்னை - 58.

அலகு 1 : அழகுக்கலை - கட்டடக்கலை - குகைக் கோயில்கள் - கற்றளிகள் - மரக்
கட்டடங்கள் - செங்கற்கட்டடங்கள் - பாறைக் கோயில்கள் போன்றவை
(பக். 1 முதல் 46 வரை)

அலகு 2 : சிற்பக்கலை - சிற்பம் அமைக்கும் பொருள்கள் - இரண்டு வகைச் சிற்பங்கள் -
கல்லும் உலோகமும் - யவன நாட்டுச் சிற்பமும் நமது நாட்டுச் சிற்பமும் -
ஓவியக்கலை (பக். 47 முதல் 86 வரை)

அலகு 3 : கூத்துக்கலை - காவியக்கலை - பதினோர் ஆடல் - பரத நாட்டியம் - காவியப்
புலவனும் ஓவியக்கலைஞனும் சிந்தாமனர் - சூளாமணி - தேவாரம் -
இராமாயணம் முதலியன (பக். 87 முதல் 161 வரை)

அலகு 4 : நாடகக்கலை - நாடக நூல்கள் - நாடக இலக்கணம் - ஒன்பதுசுவை - நடிப்பு
-
நாடகக் கலையின் மறுமலர்ச்சி போன்றவை (பக்.162 முதல் 194 வரை)

அலகு 5 : கலைகளைப் போற்றும் - கடற்கரைகோயில் - பல்லவர் சோழர் கோயில்கள் -
மேல்நாட்டாரின் கலை ஆர்வம் - வேலூர் மண்டபம் - சிற்பங்கள்
(பக்.195 முதல் 237 வரை)

பார்வை நூல்கள் :

1. முனைவர் பாக்யமேரி காலந்தோறும் தமிழர் கலைகள்,
அறிவுப் பதிப்பகம்,
142, ஜானிஜான்கான் ரோடு,
சென்னை - 14.
2. திரு.வி. கலியாணசுந்தரனார் தமிழர் கலை,
பாரிநிலையம்,
59, பிராட்வே, சென்னை - 1.
3. க.சி. கமலையா தமிழகக் கலை வரலாறு,
மணிவாசகர் பதிப்பகம்,
55, லிங்கி தெரு, சென்னை.

ஆ. பெண்ணியம்

- பாடநூல் :** பெண்ணியம்,
முனைவர் இராம. பிரேமா,
உலகத் தமிழாராய்ச்சி நிறுவனம்,
டி.டி.டி.ஐ. (அஞ்சல்), தரமணி, சென்னை - 600 113.
- அலகு 1 :** பெண்ணியம் - சொற்பொருள் விளக்கம் - பெண்ணியத்தின் தோற்றமும்
வளர்ச்சியும் - 1970-75 ஆம் ஆண்டுகளில் பெண்ணிய வளர்ச்சி முதலானவை
(பக். 1 முதல் 33 வரை)
- அலகு 2 :** எண்பதுகளில் பெண்ணியம் - பெண்ணியத்தின் எதிர்காலம் - பெண்ணிய
வகைகள் முதலானவை. (பக். 33 முதல் 55 வரை)
- அலகு 3 :** குடும்ப அமைப்பு - பால்தன்மை - பெண்ணின் வரலாறு - தீவிரவாதப் பெண்ணிய

வாதிகளின் செயற்பாடுகள் - பெண்ணியக் கோட்பாட்டாளர்கள் - பெண்ணிய நூல்கள் (பக். 56 முதல் 75 வரை)

அலகு 4 : மகளிரியல் கல்வி - பெண்ணிய இயக்கத் திறனாய்வு - மொழியும் உளவியல் பகுப்பாய்வும் - மார்க்சியப் பெண்ணியம் (பக். 6 முதல் 96 வரை)

அலகு 5 : இந்தியப் பெண்ணிய வரலாறு - இந்தியப் பெண்களின் கூட்டமைப்பு - இந்திய தேசிய பெண்கள் குழு - அகில இந்திய பெண்கள் மாநாடு முதலானவை (பக். 96 முதல் 117 வரை)

பார்வை நூல்கள் :

1. டாக்டர் முத்துச் சிதம்பரம் பெண்ணியம் தோற்றமும் வளர்ச்சியும், தமிழ்ப்புத்தகாலயம், சிவப்பிரகாசம் தெரு, தி. நகர், சென்னை.
2. பேராசிரியர் நா. ஜெயபாலன் பெண்ணியம் ஓர் ஆய்வு, மோகன் பதிப்பகம், 4, பாரதி சாலை, திருவல்லிக்கேணி, சென்னை - 5.

இ. சுற்றுலாவியல்

பாடநூல் : சுற்றுலாவியல்
டாக்டர் ஜே. தியாகராஜன்
டாக்டர் மா. காந்திதாசன்
பாவைப்பதிப்பகம்,
மதுரை.

அலகு 1 : சுற்றுலாவியல் அறிமுகம் - அமைப்பாளர்கள் (Organizers), வழிகாட்டிகள் (Guides), பணிகள் (Tourists) பற்றிய செய்திகள்.

அலகு 2 : பண்டைக் காலச் சுற்றுலாப் பயணிகள் (யுவான் சுவாங் பாஹியான் மார்க்கோ போலோ) மூவரின் பயண அனுபவக் குறிப்புகள்.

அலகு 3 : சுற்றுலாப் பயன்கள் (அறிவு வளர்ச்சி - பொருளாதார வளர்ச்சி, வேலை வாய்ப்பு)

அலகு 4 : தமிழகத்தின் புகழ்மிக்க தலங்கள் மாமல்லபுரம் - சிற்பக் கலை - தஞ்சைப் பெரிய கோயில் - கட்டடக் கலை, சித்தன்னவாசல் - ஓவியக்கலை.

அலகு 5 : தமிழகத்தில் சுற்றுலா வளர்ச்சிக்கான வாய்ப்புகள் (தமிழகச் சுற்றுலாத் துறையின் செயற்பாடும் வளர்ச்சிப் பயன்களும்)

பார்வை நூல்கள் :

1. மா. இராசசேகர், சுற்றுலாவியல், கொங்குப் பதிப்பகம், பாண்டியன் நகர், சின்னாண்டான் கோயில், கரூர்.
2. முனைவர் ச. ஈஸ்வரன், சுற்றுலாவியல், பாவை பப்ளிகேஷன்ஸ், 142, ஜானி ஜான்கான் சாலை, இராயப்பேட்டை, சென்னை - 14, போன் : 28482441.
3. வெ. கிருட்டிணமூர்த்தி, சுற்றுலா வளர்ச்சி மணிவாசகர் பதிப்பகம், பாரிமுனை, சென்னை -18.

தாள் 4

திறன் அடிப்படையிலான விருப்பப்பாடம் - 4

தகவல் தொடர்பியல்

பாடநூல் : முனைவர் கி. இராசா – மக்கள் தகவல் தொடர்பியல் அறிமுகம், பாவை பப்ளிகேஷன்ஸ், 142, ஜானிஜான்கான் சாலை, இராயப்பேட்டை, சென்னை – 600 014.

அலகு 1 : கொள்கைகளும் கோட்பாடுகளும்

அலகு 2 : தகவல் தொடர்புச் சாதனங்கள்

- அலகு 3 : வானொலி
அலகு 4 : தொலைக்காட்சி, திரைப்படம்
அலகு 5 : விளம்பரம்

பார்வை நூல்கள் :

1. வே. தயாளன், வ. ஜெயா மக்கள் தகவல் தொடர்பியல், ஜெயா பதிப்பகம், கோயம்புத்தூர் - 1998.
2. முனைவர் மு. கோமதி, தகவல் தொடர்பு ஊடகங்களில் இலக்கியச் செல்வாக்கு மோகன் முகில் பதிப்பகம், 10, தண்டபாணி நகர், கோண்டூர், கடலூர்-2.
3. வெ. கிருஷ்ணமூர்த்தி, தகவல் தொடர்பியல், மணிவாசகர் பதிப்பகம், சென்னை, 1991.
4. வெ. நல்லதம்பி, தொலைக்காட்சியும் பிறதகவல் துறைகளும், வள்ளுவன் வெளியீட்டகம், திருவான்மியூர், சென்னை - 41, 1990.

விரிவாக்க செயல்பாடுகள்

ஆய்வேடு

ஆய்வேடு பணிக்க மேற்கொள்ள வேண்டிய நெறிமுறைகள்:

- ❖ ஆய்வு பற்றிய விளக்கம் அறிதல்
- ❖ ஆய்வுத் தலைப்பு தேர்வு செய்தல்
- ❖ முதன்மைத் துணை ஆதாரங்களைத் திரட்டுதல்.
- ❖ ஆய்வு நெறிமுறைகளை அறிந்து ஆய்வேடு எழுதுதல்.
- ❖ மேற்கோள்களைத் தேர்ந்தெடுத்தல்,

- ❖ ஆய்வுப் பயனை வெளிப்படுத்துதல்,
- ❖ களஆய்வினை மேற்கொள்ளுதல்
- ❖ துணை நூற்பட்டியல் தயாரித்தல்.

ANNAMALAI UNIVERSITY – AFFILIATED COLLEGES
301 M.A. TAMIL

Programme Structure and Scheme of Examination (under CBCS)

(Applicable to the candidates admitted in Affiliated Colleges from the academic year 2022 -2023 onwards)

Course Code	Study Components & Course Title	Hours/Week	Credit	Maximum Marks		
				CIA	ESE	Total
SEMESTER – I						
22PTAMC11	Core Course-I: இக்கால இலக்கியம்	5	4	25	75	100
22PTAMC12	Core Course-II: தொல்காப்பியம் எழுத்த்திகாரமும் மொழியியலும்	5	4	25	75	100
22PTAMC13	Core Course-III : சிற்றிலக்கியம்	5	4	25	75	100
22PTAMC14	Core Course-IV: இந்திய இலக்கியம்	5	4	25	75	100
22PTAME15	Core Elective-I:	5	3	25	75	100
22PTAMO16	Open Elective-I:	5	3	25	75	100
Total		30	22			600
SEMESTER – II						
22PTAMC21	Core Course - V: சமய இலக்கியம்	6	4	25	75	100
22PTAMC22	Core Course - VI: தொல்காப்பியம் சொல்லதிகாரமும் மொழியியலும்	6	4	25	75	100
22PTAMC23	Core Course - VII: ஆராய்ச்சி நெறிமுறைகள்	6	4	25	75	100
22PTAMC24	Core Course – VIII: கலைச்சொல்லாக்கம்	5	3	25	75	100
22PTAME25	Core Elective - II:	5	3	25	75	100
22PFLDC26	Field Study	-	3	25	75	100
22PHUM27	Compulsory Course: Human Rights	2	2	25	75	100
Total		30	23			700

List of Core Electives

[Internal Elective for Same Major Students]

(Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22PTAME15-1	ஒப்பிலக்கியம்	5	3	25	75	100
	22PTAME15-2	சைவசித்தாந்தம்	5	3	25	75	100
	22PTAME15-3	அகராதியியல்	5	3	25	75	100
II	22PTAME25-1	பெண்ணியம்	5	3	25	75	100
	22PTAME25-2	சுவடியியல்	5	3	25	75	100
	22PTAME25-3	பொருண்மையியல்	5	3	25	75	100

List of Open Electives

[External Elective for Other Major Students – Inter/Multi Disciplinary Courses]

(Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22PTAMO16-1	தமிழ்ப் பண்பாட்டு வரலாறு	5	3	25	75	100
	22PTAMO16-2	இசைத்தமிழ்	5	3	25	75	100
	22PTAMO16-3	அறிவியல் தமிழ்	5	3	25	75	100

படிப்பின் பயன் (Programme Objectives)

- PO1 : இலக்கியங்கள் உணர்த்தும் மானுட பண்பாட்டு வாழ்வியல் விழுமியங்களைக் கற்றறிந்து ஆளுமை மிக்க மானுடராகத் தம்மைத் தகமைத்துக்கொள்வர்.
- PO2 : இலக்கிய இலக்கணங்களைக் கற்றறிவதன் மூலம் மொழிப்புலமை வாய்ந்த மொழியாளுமை மிக்கவராக மாற்றம் கொள்வர்.
- PO3 : பண்மொழி இலக்கிய அறிவினைப் பெற்று சமத்துவ / ஒற்றுமை உணர்வினைப்பெறுவர்.
- PO4 : படப்பாக்கத்திறனோடு கூடிய சமூகத்தைப் பிரதிபலிக்கும் படைப்பிலக்கியங்களைப் படைத்தளிப்பர்.
- PO5 : மொழி இலக்கிய வல்லுநராய்த் தன்னைத் தகவமைத்துக்கொண்டு தொழில் முனைவோராகவும் பணி வாய்ப்புப் பெறுபவராகவும் தன்னை உருவாக்கிக் கொள்வர்.

முதுகலைத் தமிழ்
(தெரிவு சார் தரப்பள்ளி முறையுடன் கூடிய பாடத்திட்டம்)
(இணைப்புக் கல்லூரிகளுக்கானது)
(2022 -23 ஆம் கல்வி ஆண்டு முதல்)
22PTAMC11 இக்கால இலக்கியம்

முதல் பருவம்

4 தரப்பள்ளி

முதன்மைப்பாடம் - 1

5 மணி நேரம்

பாட நோக்கம் :

1. கவித்துவ மொழியின் ஆளுமைத்திறனை அறிவார்.
2. சமூக அடித்தள மக்கள் வளர்ச்சிப் பதிவுகளின் மேன்மைகளை அறிவார்.
3. படைப்புகள் வழி மனித உறவுகளின் தகவுகளை அறிவார்.
4. கலை வெளிப்பாட்டுத் திறனை அறிவார்.
5. இலக்கியப் பதிவுகளைத் தற்கால மொழி வழி அறிவார்.

அலகு - 1: மரபுக்கவிதை

பாரதியார் - கண்ணன் பாட்டு (தோழன், தாய், தந்தை, சேவகன், அரசன், சீடன், சற்குரு, குழந்தை, காதலன் (தூண்டிற் புழுவினைப் போல்...), காதலி (பின்னே வந்து கண் மறைத்தல்))

பாரதிதாசன் - தமிழியக்கம் (நெஞ்சு பதைக்கும் நிலை, இருப்பதைவிட, வரிப்புலியே, மங்கையர் முதியோர் எழுக, வாணிகர், அரசியல் சீர் வாய்ந்தார் (1), புலவர் (1), குடும்பத்தார், கோயிலார், அறத்தலைவர், விழாநடத்துவோர், மாணவர்)

வாணிதாசன் - கொடிமுல்லை (முழுவதும்)

சேஷாசலம் - ரப்பர் மரத்துக்கு ரணங்கள் புதிதல்ல (1-75 விருத்தங்கள்)

வெண்ணிலா - ஆதியில் சொற்கள் இருந்தன (முழுவதும்)

அலகு - 2: புதினம்

இரா.முருகவேள் - மிளிர்கல்

ச.சுபாஷ் சந்திரபோஸ் - கூத்தாயி

அலகு - 3: சிறுகதை

வண்ணதாசன் - கலைக்க முடியாத ஒப்பனைகள் (6-15)

ஹரணி - அப்பா (முழுவதும்)

அலகு - 4: நாடகம்

கு.வெ.பாலசுப்பிரமணியம் - கயற்கண்ணி

கே.ஏ.குணசேகரன் - பலி ஆடுகள்

அலகு - 5: உரைநடை

நாஞ்சில் நாடன் - பாடுக பாட்டே (எல்லோர்க்கும் ஒவ்வொன்று எளிது, வள்வரவு வாழ்வார்க்கு உரை, முன்னின்று கல் நின்றவர், மருதம் வீற்றிருக்கும் மாதோ, மூப்பும் குறுகிற்று, வசைபாட காளமேகம், எவ்வுருவோ நின் உருவம், கொட்டிக்கிழங்கு, கட்டம், ஈயாத புல்லர் என்னும் தலைப்பிலான கட்டுரைகள் மட்டும்)

இரா.ஜெகதீசன் - இலக்கியப் புதுப்புனல் (முழுவதும்)

பாடப்பயன்கள்

1. முற்கால, இக்காலப் படைப்பு வெளியின் இணைப்பை உணர்ந்து அறிவர்.
2. மக்கள் வாழ்வியல் பதிவுகளை வெளிப்படுத்தும் பாங்கினைத் தெரிந்து தெளிவர்.
3. சமூக நிலைப்பேற்றுக்குக் காரணமான மனித உறவு மேம்பாட்டினை உணர்ந்து பயன்கொள்வர்.
4. சமூகம் சார் பதிவுகளைக் கலை இலக்கியப் பிரதியாக வெளிப்படுத்தும் பாங்கினை அறிவர்.
5. எழுத்தின் வெளிப்பாட்டு உத்திகளையும் வலிமையையும் உணர்ந்து எழுதிப் பழகுவர்.

பாட நூல்கள்

1. ம.ரா.போ.குருசாமி (ப.ஆ.) 1987, பாரதி பாடல்கள் (ஆய்வுப்பதிப்பு), தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர் - 10.
2. பாரதிதாசன், 2005, தமிழியக்கம், பாவை பப்ளிகேஷன்ஸ், சென்னை - 14.
3. மகரந்தன், 2014, வாணிதாசன் கவிதைத் திரட்டு, சாகித்திய அகாதமி, புதுதில்லி - 110001.
4. சேஷாசலம், 2004, ரப்பர் மரத்துக்கு ரணங்கள் புதிதல்ல, மணிவாசகர் பதிப்பகம், சென்னை -108.
5. வெண்ணிலா, 2008, ஆதியில் சொற்கள் இருந்தன, அகநி வெளியீடு, வந்தவாசி - 604408.

6. இரா.முருகவேள், 2014, மிளிர்கல், ஐம்பொழில் பதிப்பகம், கோயமுத்தூர்
7. ச.சுபாஷ் சந்திரபோஸ், 2015, கூத்தாயி, இயல் பதிப்பகம், தஞ்சாவூர் - 1.
8. வண்ணதாசன், 2016, கலைக்க முடியாத ஒப்பனைகள், சந்தியா பதிப்பகம், சென்னை- 76.
9. ஹரிணி, 2020, அப்பா, கே.ஜி.பப்ளிகேஷன்ஸ், தஞ்சாவூர்- 2
10. கு.வெ.பாலசுப்பிரமணியம், 2003, கயற்கண்ணி, அனூராதா ஏஜென்சீஸ், கும்பகோணம் - 612605.
11. கே.ஏ.குணசேகரன், 2012, பலி ஆடுகள், நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை -
12. நாஞ்சில் நாடன், 2020, பாடுக பாட்டே, விஜயா பதிப்பகம், கோயமுத்தூர் - 1
13. இரா.ஜெகதீசன், 2010, இலக்கியப் புதுப்புனல், குறிஞ்சிப் பதிப்பகம், மதுரை - 8

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	3	2	2	3	2
CO3	3	2	2	3	2
CO4	3	2	3	3	2
CO5	3	2	3	3	2

22PTAMC12 தொல்காப்பியமும் மொழியியலும்
(எழுத்ததிகாரம்)

முதல் பருவம்

4 தரப்புள்ளி

முதன்மைப்பாடம் - 2

5 மணி நேரம்

பாட நோக்கம் :

1. தமிழ் எழுத்துக்களின் பெயரீடு முறைகள் சொற்களின் கட்டுமானம் முதலியவற்றைப் புரிந்து கொள்வர்.
2. தமிழ் எழுத்துக்களின் பிறப்பு முயற்சிகளையும் கூட்டுச் சொற்கள் உருவாக்கத்தின் அடிப்படைகளையும் அறிந்து கொள்வர்.
3. புணர்ச்சியில் எழுத்துக்களும் சொற்களும் தொகையாகவும் உருபாகவும் சொற்கட்டுமானத்தின் அடிப்படையாக அமையும் பொழுது ஏற்படும் மாற்றங்கள் குறித்துத் தெளிவடைவர்.
4. புணர்ச்சியில் மெய்யெழுத்துக்களும் குற்றியலுகர எழுத்துக்களும் ஊடாடும் பொழுது எழுதும் திரிபுகளைத் தெளிவு கொள்வர்.
5. தொல்காப்பியரின் எழுத்தியல் சிந்தனைகள் மேனாட்டு அறிஞர்களின் ஒலியனியல் கோட்பாடுகளின் முன்னோடி என்பதை உணர்வர்.

அலகு - 1

நூன்மரபு - மொழி மரபு

அலகு - 2

பிறப்பியல் - புணரியல்

அலகு - 3

தொகை மரபு - உருபியல் - உயிர் மயங்கியல்

அலகு - 4

புள்ளி மயங்கியல் - குற்றியலுகரப் புணரியல்

அலகு - 5

ஒலியனியல்

ஒலியியல் வகைகள் - ஒலிப்பியல் - ஒலியியக்கவியல் - ஒலியுணர்வியல் - ஒலி பிறப்பு முறை - பேச்சுறுப்புகள் - உயிரொலிகள் - உயிர் முக்கோணம் - தமிழ் உயிரொலிகள் - மெய்யொலிகள் - வகைகள் - தமிழ் மெய்யொலிகள் - வெடிப்பொலி - மூக்கொலி - மருங்கொலி - ஆடொலி - வருடொலி - ஆய்த ஒலி - ஒலியனியல் விளக்கம் - ஒலியன்களைக் கண்டறியும் கோட்பாடுகள் - தமிழ்

ஒலியன்கள் - உயிர் ஒலியன் - மெய்யொலியன் - மாற்றொலி - ஒலியன்கள் வரைமுறை - மேனிலை ஒலியன்கள்.

பாடப்பயன்கள் :

1. தமிழ் எழுத்துக்களின் பெயரீடு முறைகளைக் காரண காரியத்துடன் அறிந்து மகிழ்வர்.
2. தமிழ் எழுத்துக்களின் பிறப்பியல் முயற்சிகளின் செயல்பாடுகளை அறிவு அடிப்படையிலும் செயல் முறை நிலையிலும் புரிந்து கொள்ள முடியும்.
3. சொற்களின் சேர்க்கையின் பொழுது ஏற்படும் தோன்றல், திரிதல், கெடுதல் என்னும் முத்திறக்கோட்பாடுகளை உய்த்தறிவர்.
4. சொற்சேர்க்கையில் எழுத்துக்களின் நிலைப்பாட்டால் ஏற்படும் மாற்றங்களைத் தமிழ் மொழிக்கொள்கையின் அடிப்படைகளைக் கற்றறிவர். தமிழர் அறிவு தொன்மையனது உயர்வானது என்பதை எழுத்துப் பிறப்பியல் கோட்பாடுகள் வழி உணர்வர்.

பாட நூல்கள் :

1. தொல்காப்பியம், எழுத்ததிகாரம், இளம்பூரணர், 1979, சைவ சித்தாந்த நூற்பதிப்புக்கழகம், சென்னை.
2. டாக்டர் சு.ராஜாராம், 1981, ஒலியியல், அனைத்திந்திய தமிழ் மொழியியற் கழகம், அண்ணாமலை நகர்.
3. கு.பரமசிவம், 2012, இக்கால மொழியியல், அடையாளம் பதிப்பகம், திருச்சி.
4. சா.வளவன், 2013, பொது மொழியியல், 269/4ஏ இரமணியம், துவாரகா அடுக்ககம், எட்டாவது பிரதான சாலை அண்ணா நகர், சென்னை - 40

பார்வை நூல்கள் :

1. தொல்காப்பியம் மூலமும் உரையும், 2022, கு.வெ.பாலசுப்பிரமணியன் (உ.ஆ.), நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை - 50
2. தொல்காப்பியம் சொல்லதிகாரம், 2012, ச.பாலசுந்தரம் (உ.ஆ.), பெரியார் பல்கலைக்கழகம், சேலம் - 11
3. தொல்காப்பியம் சொல்லதிகாரம், 2022, ச.சுபாஷ் சந்திர போஸ் (உ.ஆ.), இயல் பதிப்பகம், தஞ்சாவூர் -1

4. முனைவர் கி.செம்பியன், 2013, தொல்காப்பிய எழுத்ததிகார நச்சினார்க்கினியர் உரை எடுத்துக் காட்டுகளின் பகுப்பு முறை, திங்கள் பதிப்பகம், செம்பனார்கோவில் -609309
5. இரா.அறவேந்தன், ம.லோகேஸ்வரன், 2017, தொல்காப்பியம் எழுத்ததிகாரம் நச்சினார்க்கினியர் உரை (உரை மொழி ஒப்பீட்டு ஆய்வு) நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்; சென்னை - 600098.
6. ஆ.சிவலிங்கனார், தொல்காப்பிய இயல்களின் உரைவள நூல்கள், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை - 600113.
7. செ.வை.சண்முகம், 1980, எழுத்திலக்கணக் கோட்பாடு, அனைத்திந்திய தமிழ் மொழியியல் கழகம், சிதம்பரம் - 608602
8. சூ.இன்னாசி, 2009, எழுத்தியல், பாரதி புத்தகப் பண்ணை, சென்னை
9. த.பரசராமன், க.இரவிசங்கர், 2012, சங்க இலக்கியம் எழுத்து சொல் மரபுகள், புதுச்சேரி மொழியியல் பண்பாட்டு ஆராய்ச்சி நிறுவனம், புதுச்சேரி. -8
10. டாக்டர் ரா.சீனிவாசன், 2016, தொல்காப்பியம் மொழியியல், தமிழ் வளர்ச்சி இயக்ககம், சென்னை - 600008.
11. முனைவர் சண்முக செல்வ கணபதி, 2016, தமிழ் மொழியியல், ராஜா பதிப்பகம், திருச்சிராப்பள்ளி - 23
12. முனைவர் ஞானம், 2017, மொழியியல் தோற்றமும் வளர்ச்சியும், சாரதா பதிப்பகம், சென்னை- 600014

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	3	3	2	3	2
CO3	3	3	2	3	2
CO4	3	3	2	3	2
CO5	3	3	2	3	2

22PTAMC13 சிற்றிலக்கியம்

முதல் பருவம்

4 தரப்புள்ளி

முதன்மைப்பாடம் - 3

5 மணி நேரம்

பாட நோக்கம் :

1. இலக்கியத் தொடர்ச்சியையும் விரிவையும் அறிவர்.
2. இலக்கியத்திற்கும் சமூக உறவிற்குமான தொடர்பை அறிவர்.
3. வாழ்வியல் விழுமியங்களை அறிவர்.
4. மொழி ஆளுகையை அறிவர்.
5. படைப்பிலக்கியப் பயிற்சி பெறுவர்.

அலகு - 1

சேரமான் பெருமாள் நாயனார் - பொன் வண்ணத்து அந்தாதி (81-100 பாடல்கள் - தறிதாய யயன்றலை முதல் - மாயனன் மாமணி வரை)

ராய.சொக்கலிங்கன் - காந்தி பிள்ளைத்தமிழ் (வருகை, அம்புலிப் பருவங்கள் மட்டும்)

அலகு - 2

செயங்கொண்டார் - கலிங்கத்துப்பரணி

(தேவியைப் பாடியது, பேய்களைப் பாடியது மட்டும்).

பாந்தளூர் வெண்கோழியார் - காக்கை விடு தூது (முழுவதும்)

அலகு - 3

ஒட்டக்கூத்தர் - விக்கிரம சோழன் உலா - (1-51 கண்ணிகள் வரை)

சவரிமுத்து உடையார் - சேசநாதர் சதகம் - 1-20 பாடல்கள்

அலகு - 4

குமரகுருபரர் மதுரைக்கலம்பகம் (1-20 பாடல்கள் மணிகொண்ட முதல் பல்லார் உயிர்க்கு உயிர் வரை)

எஸ்.மோட்சக்கண் - சிலுவைத் திருமொழிப்பதிகம் (முதலாம் திருமொழி,

இரண்டாம் திருமொழி - 20 பாடல்கள்)

அலகு - 5

சிவப்பிரகாச சுவாமிகள் - சோணசைல மாலை (1-25 பாடல்கள்)

குணங்குடி மஸ்தன் சாகிபு - பராபரக்கண்ணி, எக்காலக்கண்ணி
(முழுவதும்)

பாடப்பயன்கள் :

1. இடையறாது வளர்ந்து வரும் இலக்கிய வகைமை வரலாற்றைத் தெரிந்து தெளிவர்.
2. பிற்காலச் சமூக நிலைபேற்றில் இலக்கியங்களின் பங்களிப்பை உணர்ந்து கொள்வர்.
3. மக்கள் வாழ்க்கையும் இலக்கியங்களின் பாடு பொருளும் இரண்டறக் கலப்பதைப் புரிந்து கொள்வர்.
4. மொழிப் பயன்பாட்டில் சொற்பொருள் மாற்றங்களைத் தெரிந்து கொள்வர்.
5. படைப்பாற்றல் திறனைப் பெறுவர்.

பாட நூல்கள் :

1. சேரமான் பெருமாள் நாயனார், 2010, பொன்வண்ணத்து அந்தாதி, கதிர்முருகு உரையுடன், சாரதா பதிப்பகம், சென்னை - 14.
2. ராய சொக்கலிங்கன், 1924, காந்தி பிள்ளைத்தமிழ், தனவைசிய ஊழியன் அச்சகம், காரைக்குடி
3. செயங்கொண்டார், 1965, கலிங்கத்துப்பரணி, பெ,பழனிவேல் பிள்ளை உரையுடன், கழகம், சென்னை- 108.
4. பாந்தனூர் வெண்கோழியார், 2022, காக்கை விடு தூது, முனைவர் கி.சிவா (உரையும் பதிப்பும்), லட்சுமிப் பதிப்பகம், மதுரை - 3
5. ஒட்டக்கூத்தர், விக் கிரம சோழன் உலா, சரசுவதி மகால் நூலகம், தஞ்சாவூர் - 1.
6. முனைவர் ஜி.ஜான் சாமுவேல், 2014, கிறித்துவச் சிற்றிலக்கியத் திரட்டு, ஆசியவியல் நிறுவனம், சென்னை - 119.
7. குமரகுருபரர், 2016, மதுரைக் கலம்பகம், கதிர்முருகு உரையுடன், சாரதா பதிப்பகம், சென்னை - 14.
8. சிவப்பிரகாச சுவாமிகள், 1994, சோணசைலமாலை, உரையுடன், பொம்மபுர ஆதீன வெளியீடு, மயிலம்.
9. குணங்குடி மஸ்தான் சாகிபு, குணங்குடியார் பாடற்கோவை, நேஷனல் பப்ளிகேஷன்ஸ், சென்னை -17.

OUTCOME MAPPING

	P01	P02	P03	P04	P05
C01	3	3	3	3	2
C02	3	3	3	3	2
C03	3	3	3	3	2
C04	3	3	3	3	2
C05	3	3	3	3	2

22PTAMC14 - இந்திய இலக்கியம்
(மொழிபெயர்ப்பு இலக்கியங்கள்)

முதல் பருவம்

4 தரப்புள்ளி

முதன்மைப்பாடம் - 4

5 மணி நேரம்

பாட நோக்கம்:

1. ஒருமைப்பாட்டு உணர்வைப் பெறுவர்.
2. தொல்மொழி தொடங்கி தற்கால அதிகார மொழி வரையிலான படைப்பாக்க மாற்றங்களை அறிவர்.
3. இலக்கிய பாரம்பரிய மொழிகளின் வெளிப்பாட்டுத் திறன்களை அறிவர்.
4. கருத்துப் புலப்பாட்டுக்கும் மொழி ஆளுகைக்குமான தொடர்பை அறிவர்.
5. வாழ்வியல் விழுமியக் கூறுகளை அறிவர்.

அலகு : 1 இந்திய இலக்கியம் :

சமஸ்கிருத இலக்கிய வரலாறு - இந்தி இலக்கிய வரலாறு - வங்க இலக்கிய வரலாறு - மராத்தி இலக்கிய வரலாறு - தெலுங்கு இலக்கிய வரலாறு - கன்னட இலக்கிய வரலாறு - மலையாள இலக்கிய வரலாறு - உருது இலக்கிய வரலாறு.

அலகு : 2 சமஸ்கிருதம், இந்தி

பர்த்ருஹரி, சபாஷிதம் (50 பாடல்கள்) - கற்றோர் பெருமை, நல்லோர் இயல்பு, பெண்ணின் கீர்த்தி, கால மகிமை, பற்றறுத்தல் (பாக்கள்)

ஹிந்திச் சிறுகதைத் தொகுப்பு, ஜைனேந்திர குமார், சரஸ்வதி ராம்நாத் (மொ.ஆ), சாகித்திய அகாதமி வெளியீடு, (1-11 சிறுகதைகள் - சவக்கோடி முதல் அல்லாவின் ராமன் வரை) (சிறுகதை)

அலகு : 3 வங்கம், மராத்தி :

1. இரவிந்திரநாத் தாகூர் - கீதாஞ்சலி, புவியரசு (மொ.ஆ) (நெடுங்கவிதை)
2. லட்சுமணன் மானே - உபாரா அன்னியர், எஸ்.பாலசந்திரன் (மொ.ஆ) (புதினம்)

அலகு : 4 தெலுங்கு, கன்னடம் :

தும்மல ராமகிருஷ்ணா - மஹாவித்துவான் - கா.மாரியப்பன் - மொ.ஆ - (சிறுகதை)

கிரிஷ்கர்னாட், பலிபீடம், பாவண்ணன் (மொ.ஆ) காவ்யா வெளியீடு, சென்னை (நாடகம்)

அலகு : 5 மலையாளம், உருது :

அம்பிகாசுதன் மாங்காடு, என் மகஜே: சிற்பி பாலசுப்பிரமணியன் (மொ.ஆ),
(புதினம்)

விஸ்வநாத் பிரதாப்சிங், ஒரு துளி பூமி ஒரு துளி வானம், த.சி.க. கண்ணன்
(மொ.ஆ.) (கவிதை)

பாடப்பயன் :

1. இலக்கியங்களின் வழி ஒருமைப்பாட்டுப் பாலம் உருவாவதைப் புரிந்து கொள்வர்.
2. மொழிகளுக்கிடையேயான படைப்பு வெளி கருத்தியல் மாற்றங்களைக் கற்றறிவர்.
3. படைப்பு வெளியில் உயர்ந்து நிற்கும் இலக்கிய ஆளுமைகளைக் கற்றுத்தெளிவர்.
4. கருத்தியல் வளர்ச்சிகளுக்கான சமூகக் காரணிகளை உற்றுநோக்கி அறிவர்.
5. மக்களுக்கும் இலக்கியத்திற்குமான உறவினை அறிவர்.

பாட நூல்கள் :

1. இந்திய இலக்கிய மலர், 1974, தில்லி தமிழ்ச்சங்க 22ஆவது சுடர் மலர்.
2. ஏ.ஜி.வேங்கடாச்சாரி, 2016, இன்றைய இந்திய இலக்கியம், சாகித்திய அகாதமி, புது தில்லி - 110001.
3. தும்மல ராமகிருஷ்ணா, 2022, மகாவித்துவான் கா.மாரியப்பன், (மொ.ஆ), நன்னூல் பதிப்பகம், திருத்துறைப்பூண்டி - 610203.
4. கிரீஷ் கர்னாட், 2003, பலிபீடம், பாவண்ணன் (மொ.ஆ.), காவ்யா பதிப்பகம், சென்னை.
5. பர்த்ருஹரி, 2018, சுபாஷிதம் சமஸ்கிருத நன்மொழிகள், மதுமிதா(மொ.ஆ.), சந்தியா பதிப்பகம், சென்னை - 83.
6. ஹிந்திச் சிறுகதைகள், 2002, ஜைனேந்திர குமார் (தொ.ஆ), சரஸ்வதி ராம்நாத் (மொ.ஆ), சாகித்திய அகாதமி வெளியீடு, புது தில்லி - 110001.
7. இரவிந்திரநாத் தாகூர் - கீதாஞ்சலி, புவியரசு (மொ.ஆ), விஜயா பதிப்பகம், கோயம்புத்தூர்.
8. லட்சுமணன் மாணே உபாரா: அன்னியர், 2014, எஸ்.பாலசந்திரன் (மொ.ஆ), நியூ செஞ்சுரி பக் ஹவுஸ், சென்னை - 98
9. அம்பிகாசுதன் மாங்காடு, என் மகஜே: சிற்பி பாலசுப்பிரமணியன் (மொ.ஆ), கவிதா பப்ளிகேஷன்ஸ், சென்னை.
10. விஸ்வநாத் பிரதாப்சிங், ஒரு துளி பூமி ஒரு துளி வானம், த.சி.க. கண்ணன் (மொ.ஆ.), பெரியார் சுயமரியாதைப் பிரச்சார நிறுவன வெளியீடு, சென்னை -7.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
C01	3	3	3	3	3
C02	3	3	3	3	3
C03	3	3	3	3	3
C04	3	3	3	3	3
C05	3	3	3	3	3

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இரண்டாம் பருவம்
முதன்மைப்பாடம் - 5

4 தரப்புள்ளி
6 மணி நேரம்

பாட நோக்கம் :

1. சமயம் இலக்கிய அறிவை அறிதல்.
2. பல்வேறு சமயக் கோட்பாடுகளை அறிதல்.
3. இறை ஒன்றே என்னும் ஒருமைப்பாட்டு உணர்வை அறிதல்.
4. இலக்கிய வகைமைகளை அறிதல்.
5. படைப்பாற்றல் திறன் பெறுதல்.

அலகு - 1: திருமுறைகள்

திருஞானசம்பந்தர் தேவாரம் - முதல் திருமுறை திருச்சோபுரம் பதிகம் வெங்கனானை

யீருரிவை எனத் தொடங்கி 11 பாடல்கள்

திருநாவுக்கரசர் தேவாரம் - ஐந்தாம் திருமுறை திருநெல்வாயில் அரத்துறை பதிகம்

கடவுளைக் கட லுள்ளெழு நஞ்சுண்ட முதல் 10 பாடல்கள்.

சுந்தரர் தேவாரம் - ஏழாம் திருமுறை திருநாவலூர் பதிகம் கோவலன் நான்முகன்

முதல் 11 பாடல்கள்

மாணிக்கவாசகர் - எட்டாம் திருமுறை திருவாசகம் கோயில் மூத்த திருப்பதிகம் 10 பாடல்கள்.

திருமூலர் - திருமந்திரம் - ஆறாந்தந்திரம் - சிவகுரு தரிசனம் - பத்தி பணித்துப் பரவும் அடி நல்கி 1-10 பாடல்கள்

அலகு - 2: நாலாயிர திவ்வியப் பிரபந்தம்

ஆண்டாள் பாசுரம் - வாரணம் ஆயிரம் முதல் 11 பாடல்கள் -

நம்மாழ்வார் - திருவாய்மொழி - மூன்றாம் பத்து - முடிச்சோதியாயுனது முதல் 11 பாடல்கள் தொண்டரடிப்பொடியாழ்வார் - திருப்பள்ளியெழுச்சி - 10 பாடல்கள்

குலசேகர ஆழ்வார் - பெருமாள் திருமொழி - 10 ஆம் திருமொழி - அங்கண் நெடுமதில் (1-11)

அலகு - 3: பிற்கால சமய இலக்கியங்கள்

பிள்ளைபெருமாள் ஐயங்கார் - சீரங்க நாயகர் ஊசல் - உருத்திரளோ ...
வானவர்கள் 23-32

சிவப்பிரகாசர் - நால்வர் நான்மணிமாலை - பூவான் மலி மணிநீர் முதல் 12 பாடல்கள்

தாயுமானவர் - எங்கும் நிறைகின்ற பொருள் - அவன் அன்றி ஓரணுவும் - முதல் 1-10 பாடல்கள்

வள்ளலார் - முதல் திருமுறை - வேட்கை விண்ணப்பம் - மன்னே என்றன முதல் 1-10 பாடல்கள்.

அலகு - 4: இசுலாமிய இலக்கியங்கள்

குணங்குடி மஸ்தான் சாகிபு - முகைதீன் சதகம் - 1-10 பாடல்கள்

காசிம் புலவர் - திருப்புகழ் - 1-5 பாடல்கள்

செய்குதம்பிப் பாவலர் - நபிகள் நாயக மஞ்சரி 1- 10 பாடல்கள்

ஷெய்க் அப்துல் காதிர் நயினார் - நாகை அந்தாதி - 1-10 பாடல்கள்.

அலகு - 5: கிறித்துவ இலக்கியம்

வீரமாமுனிவர் - திருக்காவலூர் கலம்பகம் 1-5 பாடல்கள்

வேதநாயகம் சாஸ்திரி - வேத வினா விடை அம்மாளை - 1-20 பாடல்கள்

திட்டூர் தேசிகர் - மெய்ஞ்ஞானமாலை, 1-25 பாடல்கள்

பாடப் பயன்கள் :

1. சமயபொறை நிலவ சமய இலக்கிய அறிவு துணை செய்யும் என உணர்ந்து போற்றுவர்.
2. சமயங்கள் உணர்த்தும் இறைக்கோட்பாட்டு வேறுபாடுகளுக்கிடையே ஒற்றுமையை உணர்ந்து தெளிவர்.
3. இறைவனை அடைய செல்லும் பாதைகள் வெவ்வேறு சென்றடையும் இடம் ஒன்று என்பதை உணர்வர்.
4. இறைவனைப் பாடிய பாவகைகளையும் இலக்கிய வகைமைகளையும் வெளிப்பாட்டு நெறியையும் அறிவர்.
5. சொல்லாட்சித் திறன் வழி படைப்பாக்கத் திறனைப் பெறுவர்.

பாட நூல்கள் :

1. திருஞானசம்பந்தர் தேவாரம், முதல் திருமுறை, 1997, ஞானசம்பந்தம் பதிப்பகம்,
மயிலாடுதுறை - 1

2. திருநாவுக்கரசர் தேவாரம், ஐந்தாம் திருமுறை, 1997, ஞானசம்பந்தம் பதிப்பகம், மயிலாடுதுறை - 1
3. சுந்தரர் தேவாரம், ஏழாம் திருமுறை, 1997, ஞானசம்பந்தம் பதிப்பகம், மயிலாடுதுறை - 1
4. மாணிக்கவாசகர் திருவாசகம், எட்டாம் திருமுறை தொ.1, 1997, ஞானசம்பந்தம் பதிப்பகம், மயிலாடுதுறை - 1
5. திருமூலர் திருமந்திரம், பத்தாம் திருமுறை தொ.2, 1997, ஞானசம்பந்தம் பதிப்பகம், மயிலாடுதுறை - 1
6. நாலாயிரதிவ்வியபிரபந்தம் தொகுதி -1, இரா.வ.கமலக்கண்ணன் (உ.ஆ.) வர்த்தமானன் பதிப்பகம், சென்னை - 17
7. நாலாயிரதிவ்வியபிரபந்தம் தொகுதி -4, இரா.வ.கமலக்கண்ணன் (உ.ஆ.) வர்த்தமானன் பதிப்பகம், சென்னை - 17
8. பிள்ளைபெருமாள் ஐயங்கார், அஷ்ட பிரபந்தம், இரா.வ.கமலக்கண்ணன் (உ.ஆ.) வர்த்தமானன் பதிப்பகம், சென்னை - 17
9. சிவப்பிரகாசர், நால்வர் நான்மணிமாலை,
10. தாயுமானவர் பாடல்கள்
11. இராமலிங்க அடிகளார், 2012, திருவருட்பா முதல் திருமுறை, வர்த்தமானன் பதிப்பகம், சென்னை - 17
12. குணங்குடி மஸ்தான் சாகிபு, முகைதீன் சதகம்,
13. காசிம் புலவர், 1914, திருப்புகழ், கலாரத்னாகர அச்சுக்கூடம், சென்னை.
14. ஷெய்க் அப்துல் காதிரு நைனார் லெப்பை, நாகை அந்தாதி, கலாரத்னாகர அச்சுக்கூடம், சென்னை.
15. செய்கு தம்பி பாவலர், நபிகள் நாயக மஞ்சரி,
16. ஜான்சாமுவேல் (ப.ஆ.), 2014, கிறித்துவச் சிற்றிலக்கியத்திரட்டு, ஆசியவியல் நிறுவனம், சென்னை - 119.

பார்வை நூல்கள் :

1. டாக்டர் ப.அருணாசலம், பக்தி இலக்கியம் ஓர் அறிமுகம், தமிழ்ப்புத்தகாலயம். சென்னை -5
2. முனைவர் சோ.ந.கந்தசாமி, திருமுறை இலக்கியம், உலகத்தமிழாராய்ச்சி நிறுவனம், சென்னை.

3. ப.அருணாசலம், வைணவ சமயம், பாரி புத்தகப் பண்ணை, சென்னை.
4. மயிலை சீனிவேங்கடசாமி, கிறித்துவமும் தமிழும், கழக வெளியீடு, சென்னை.
5. முனைவர் சு.அமிர்தலிங்கம், வள்ளலாரின் ஆளுமை உருவாக்கம், தி பார்க்கர், சென்னை.
6. வெள்ளைவாரணார், பன்னிரு திருமுறை வரலாறு - இரண்டு தொகுதிகள், அண்ணாமலைப் பல்கலைக்கழகம், சிதம்பரம்.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	3	2

22PTAMC21: தொல்காப்பியம் சொல்லதிகாரமும் மொழியியலும்

இரண்டாம் பருவம்

4 தரப்புள்ளி

முதன்மைப்பாடம் - 6

6 மணி நேரம்

பாட நோக்கம் :

1. தொல்காப்பியரின் சொல், தொடர், இலக்கணப் புலமையை அறிமுகம் செய்தல்.
2. தொடரமைப்பில் ஏற்படும் பொருள் மாற்றங்களுக்கான அடிப்படைக் கூறுகளை விளக்குதல்.
3. சொல்லின் அடிப்படை வகைகளை விளக்கிப் பயன்பாட்டுக் கூறுகளை அறிமுகம் செய்தல்.
4. பெயர், வினைச் சொற்களின் பொருள் நீட்சிக்குக் காரணமான கூறுகளைப் பொருத்திக் காட்டுதல்.
5. சொல்லிலக்கண மரபுகளை அடிப்படையாகக் கொண்டு தற்கால மொழியியல் வளர்ச்சியைப் பொருத்திக்காட்டி விளங்கச் செய்தல்.

அலகு : 1

கிளவியாக்கம்

அலகு : 2

வேற்றுமையியல் - வேற்றுமை மயங்கியல் - விளிமரபு

அலகு : 3

பெயரியல் - வினையியல்

அலகு : 4

இடையியல் - உரியியல் - எச்சவியல்

அலகு : 5

உருபனியல் : உருபன் - உருபு- மாற்றுருபு - உருபன் - உருபனின் வகைகள் - நைடாவின் உருபனைக் கண்டறியும் விதிகள் - தொடரியல் - அண்மையுறுப்புப் பகுப்பு முறை - மாற்றிலக்கணப் பகுப்பு முறை - தமிழ்ச் சொற்றொடர் அமைப்பு.

பாடப் பயன்கள் :

1. சொல்லிலக்கண, தொடரிலக்கண அறிவின் திறத்தினை உணர்ந்து கொள்வர்.

2. வேற்றுமை உருபுகள் தொடரமைப்பில் ஏற்படுத்தும் மாற்றங்களினால் பொருள் மாற்றக்கோட்பாடுகளை உய்த்தறிவர்.
3. பெயர், வினை என்னும் சொற்பாகுபாட்டின் பொருள் விரிவையும் பயன்பாட்டுத் தளத்தையும் அறிந்து கொள்வர்.
4. அகராதியியல் உருவாக்கத்தில் தமிழ்ப் பதிவுகளின் எண்ணிக்கை விரிவிற்கான புலமையை அறிந்து பயன் கொள்வர்.
5. சொற்றொடரியலில் ஏற்பட்டுள்ள தற்கால மாற்றங்களைத் தமிழ் மரபிலக்கணம் வழியாகப் புரிதலை உண்டு பண்ணிக் கொள்வர்.

பாட நூல்கள் :

1. தொல்காப்பியம், சொல்லதிகாரம், சேனாவரையர், 1979, சைவ சித்தாந்த நூற்பதிப்புக்கழகம், சென்னை.
2. கு.பரமசிவம், 2012, இக்கால மொழியியல், அடையாளம் பதிப்பகம், திருச்சி.
3. சா.வளவன், 2013, பொது மொழியியல், 269/4ஏ இரமணியம், துவாரகா அடுக்ககம், எட்டாவது பிரதான சாலை அண்ணா நகர், சென்னை - 40.

பார்வை நூல்கள்

1. தொல்காப்பியம் மூலமும் உரையும், 2022, கு.வெ.பாலசுப்பிரமணியன், நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை - 50
2. தொல்காப்பியம் சொல்லதிகாரம், 2012, ச.பாலசுந்தரம் (உ.ஆ.), பெரியார் பல்கலைக்கழகம், சேலம் - 11.
3. தொல்காப்பியம் சொல்லதிகாரம், 2022, சுபாஷ் சந்திர போஸ் (உ.ஆ.), இயல் பதிப்பகம், தஞ்சாவூர் -1.
4. ஆ.சிவலிங்கனார், தொல்காப்பியம் சொல்லதிகாரம், இயல்களின் உரைவள நூல்கள், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை - 600113.
5. செ.வை.சண்முகம், 2008. சொல்லிலக்கணக் கோட்பாடு தொல்காப்பியம் பகுதி - 1, உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை - 113.
6. சூ.இன்னாசி, 2009, சொல்லியல், பாரதி புத்தகப் பண்ணை, சென்னை.
7. தே.ஆண்டியப்பன், 1977, காப்பியர் நெறி சொல்லியல், முத்து பதிப்பகம், மதுரை - 19.
8. த.பரசுராமன், க.இரவிசங்கர், 2012, சங்க இலக்கியம் எழுத்து சொல் மரபுகள், புதுச்சேரி மொழியியல் பண்பாட்டு ஆராய்ச்சி நிறுவனம், புதுச்சேரி. -8

9. டாக்டர் ரா.சீனிவாசன், 2016, தொல்காப்பியம் மொழியியல், தமிழ் வளர்ச்சி இயக்ககம், சென்னை - 600008.
10. முனைவர் சண்முக செல்வ கணபதி, 2016, தமிழ் மொழியியல், ராஜா பதிப்பகம், திருச்சிராப்பள்ளி - 23.
11. முனைவர் ஞானம், 2017, மொழியியல் தோற்றமும் வளர்ச்சியும், சாரதா பதிப்பகம், சென்னை- 600014.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	3	2	2
CO4	3	3	3	2	2
CO5	3	3	3	2	2

22PTAMC23: ஆராய்ச்சி நெறிமுறைகள்

இரண்டாம் பருவம்

4 தரப்புள்ளி

முதன்மைப்பாடம் - 7

6 மணி நேரம்

பாட நோக்கம் :

1. ஆராய்ச்சி என்னும் சிந்தனையை மாணவர்கள் உளங்கொள்ளும் வகையில் அறிதல்.
2. ஆராய்ச்சி நெறிமுறைகளைப் பயிற்றுவித்தல்.
3. ஆராய்ச்சிக்குப் பயன்படும் கோட்பாடுகளைக் கற்றல்.
4. ஆய்வேட்டின் வடிவமைப்பு பற்றிப் பயிலுதல்.
5. ஆய்வில் மேற்கொள்ள வேண்டிய அறம் பற்றி அறிதல்.

அலகு: 1 ஆராய்ச்சி பொதுவிளக்கம்

ஆராய்ச்சி நெறிமுறைகள் விளக்கம் - ஆராய்ச்சிப்பொருள் - ஆய்வாளருக்குரிய தகுதிகள் - ஆராய்ச்சிவகைகள் - அணுகுமுறைகள் - கருதுகோள் - ஆய்வுச்சிக்கல்கள்.

அலகு -2 ஆய்வின் அடிப்படை நெறிகள்

ஆய்வுப்பொருளைத் தெளிவாகச் சுட்டல் - இதுவரை செய்யப்பட்ட முன்னாய்வுகளை அறிதல் - ஆய்வு முன்னாய்வுகளைக் கருத்தில் கொண்டு அமைத்தல் - ஆராயப்பட வேண்டியன - அவற்றுள் இப்போது எடுத்துக்கொள்ளவேண்டியன.

அலகு - 3 ஆய்வுலக அடிப்படைக் கோட்பாடுகள்

செய்திகள் (Facts), கருத்துகள்- விதி (Law) - கொள்கைகள் (Theory) - வகைப் பாடுகள் Classification - கோட்பாடுகள் - அறிவியல் ஆய்வும் கலையியல் ஆய்வும்.

அலகு - 4 ஆய்வேட்டின் அமைப்பும் வரைவு முறையும்

ஆய்வேட்டின் அமைப்பு - தகவல்திரட்டல் - திட்டமிடுதல் - ஆய்வுமொழிநடை - முதல்படி - திருத்தப்படி - அடிக்குறிப்புகள் - துணைநூற்பட்டியல் - குறுக்கவிளக்கம் - முன்னுரை - முடிவுரை - பரிந்துரை - படங்கள் - அட்டவணைகள் - பொருட்குறிப்பு அகராதி.

அலகு- 5 ஆய்வு அறமும் ஆய்வுக் களவின்மையும்

தமிழ் ஆராய்ச்சி வரலாறு - பல்வேறு முன்னோடி ஆய்வுகள் நிகழ்ந்துள்ளமை - முந்தைய ஆய்வுகளையே திரும்ப எழுதுதல் - மேலாய்வுகளாக அமைய வேண்டிய தேவை - அறிவுசார் சொத்துடைமை - ஆய்வாளர்களின் நேர்மை - சான்றுகளைச் சோதனை செய்தல் - ஆய்வு மேற்கோள்களைக் கையாளும்முறை.

பாடப் பயன்கள் :

1. ஆராய்ச்சி பற்றிய அடிப்படை அறிவுகளைக் கற்றுத் தெளிவர்
2. ஆராய்ச்சிக்குக் கோட்பாடுகளை ஆய்வில் உட்படுத்தி எழுதிப்பார்த்துத் தெளிவர்.
3. ஆய்வேட்டின் கட்டமைப்பினை அறிந்து மாதிரி ஆய்வேட்டை எழுதுவர்.
4. ஆய்வின் பொருண்மை ஆழத்தை உணர்ந்து ஆய்வு நெறியை உணர்வர்.
5. ஆய்வு அறம், ஆய்வுக்களவின்மை குறித்துத் தெளிந்து நெறி அறிந்துகொள்வர்.

பாட நூல்கள் :

1. கு.வெ. பாலசுப்பிரமணியன், 2004, ஆய்வியல் நெறிமுறைகள், உமாநூல் வெளியீட்டகம், தஞ்சாவூர்.
2. டாக்டர்பொற்கோ, ஆராய்ச்சிநெறிமுறைகள், ஐந்திணைப்பதிப்பகம், சென்னை, 2005.

பார்வைநூல்கள் :

1. தமிழண்ணல், தமிழியல் ஆய்வு, பதிப்புத்துறை, மதுரை காமராசர் பல்கலைக்கழகம், மதுரை.
2. தமிழண்ணல், ஆய்வியல் அறிமுகம், மீனாட்சி புத்தக நிலையம், மதுரை.
3. ச. வே. சுப்பிரமணியன் (ப.ஆ.), 1975. ஆராய்ச்சிநெறிமுறைகள், உலகத்தமிழாராய்ச்சி நிறுவனம், சென்னை,
4. டாக்டர் ஈ.சா. விசுவநாதன், 1986, ஆய்வுநெறிமுறைகள், தமிழ்ப்புத்தகாலயம், சென்னை.
5. டாக்டர் முத்துச்சண்முகம், 1979, டாக்டர் ச. வேங்கடராமன், ஆய்வுக்கட்டுரை எழுதும் முறை, முத்துப்பதிப்பகம், மதுரை.
6. டாக்டர். என்.கணேசன், 1991, ஆய்வியல் கோட்பாடுகளும் செயல்முறைகளும், பயோனியர் புக்சர்வீஸ், சென்னை.

7. வே. சிதம்பரநாதன், 1987, ஆய்வியல்முறைகள், சுபாபதிப்பகம், நாகர்கோவில்.

Outcome Mapping

	P01	P02	P03	P04	P05
C01	2	3	3	2	3
C02	2	3	3	2	3
C03	2	3	3	2	3
C04	2	3	3	2	3
C05	2	3	3	2	3

22PTAMC24: கலைச்சொல்லாக்கம்

இரண்டாம் பருவம்

3 தரப்புள்ளி

முதன்மைப்பாடம் – 8

5 மணி நேரம்

பாட நோக்கம்:

1. கலைச்சொல்லாக்க வரலாற்றை அறிவர்.
2. கலைச்சொல்லாக்கத்தின் தேவையை அறிவர்.
3. சொற்களைத் தரப்படுத்தும் திறனைப் பெறுவர்.
4. புதிய சொற்களை உருவாக்கும் திறனை அறிவர்.
5. அறிவியல் தமிழ் நூல்களை எழுதும் திறனைப் பெறுவர்.

அலகு : 1 அறிவியல் தமிழ் கலைச்சொல்லாக்கம் :

கலைச்சொல்லாக்கம் - தமிழில் கலைச்சொல்லாக்க முயற்சிகள் - கலைச்சொல்லாக்கக் கோட்பாடுகள் - கலைச் சொல்லாக்கத்தில் சமுதாய உணர்வு - தமிழில் கலைச்சொல் வளம்.

அலகு : 2 கலைச்சொல்லாக்க வரலாறு :

கலைச் சொல்லாக்க முன் முயற்சிகள் - கலைச் சொல்லாக்கச் சிக்கல்கள் - கலைச்சொல் ஒலி பெயர்ப்புகள் - ஒலி பெயர்ப்பில் மெய்மயக்கங்கள் - இலங்கை கலைச்சொல்லாக்க முயற்சிகள் - தமிழ்க் கலைச் சொல்லாக்க முயற்சிகள்.

அலகு : 3 கலைச்சொல்லாக்க உருவாக்கமும் தரப்படுத்துதலும் :

பன்னாட்டுக் கலைச் சொல்லாக்கக் கோட்பாடுகளும் வழிமுறைகளும் - கலைச் சொல்லாக்கத் தரப்படுத்துதல் - தகவல் பரிமாற்ற மாதிரி - துறை சார் கலைச்சொற்கள் - இயல்பியல், வேதியல், தாவரவியல், விலங்கியல் கணிதவியல், மருந்தியல் - அறிவியல் பாட நூல்களில் மொழிப் பயன்பாடு.

அலகு : 4 அறிவியல் தமிழாக்கம் :

அறிவியல் தமிழாக்கம் - அறிவியல் இலக்கியத் தமிழாக்கம் - அறிவியல் தமிழாக்க முயற்சிகள் - தமிழ் வழி அறிவியல் கல்வி வரலாறு - அறிவியல் தமிழ் வளர்ச்சியும் இலக்கிய உருவாக்கமும்.

அலகு : 5 கலைச்சொல்லாக்கப் பயிற்சி - உருவாக்கம் :

துறை சார் அறிவியல் கலைச்சொற்களை உருவாக்குதல் - (மொழிபெயர்த்தல்) - அறிவியல் பத்திகளை எழுதுதல் - (ஆங்கிலத்திலிருந்து தமிழுக்கு)

பாடப்பயன்கள் :

1. தாய் மொழி வழிக் கல்விக்குத் துணை செய்யும்.
2. மொழித் தூய்மை மொழி வளம் பெருகத் துணை செய்யும்.
3. கலைச்சொல்லாக்கத் திறன் வழி மொழிபெயர்க்கும் பணியில் ஈடுபடுவர்.
4. புத்தம் புதிய கலைகளையும் துறைகளையும் மொழிக்கு அறிமுகம் செய்து வைப்பர்.
5. அறிவியல் நூல்களை எழுதிப் பதிப்பதன் மூலம் தொழில் முனைவோராக வேலை வாய்ப்பைப் பெறுவர்.

பாட நூல்கள் :

1. இராம.சுந்தரம், 2009, தமிழ் வளர்க்கும் அறிவியல், நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை.
2. முனைவர் வ.செ.குழந்தைசாமி, 2001, அறிவியல் தமிழ், பாரதி பதிப்பகம், சென்னை.
3. முனைவர் சு.லதா, 2002, தமிழில் அறிவியல் நூல்கள், தி பார்க்கர் வெளியீடு, சென்னை.
4. இரா.பாவேந்தன், 1998, தமிழில் அறிவியல் இதழ்கள், சாமுவேல் பிஷ்ஃபிரீன் பதிப்பகம், கோவை.
5. முனைவர் இராதா.செல்லப்பன், 2006, கலைச்சொல் உருவாக்கமும் தரப்படுத்துதலும், பாரதிதாசன் பல்கலைக்கழகம், திருச்சி.
6. முனைவர் இராதா.செல்லப்பன், 2012, கலைச்சொல் உருவாக்கம், அறிவுப் பதிப்பகம், சென்னை.
7. மணவை முஸ்தபா, மருத்துவக் கலைச்சொல் களஞ்சியம், மணவை பப்ளிகேஷன்ஸ், சென்னை.
8. ப.அருளி, அருங்கலைச்சொல் அகரமுதலி, 2006, தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்.

பார்வை நூல்கள் :

1. முனைவர் மு.சிவதாசு, 2013, அறிவியல் தமிழ், தமிழக அறிவியல் ஆசிரியர் மன்றம், தஞ்சாவூர்
2. கு.அண்ணாதுரை, 2004, அறிவியல் தமிழ், தமிழக அறிவியல் ஆசிரியர் மன்றம், தஞ்சாவூர்
3. நெல்லை க.முத்து, 2003, அறிவியலும் இலக்கியமும் சில மதிப்பீடுகள், சேகர் பதிப்பகம், சென்னை.
4. அ.சிவபெருமான், 2006, தமிழும் அறிவியலும், கைலாசநாதர் பதிப்பகம், குகையூர்.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	2	3	3	2	2
CO3	2	3	3	2	2
CO4	2	3	3	2	2
CO5	2	3	3	2	2

22PTAME15 - 1 ஒப்பிலக்கியம்

முதல் பருவம்

3 தரப்புள்ளி

முதன்மைத் தெரிவுப்பாடம்

5 மணி நேரம்

பாட நோக்கம்:

1. ஒப்பிலக்கியக் கோட்பாடுகளைப் பயிற்றுவித்தல்.
2. தமிழ் இலக்கியங்களை ஒப்பிலக்கிய கோட்பாடுகளின் அடிப்படையில் நோக்கிக் கற்பித்தல்.
3. தமிழ் இலக்கியங்களைப் பிறமொழி இலக்கியங்களுடன் ஒப்பீடு செய்துள்ளவற்றை அறிமுகப்படுத்துதல்.
4. இலக்கியங்கள் வழி ஒருமைப்பாட்டுணர்வை உருவாக்க முனைதல்.
5. இந்திய இலக்கியம், உலக இலக்கியம் என்னும் உயர் இலக்கியப் படைப்பை உருவாக்க முனைதல்.

அலகு - 1 ஒப்பிலக்கியம் அறிமுகம் :

ஒப்பிலக்கியம் - வரையறை - சிக்கல்கள் - எல்லை - ஒப்பிலக்கியம் பற்றிய பிரெஞ்சு மற்றும் அமெரிக்க வரையறைகள் - உலக இலக்கியம் - பொது இலக்கியம் - தேசிய இலக்கியம் - இலக்கிய உளவியல் - இலக்கியச் சமூகவியல்

அலகு - 2 ஒப்பிலக்கியக்கோட்பாடுகள் - I :

தாக்கக்கோட்பாடு - போலச்செய்தல் - தாக்க ஆய்வின் நெறிமுறைகள் - தாக்க ஆய்வின் நோக்கம் - தாக்கத்திற்கும் வரவேற்பிற்கும் உள்ள வேறுபாடு - வரவேற்புக் கோட்பாடும் நிலைபேறாக்கமும் - இலக்கிய வரவேற்பு - இணைவரைக் கோட்பாடு.

அலகு - 3 ஒப்பிலக்கியக் கோட்பாடுகள் - II :

இலக்கிய வகைமைக் கோட்பாடு - இலக்கிய வகைமைகளின் உருவாக்கம் - ஒப்பிலக்கியத்தில் வகைமை ஆய்வு - வகைமை வரலாறு - தமிழில் இலக்கிய வகைமை--- - அடிக்கருத்தியல் கோட்பாடு - அடிக்கருத்து - சொற்பொருள் விளக்கம் - அடிக்கருத்து உருவாக்கம் - வெளிநாட்டாரின் அடிக்கருத்து.

அலகு - 4 இலக்கியமும் பிற கலைகளும் :

இலக்கியத்திற்கும் கலைகளுக்கும் இடையே உள்ள உறவு - கலைகளுக்கிடையேயான கொள்வினை கொடுப்பினை - கலைகள் - ஒன்றையொன்று வளர்த்துக் கொள்ளல் - கலை இலக்கியத்திற்கிடையேயான

ஒப்புமை வரலாறு- மொழிபெயர்ப்பின் இன்றியமையாமை - மொழிபெயர்ப்பின் வகைகள் - ஒப்பிலக்கிய வளர்ச்சியில் மொழிபெயர்ப்பின் தேவை.

அலகு- 5 தமிழில் ஒப்பிலக்கிய ஆய்வுகள்

தமிழ் கிரேக்க வீரநிலைக்காலப் பாடல்கள் - திருக்குறளும் பிறமொழி அற இலக்கியங்களும் - கம்பனும் வால்மீகியும் - கம்பனும் மில்டனும் - பாரதியும் விட்மனும் - இளங்கோவும் ஷேக்ஸ்பியரும் - பாரதியும் ஷெல்லியும் - பாரதிதாசனும் வில்லியம் வேர்ட்ஸ்வொர்த்தும்.

பாடப்பயன்கள் :

1. ஒப்பிலக்கியக் கோட்பாடுகளைப் பற்றிய அறிவைப் பெறுவர்.
2. தமிழ் இலக்கியங்களை ஒப்பிலக்கிய கோட்பாடுகளின் அடிப்படையில் பார்க்கும் திறனைப் பெறுவர்.
3. தமிழ் இலக்கியங்களைப் பிறமொழி இலக்கியங்களுடன் ஒப்பிடும் ஆர்வத்தைப் பெறுவர்.
4. ஒப்பியல் திறனாய்வு வழி பன்மொழி இலக்கியங்களின் வெளிப்பாட்டு உத்திகளையும் திறன்களையும் அறிந்து தெளிவர்.
5. வேற்றுமையில் ஒற்றுமை காணும் சமூகங்களுக்கிடையே சமத்துவம், சகோதரத்துவம் நிலவ ஒப்பிலக்கிய ஆய்வுகள் பெரிதும் துணை செய்யும்.

பாட நூல்கள் :

1. சச்சிதானந்தம், ஒப்பிலக்கியம் ஓர்அறிமுகம், ஆக்ஸ்போர்டு பல்கலைக்கழகம்.
2. ம. திருமலை, 2011, ஒப்பிலக்கியம் கொள்கைகளும் பயில்முறைகளும், செல்லப்பா பதிப்பகம், மதுரை.

பார்வை நூல்கள் :

1. தமிழண்ணல், 1973, ஒப்பிலக்கியம் ஓர்அறிமுகம், மீனாட்சி புத்தக நிலையம், மதுரை.
2. க.கைலாசபதி., 1978, ஒப்பியல் இலக்கியம், பாட்டாளிகள் வெளியீடு, சென்னை.
3. கி.இராசா, 2018, ஒப்பிலக்கியம், நியூசெஞ்சுரி புக்ஹவுஸ், சென்னை.
4. ச.சீனிவாசன், 2016, ஒப்பிலக்கியம் இனவரைவியல் சமூகம், காவ்யா.
5. Weisstien Ulrich, 1973, Comparative Literature and Literary Theory, Survey & Introduction, Indiana University, Bloomington.

Outcome Mapping

	P01	P02	P03	P04	P05
C01	3	3	3	3	2
C02	3	3	3	3	2
C03	3	3	3	3	2
C04	3	3	3	3	2
C05	3	3	3	3	2

22PTAME15 - 2 சைவ சித்தாந்தம்

முதல்பருவம்

3 தரப்புள்ளி

முதன்மைத்தெரிவுப்பாடம்

5 மணி நேரம்

பாட நோக்கம் :

1. சைவ சமய அடிப்படைக் கோட்பாடுகளை அறிவார்.
2. சித்தாந்தக் கோட்பாடுகளின் அடிப்படை அலகுகளை அறிவார்.
3. சித்தாந்தக் கோட்பாடுகளின் உண்மைத்தன்மையையும் உயர் தன்மையையும் அறிவார்.
4. சித்தாந்த நூல்களின் நுவல் பொருண்மைகளை அறிவார்.
5. சித்தாந்தக் கொள்கைகளின் வழி இறைத்தத்துவ உணர்வினை அறிவார்.

அலகு -1 இந்திய சமயங்கள் :

தமிழகச் சமயங்கள்- அறுவகைச் சமயங்கள் - புறப்புறச் சமயம் - புறச்சமயம் - அகப்புறச் சமயம் - அகச்சமயம் - சைவ சித்தாந்தம் தோற்றமும் வளர்ச்சியும் - பன்னிரு திருமுறைகள் - பதினான்கு சாத்திரங்கள் - சமய குரவர் - சந்தான குரவர் வரலாறு - தாயுமானவர் - குமரகுருபரர் - சிவப்பிரகாசர் - சிவஞானமுனிவர் பாடல்களில் சைவ சித்தாந்தக் கூறுகள் -- கந்தபுராணம், திருவிளையாடற் புராணம் - தலபுராணங்களில் சைவ சித்தாந்தக் கூறுகள்

அலகு - 2 சைவ சித்தாந்தக் கொள்கைகள் - 1 :

சமயம் - மதம் - முப்பொருள் - பதி, பசு, பாசம் - முத்தொழில் - ஐந்தொழில் - சற்காரிய வாதம் - அத்துவித தொடர்பு -பேதம் - அபேதம் - பேதாபேதம் - ஒன்றாய், வேறாய், உடனாய் இருத்தல் - பொது இயல்பு- சிறப்பு இயல் - இறைவன் இயல்புகள் - எண் குணம் சத்து சித்து ஆனந்தம் - உயிர்களின் இயல்புகள் - ஆன்மா என்ற சொல்வழக்கு - பேரறிவு - சிற்றறிவு - உயிர்களும் இறைவனும் - சார்ந்ததன் வண்ணம் ஆதல் - சதசத்து - சித்து, அசித்து, சடம் - ஆணவம், கன்மம், மாயை - ஐந்து மலங்கள்.

அலகு - 3 சைவ சித்தாந்தக் கொள்கைகள் - 2 :

காரண அவத்தைகள், காரிய அவத்தைகள்- கேவலம், சகலம், சுத்தம் - கீழால் அவத்தை, மத்தியாலவத்தை, மேலாலவத்தை - அளவைகள் - ஆணவ மலத்தின் இயல்பு - கன்ம மலத்தின் இயல்பும் வகையும் - மாயா மலத்தின் இயல்பும் வகையும் - ஐந்து வகை உடம்புகள் - நால்வகை வாக்குகள் - மலபரிபாகம் - சத்திநிபாதம் - இருவினை ஒப்பு - பதி புண்ணியம், பசு புண்ணியம் - அணைந்தோர் தன்மை - இறைவன் குருவாய் வருதல் - தீக்கை வகைகள் - ஐந்தெழுத்தோதல் - திருக்கோயில், அடியார் வழிபாடு - வீடுபேறு

அலகு - 4 சாத்திர நூல்கள் - 1 :

திருவருட்பயன் (1-30 குறட்பாக்கள்)

உண்மை நெறி விளக்கம் (1-22 வெண்பாக்கள்)

கொடிக்கவி (முழுவதும்)

இருபா இருபது (முழுவதும்)

அலகு - 5

சாத்திர நூல்கள் - 2 :

சிவஞானபோதம் 1-12 நூற்பாக்கள் மட்டும் (தெளிவுரையுடன்)

பாட பயன்கள் :

1. சைவ சமயத்தின் கட்டமைப்புக் கூறுகளைக் கற்றுத்தெளிவர்.
2. இறை - உயிர் இரண்டிற்குமான தொடர்பினைக் கற்று உணர்வர்.
3. ஒரு பொருளின் உண்மைத்தன்மையினை நுணுக்கமாக அறியும் அறிவுத்திறப்பாட்டினைப் பெறுவர்.
4. சாத்திர நூல்களில் பேசப்பெரும் பதி பசு பாசம் தொடர்பான சிந்தனைத் தெளிவைப் பெறுவர்.
5. சைவ சமய உட்பொருளையும் ஆழ்புருளையும் கற்று உண்மைப் பொருளை உணர்வர்.

பாட நூல்கள் :

1. க. வச்சிர வேலு முதலியார், 1968, சித்தாந்தத்தெளிவியல், தருமையாதீனம், மயிலாடுதுறை.
2. வி.பி.காந்திமதிநாதப்பிள்ளை, 1945, சிவஞானபோதச் சொற்பொழிவு நூல், கழக வெளியீடு, சென்னை.
3. கு. சுந்தரமூர்த்தி(உ.ஆ), 1980, திருவருட்பயன், காசிமட வெளியீடு, திருப்பனந்தாள்.
4. வ.ஆ.தேவசேனாதிபதி, 1981, சைவ சித்தாந்தத்தின் அடிப்படைகள், சென்னைப் பல்கலைக்கழகம்.
5. சி.அருணைவடிவேல் முதலியார், சிவஞானபோத மாபாடியப் பொருள்நிலை விளக்கம், தருமையாதீனம், மயிலாடுதுறை.
6. சி.அருணை வடிவேலு முதலியார், முப்பொருள் இயல்பு, சைவ சித்தாந்தப் பெருமன்ற வெளியீடு, சென்னை.
7. சிவஞான சுவாமிகள், 1940, சிவஞான போதச் சிற்றுரை, சைவ சித்தாந்த மகா சமாஜம், சென்னை.

பார்வை நூல்கள் :

1. க.வெள்ளைவாரணனார், 1969, 1972, பன்னிரு திருமுறை வரலாறு பாகம் - 1&2, அண்ணாமலைப் பல்கலைக்கழகம்.
2. டாக்டர் சோ.ந. கந்தசாமி, இந்திய தத்துவக் களஞ்சியம், மெய்யப்பன் பதிப்பகம், சிதம்பரம்.
3. டி.பி. சித்தலிங்கையா, 1984, சைவ சமயத் தோற்றமும் வளர்ச்சியும், கன்யா குருகுலம், வேதாரண்யம்.
4. ப. அருணாசலம், 1979, சைவ சமயம் - ஓர் அறிமுகம், நாகர்கோயில்.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	3	2	3	2	2
CO3	3	2	3	2	2
CO4	3	2	3	2	2
CO5	3	2	3	2	2

22PTAME15 – 3: அகராதியியல்

முதல் பருவம்
முதன்மைத் தெரிவுப்பாடம்

3 தரப்புள்ளி
5 மணி நேரம்

பாட நோக்கம்:

1. தமிழ் மொழி அகராதிகளின் வரலாற்றினை அறிவர்.
2. அகராதிகளின் வகைகளை அறிந்து கொள்வர்.
3. சொல் பயன்பாட்டையும் இலக்கணக்குறிப்புகளையும் உணர்ந்து அறிவு பெறுவர்.
4. அகராதியில் இடம் பெறும் சொற்களின் தன்மையையும் முன்னுரிமையையும் உணர்வர்.
5. அகராதியின் கட்டமைப்பில் சொற்களின் வரிசி முறையை அறிவர்.

அலகு : 1 தமிழ் அகராதி வரலாறு :

உரிச்சொல் - தொல்காப்பியம் - இடையியல், உரியியல், மரபியல்களில் அகராதிக்கூறுகள் - நிகண்டுகள் - ஒரு மொழி அகராதிகள் - இரு மொழி, பன்மொழி அகராதிகள் - கலைக்களஞ்சியம் - கலைச்சொல்லகராதி - சொல்லடைவு.

அலகு : 2 அகராதி வகைகள் :

கலைக்களஞ்சியம் - மொழி அகராதிகள் - ஒரு மொழி அகராதி - இரு மொழி அகராதி, பன்மொழி அகராதி - காலமுறை அகராதிகள் - வரலாற்று அகராதி - சொற்பிறப்பு அகராதி - ஒப்பியல் அகராதி - சிறப்பு அகராதிகள்.

அலகு : 3 சொல் தேர்வும் பொருள் கோட்பாடும் :

கட்டுடைச்சொல் - கட்டில்லாச்சொல் வடிவம் - சொல்லடுக்கும் சொல் விரிவும் - ஆக்கச்சொல் - கூட்டுச்சொல் - அகராதிச் சொல் - பொருட்கோட்பாடுகள் - மொழி ஒருங்கும் சொற் பயன்பாடும் - சொற்பொருட் கூறுகள் - பொருளுறவுகள்.

அலகு : 4 அகராதி உருவாக்கம் - திட்டமிடலும் தரவு சேகரிப்பும் :

அகராதித் திட்டம் - சொல்தெரிவு - அகராதி சொற் சூழல் - பதிவுத் தெளிவு - எழுத்துத் தரவில்லா மொழியும் தரவு சேகரிப்பும்.

அலகு : 5 அகராதி உருவாக்கம் :

பதிப்புப் பணியும் பதிவுக் கட்டுமானமும் - தலைச்சொல் - எழுத்துப்பெயர்ப்பு - ஒலிப்பு நெறி - இலக்கணக் குறிப்பு - பொருட்பகுதி - சொல் மூலமும் சொற்பிறப்பும் - சொற்பொருள் - மேற்கோள் தொடர் - பட விளக்கக்

குறிப்புகள் - அச்சுப்படி தயாரித்தல் - சொல் வரிசை முறை - பதிவு வரிசை முறை - பதிவுத் தொகுப்பு.

பாடப்பயன் :

1. அகராதி வளர்ச்சி வரலாற்றை விரிவாக அறிந்து போற்றுவர்.
2. தமிழில் தோற்றம் பெற்றுள்ள அகராதி வகைமைகளை அறிந்து தெளிவர்.
3. அகராதியில் இடம்பெறும் சொற்களின் இலக்கணக் கூறுபாட்டை அறிந்து தெளிவு கொள்வர்.
4. அகராதி உருவக்கத்தில் சொல் தேர்வு முதன்மையை அறிந்து சொல்லாய்வின் ஆழத்தைப் புரிந்து கொள்வர்.
5. அகராதியின் புறக் கட்டமைப்பை அறிந்து தெளிவர்.

பாடநூல்கள் :

1. பெ.மாதையன், 1997, அகராதியியல், தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர் - 10.
2. சுந்தர சண்முகனார், 1965, தமிழ் அகராதிக் கலை, பைந்தமிழ்ப் பதிப்பகம், புதுவை.

பார்வை நூல்கள் :

1. வ.ஜெயதேவன், 1977, தமிழ் அகராதியியல், அன்பு நூலகம், சென்னை.
2. வ.ஜெயதேவன், 1985, தமிழ் அகராதியியல் வளர்ச்சி வரலாறு, ஐந்திணைப் பதிப்பகம், சென்னை.
3. மா.சற்குணம், 1997, நிகண்டுகள், தி பார்க்கர், சென்னை.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	3
CO2	2	3	3	2	3
CO3	2	3	3	2	3
CO4	2	3	3	2	3
CO5	2	3	3	2	3

22PTAME24 - 1 பெண்ணியம்

இரண்டாம் பருவம்
முதன்மைத் தெரிவுப்பாடம்

3 தரப்புள்ளி
5 மணி நேரம்

பாட நோக்கம் :

1. பெண்ணியக் கோட்பாட்டை அறிவர்.
2. பெண்களுக்கான சம உரிமை கேட்கும் அமைப்புகளை அறிவர்.
3. பெண்களுக்கான உரிமைப் போரின் எல்லைகளை அறிவர்.
4. பெண்களுக்கான எழுத்தின் வலிமையை அறிவர்.
5. பெண்மொழி குறித்து அறிவர்.

அலகு - 1 பெண்ணியம் :

சொல் விளக்கம் - கருத்தாக்கப் பின்புலம் - இயக்கநிலை வளர்ச்சி - இலக்கியமும் பெண்ணியமும் - பெண்ணியப் போக்குகள் - பெண்ணியத் திறனாய்வுகள்.

அலகு - 2 பெண்ணிய இயக்கங்கள் :

உலக அளவில் , அமெரிக்க அளவில் - ஓட்டுரிமை - சம உரிமை - சீன மாநாடு - மார்ச் 8 ஆம் நாள் வரலாறு - மேலை நாடுகளில் பெண்ணியம் - பெண் விடுதலை இயக்கம் - இந்திய அளவில் வாழ்வுரிமைப் போராட்டம் - அகில இந்தியப் பெண்கள் மாநாடு - தோள் சீலைக் கழகம் - தேவதாசி முறை ஒழிப்பு - பெண் கல்வி - மூவலூர் ராமாமிருதம் அமையாரின் பங்களிப்பு

அலகு - 3 பெண்ணிய வகைகள் :

மிதவாதம் - தீவிரவாதம் - பெரயாரியம் - தலித்தியம் - இவற்றின் நிறை குறைகள் - பெண்ணிய மாநாடுகள் - பெண்களும் சட்டங்களும் - விடுதலை இயக்கத்தில் பெண்ணிய பங்களிப்பு - மத்திய மாநில அரசுகளில் மகளிருக்கான திட்டங்கள் - தலைமைப் பண்பு

அலகு - 4 தமிழிலக்கியப் பெண் பதிவுகள் :

மரபிலக்கியத்தில் பெண்கள் - பாரதி பாரதிதாசன் படைப்புகளில் பெண்கள் - பெண் சிறுகதை ஆசிரியர்கள் - பெண் புதின ஆசிரியர்கள் - பெண் புதுக்கவிஞர்கள் - நாடக ஆசிரியர்கள் - படைப்பிலக்கியங்களில் பெண்ணியச் சிந்தனை வெளிப்பாடு - பெண்ணிய எதிர்ப்பு இலக்கியம்.

அலகு - 5 பெண்மொழி :

பெண்மொழி - விளக்கம் - பெண்ணியமும் பெண் மொழியும் - தமிழில் பெண்மொழி - மொழியியலாளர் நோக்கில் பெண்மொழி - பெண்மொழியும் பெண் வாசிப்பும் - பெண் எழுத்து - பெண் எழுத்தும் பெண்மொழியும் - பெண் எழுத்தும் பண்பாடும் - பெண் கருத்தியலும் மொழி புனைவும் - பெண் கவிஞர்களின் பெண்மொழி.

பாடப்பயன்கள் :

1. இலக்கியங்களில் பதிவாகியுள்ள பெண்ணியச்சிந்தனைகளைக் கற்றறிவர்.
2. பெண் எழுத்து பெண் மொழி முதலியவற்றின் வெளிப்பாட்டு உத்திகளை உற்று நோக்கித் தெரிந்து கொள்வர்.
3. பெண் - பெண் உரிமை - பெண்ணியம் - பெண் எழுத்து என்பன குறித்த புரிதல்களைப் பெறுவர்.
4. பெண்கள் சமூகத்தின் இரண்டாம் பாலினம் இல்லை சமமானவர்கள் என்பதை உணர்வர்.
5. பெண் மொழி பெண் பதிவுகள் வழி இலக்கியப் படைப்பாக்கத்திறன் பெறுவர்.

பாட நூல்கள் :

1. இரா.பிரேமா, 2005, பெண்ணியம், தமிழ்ப் புத்தகாலயம், சென்னை - 17.
2. இரா.பிரேமா, 2006, பெண் - மரபிலும் இலக்கியத்திலும், தமிழ்ப் புத்தகாலயம், சென்னை - 17.
3. கதி.மகாதேவன், இரா.மோகன் (ப.ஆ.), 1994, பெண்ணியம், மதுரை காமராசர் பல்கலைக்கழகம்,
4. மதுரை -21.
5. தி.கமலி, 2006, பெண்ணியப் படைப்பிலக்கியம், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை - 113.

பார்வை நூல்கள் :

1. ச. முத்துச்சிதம்பரம், 1999, பெண்ணியம் தோற்றமும் வளர்ச்சியும், தமிழ்ப் புத்தகாலயம், சென்னை - 17.
2. பாரதி, 2003, பெண் வார்ப்பும் வளர்ப்பும், தமிழ்ப் புத்தகாலயம், சென்னை - 17.
3. ராஜம் கிருஷ்ணன், 2003, பெண் விடுதலை இலக்கியத்திலும் வாழ்விலும், தாகம், சென்னை -17.
4. கி.மைதிலி, 2000, பெண்ணியமும் தமிழும், ரமணியம், சென்னை - 40.
5. சரோஜினி, 1995, கற்பு அன்று முதல் இன்று வரை, அரசி பதிப்பகம், திண்டுக்கல்.
6. ப.தமிழரசி, 2004, இருபதாம் நூற்றாண்டு பெண் கவிஞர்கள், நந்தன் பதிப்பகம், கோவை -23.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
C01	3	2	3	3	2
C02	3	2	3	3	2
C03	3	2	3	3	2
C04	3	2	3	3	2
C05	3	2	3	3	2

22PTAME24 -2 சுவடியியல்

இரண்டாம் பருவம்
முதன்மைத் தெரிவுப்பாடம்

3 தரப்புள்ளி
5 மணி நேரம்

பாட நோக்கம்:

1. சுவடியியல் அறிவைப் பெறுவர்.
2. சுவடிப் பயன்பாட்டை அறிவர்.
3. சுவடிகளைப் பாதுகாக்க வேண்டிய தேவையை அறிவர்.
4. சுவடி எழுத்தைப் படிக்கும் திறனைப் பெறுவர்.
5. தமிழாய்வு உலகில் சுவடிகளின் முதன்மையை அறிந்து போற்றுவர்.

அலகு – 1 சுவடியியல் அறிமுகம் :

தோற்றம் - வளர்ச்சி - எழுது பொருட்கள் - எழுதுபடு பொருட்கள் - ஏடு
தயாரித்தல் - ஏடு பதப்படுத்தல் - ஏடு எழுதும் முறை - ஏடு எழுதுவோர் -
எழுதுவிப்போர் - சுவடி அமைப்பு - சுவடிகளின் வகைகள்

அலகு – 2 சுவடிகளைப் பாதிக்கும் காரணிகள் :

சுவடி அழிவின் வகைகள் - இயற்கை அழிவு - செயற்கை அழிவு -
அறியாமை அழிவு - சுவடிக்கு ஏற்படும் பாதிப்புகள்

அலகு – 3 சுவடிப் பாதுகாப்பு முறைகள் :

சுவடிகளைச் செப்பனிடும் முறைகள் - சுவடிகளை மரபு வழிப் பாதுகாத்தல்
- கையாளும் முறை - கண்காணிக்கும் முறை - பாதுகாக்கும் கருவிகள் -
அறிவியல் வழி பாதுகாப்பு - துகாக்கும் மருந்துகள் - மேலை நாடுகளில்
பாதுகாக்கும் முறைகள் - தமிழகத்தில் பாதுகாக்கும் முறைகள்.

அலகு – 4 சுவடி எழுத்துக்கள் :

எழுத்துக்களும் குறியீடுகளும் - அலகெழுத்துக்கள் - கீழ்அலகெழுத்துக்கள்
- நடுவலகெழுத்துக்கள் - மேலலகெழுத்துக்கள் - கூட்டெழுத்துக்கள் -
குறிப்பெழுத்துக்கள் - எண்கள்.

அலகு – 5 சுவடி நூலகங்கள் :

அயல்நாட்டுச் சுவடி நூலகங்கள் - இந்தியச் சுவடி நூலகங்கள் - அரசு
நிறுவன சுவடி நூலகங்கள் - கல்வி நிறுவன சுவடி நூலகங்கள் - சமய மடாலய
சுவடி நூலகங்கள்.

பாடப் பயன்கள் :

1. தமிழாய்வுலகில் சுவடிகளின் இன்றியமையாமையை அறிந்து தெளிவர்.
2. ஓலைச்சுவடிகளைத் தேடி பதிப்பில் ஈடுபட்டு சொல் தேர்வு அறிவைப் பெறுவர்.
3. சுவடிகளைத் தேடவும் திரட்டவும் பாதுகாக்கவுமான விழுப்புணர்வைப் பெறுவர்.
4. தமிழின் எழுத்து வளர்ச்சி வரலாற்றை அறிந்து தெளிவர்.
5. பதிப்புலகில் சுவடிகளின் முதன்மைய அறிந்து பதிப்புப் பணியில் ஈடுபட்டு தொழில் முனைவராகப் பணி வாய்ப்பைப் பெறுவர்.

பாட நூல்கள் :

1. மோ.கோ.கோவைமணி, 2013, ஓலைச்சுவடியியல், பாமொழிப் பதிப்பகம், தஞ்சாவூர் - 1.
2. த.கலாநீதர், 2015, சுவடியியல் வரலாறு, அகரம், தஞ்சாவூர் -7.

பார்வை நூல்கள் :

1. பூ.சுப்பிரமணியம், சுவடியியல், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை - 113.
2. இரா.இளங்குமரன், 2001, சுவடிப்பதிப்பியல் வரலாறு, மெய்யப்பன் தமிழாய்வகம், சிதம்பரம்.
3. ம.சா.அறிவுடைநம்பி, 2006, சுவடியியல் கலைச்சொல் விளக்க அகராதி, கருமணி பதிப்பகம், புதுச்சேரி - 8.
4. பூ.சுப்பிரமணியம், 2004, சுவடிப்பதிப்புக்கலை வழிகாட்டி டாக்டர் உ.வேசா., உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை - 113.
5. ப.வெ.நாகராஜன், 2004, சிரவையாதீனப் பதிப்புகள், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை - 113.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

22PTAME24 - 3 பொருண்மையியல்

இரண்டாம் பருவம்
முதன்மைத் தெரிவுப்பாடம்
பாட நோக்கம் :

3 தரப்புள்ளி
5 மணி நேரம்

1. பொருண்மையியலின் அடிப்படைகளை அறிவர்.
2. அகராதிப் பொருண்மையியலின் கூறுகளை அறிவர்.
3. பொருள் மாற்றத்தின் பின்புலத்தை அறிவர்.
4. பொருண்மையியலின் கோட்பாடுகளை அறிவர்.
5. பொருண்மையியலின் வளர்ச்சிப் போக்குகளை அறிவர்.

அலகு - 1 பொருண்மையியல் :

அணுகுமுறைகள் - பொருள் விளக்கம் - கோட்பாடுகள் - பொருள் குறிப்பீடு - பொருளின் வகைப்பாடு - சொற்பொருள்.

அலகு - 2 ஒரு பொருட் பன்மொழி :

பல் பொருண்மை - பொருள் நீட்டல் - ஒப்புருச் சொல்

அலகு - 3 பொருண்மை மாற்றம் :

காரணங்கள் - பொருண்மை மாற்றத்தின் வகைகள் - விளைவுகள்

அலகு - 4 அமைப்பு முறைக் கோட்பாடு :

ஜான் லையன்சின் பொருண்மைக் கூறுகள் - எதிர் சொற்கள் - பொருள் உட்கோடல்

அலகு - 5 அமைப்புப் பொருண்மையியல் - சொற்பொருண்மை :

பொருள் உட்கோடல் - ஆகியவற்றுடன் தொடர்பு - பொருண்மைக் களங்கள் - சொற்தொகுதிகள் - வகைகள் - பொருட்கள ஆய்வின் சிறப்பியல்புகள் - பொருள் கூற்று ஆய்வு.

பாடப் பயன்கள் :

1. பொருண்மையியலின் அடிப்படை அலகுகளையும் விரிவுகளையும் அறிந்து தெளிவர்.
2. சொல்லுக்கும் பொருளுக்குமான தொடர்புகளைப் புரிந்து கொள்வர்.
3. கால, இட, சூழல் மாற்றத்திற்கேற்ப பொருளின் விரிவையும் சுருக்கத்தையும் தெரிந்து தெளிவர்.

4. சொற், பொருள் தொடர்பிற்கான காரண காரிய விளக்கங்களை அறிஞர்களின் மொழியில் அறிவர்.
5. பொருண்மையியல் விரிவான ஆய்வுத்தளத்தை உள்ளடக்கி வளர்ந்துள்ளமையை அறிவர்.

பாட நூல்கள்

1. செ.வை.சண்முகம், 1988, பொருண்மையியல், அனைத்திந்திய தமிழ் மொழியியல் கழகம், அண்ணாமலைநகர்.
2. D.A.Cruse, 1986, Lexical Semantics, Cambridge University Press, Cambridge.
3. G.LEECH, 1981, Semantics, Penguin Books, Middle Sex, England.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	2
CO2	2	3	2	2	2
CO3	2	3	2	2	2
CO4	2	3	2	2	2
CO5	2	3	2	2	2

**அண்ணாமலை பல்கலைக்கழகம் முதுகலை
தமிழியல்
(MA. Tamil)**

நடைமுறை 2021 – 2022

The Course of study and the Scheme of Examinations

Semester III					CIA	Uni	Total	
1.	Core	Paper – 8	6	6	சங்க இலக்கியம் (அகம்)	25	75	100
2.	Core	Paper – 9	6	6	ஆராய்ச்சி நெறிமுறைகள்	25	75	100
3.	Core	Paper – 10	6	5	தொல்காப்பியம் - பொருளதிகாரம்	25	75	100
4.	Core Elective	Paper – 3	6	3	1.சிறுநிலக்கியம் (அ) 2. தமிழ் இலக்கண வரலாறு	25	75	100
5.	Open elective	Paper – 3	6	3	1.பயன்பாட்டு நாட்டுப்புறவியல் (அ) 2. அறிவியல் தமிழ்	25	75	100
6.	**Mooc Course		-			-	-	100
			30	23		125	375	600
Semester IV								
7.	Core	Paper -11	6	6	சங்க இலக்கியம் புறம்	25	75	100
8.	Core	Paper -12	6	6	தொல்காப்பியம் - பொருளதிகாரம்	25	75	100
9.	Core	Project	6	5	Project with viva voce	100 (75 Project +25 viva)		100
10.	Core Elective	Paper -4	6	3	1.இந்தியத் தத்துவங்கள் (அ) 2.கணிசியும் தமிழும்	25	75	100
11.	Open Elective	Paper – 4	6	3	1.திருவள்ளுவம் (அ) 2. இளங்கோவடிகள்	25	75	100
			30	23		125	375	500
			120	90				2400

*** Field Study**

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

- (i). Head of the respective department
- (ii). Mentor
- (iii). One faculty from other department

****Mooc Course**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

அண்ணாமலை பல்கலைக்கழகம் முதுகலை
தமிழியல் நடைமுறை
2021 - 2022

இரண்டாம் ஆண்டு

மூன்றாம் பருவம்

தாள் 8

சங்க இலக்கியம் (அகம்)

கூறு 1	:முல்லைப்பாட்டு முழுவதும்	
கூறு 2	1. கலித்தொகை	1. பாலைக்கலி - 1-5 பாடல் 2. 2. குறிஞ்சிக்கலி - 37,38,39,40,41 பாடல் 3. மருதக்கலி - 70,71,72,73,74 பாடல் 4. முல்லைக்கலி - 101,102,103,104,105 பாடல்கள்
	2. அகநானூறு	- பாடல் - 81 முதல் 90 வரை
கூறு 3:	1. குறுந்தொகை -	பாடல் - 91,92,93,94,95,.....100 வரை
	2.நற்றிணை -	பாடல் - 91.....110 வரை
கூறு 4:	ஐங்குறுநூறு -	தோழிக்கு உரைத்த பத்து - 31 - 40 கிழத்தி கூற்றுப்பத்து - 61 - 70 நெய்தற்பத்து - 181 - 190
கூறு 5	குறிஞ்சிப்பாட்டு முழுவதும்	

பார்வை நூல்கள்:

1. எஸ். வையாபுரிப்பிள்ளை : சங்க இலக்கியம்
பாரி நிலையம், சென்னை,
2-ஆம் பதிப்பு, 1967.
2. வ.சுப. மாணிக்கனார் : தமிழ்க் காதல்.
பாரி நிலையம், சென்னை,
3-ஆம் பதிப்பு, 1980.
3. அரங்க. இராமலிங்கம் : சங்க இலக்கியத்தில் வேந்தர்
பாரி புத்தக நிலையம், சென்னை-17,
3-ஆம் பதிப்பு, 2003.
4. ரா.பி. சேதுப்பிள்ளை : தமிழர் வீரம்,
பழனியப்பா பிரதர்ஸ், சென்னை-14,
எட்டாம் பதிப்பு, 1966.
5. டாக்டர் மு. வரதராசனார் : நெடுந்தொகைச் செல்வம்,
பாரி நிலையம், சென்னை.

- 4-ஆம் பதிப்பு, 1966.
6. வ.சுப. மாணிக்கம் : சங்க நெறி,
மணிவாசகர் பதிப்பகம், சிதம்பரம்,
முதற்பதிப்பு, 1987.
7. மு. வரதராசனார் : நற்றிணைச் செல்வம்,
பாரி நிலையம், சென்னை,
முதற்பதிப்பு, 1958.
8. புலவர் கா. கோவிந்தன் : குறிஞ்சிக்குமரி,
தேனருவிப் பதிப்பகம், சென்னை - 17.
முதற்பதிப்பு, 1971.
9. சு. வைத்தியநாதன் : தமிழர் சால்பு,
பாரி புத்தகப்பண்ணை, சென்னை,
இரண்டாம் பதிப்பு, 1971.
10. மா. இராசமாணிக்கனார் : பத்துப்பாட்டு ஆய்வு,
சர்வோதய இலக்கியப் பண்ணை,
மதுரை, முதற்பதிப்பு,
1981.
11. தெ.பொ. மீனாட்சிசுந்தரனார் : பத்துப்பாட்டு ஆய்வு,
சர்வோதய இலக்கியப் பண்ணை,
மதுரை,முதற்பதிப்பு, 1981.
12. டாக்டர் ஆ. இராமகிருஷ்ணன் : அகத்திணை மாந்தர் - ஓர் ஆய்வு,
சங்க இலக்கியப் பண்ணை,
மதுரை,முதற்பதிப்பு, 1982.
13. பெ. மாதையன் : அகத்திணைக் கோட்பாடுகள்,
நியூ செஞ்சரி புக் ஹவுஸ், சென்னை.
14. அம்மன்கிளி முருகதாஸ் : சங்க அகத்திணை மரபும் மாற்றமும்
குமரன் புத்தகநிலையம், சென்னை.
15. கா. சிவத்தம்பி : பண்டைத் தமிழ்ச் சமூகம் - (வரலாற்றுப்
புரிதலை நோக்கி) மக்கள் வெளியீடு, சென்னை.
16. க. கைலாசபதி : தமிழ் வீரநிலைக் கவிதை,
குமரன் புத்தக நிலையம், சென்னை, 2012.

தாள் 9

ஆராய்ச்சி நெறிமுறைகள்

- கூறு 1 : ஆராய்ச்சி: நெறிமுறைகள் விளக்கம் - ஆராய்ச்சிப் பொருள் - ஆய்வாளர்க்குரிய தகுதிகள் - ஆராய்ச்சி வகைகள் - அணுகுமுறைகள் கருதுகோள் ஆய்வுச் சிக்கல்கள்.
- கூறு 2 : ஆய்வின் அடிப்படை நெறிமுறைகள்: ஆய்வுப் பொருளைத் தெளிவாகச் சுட்டல் - ஆய்வுப் பொருள் பற்றி இதுவரை செய்யப்பட்ட ஆய்வுகள் - ஆராயப்பட வேண்டியன - ஆராயப்பட வேண்டுவனவற்றுள் இப்போது எடுத்துக்கொள்ளப்பட வேண்டியன.
- கூறு 3 : ஆய்வுலக அடிப்படைக் கோட்பாடுகள்: செய்திகள்(Facts) - கருத்துகள் - விதி (Law) - கொள்கை (Theory) - வகைப்பாடு (Classification) - கோட்பாடுகள் - அறிவியல் ஆய்வும் - கலையியல் ஆய்வும்.
- கூறு 4 : ஆய்வேட்டின் அமைப்பும் வரைவு முறையும்: ஆய்வேட்டின் அமைப்பு - தகவல் திரட்டல் - திட்டமிடுதல் - ஆய்வு மொழிநடை - முதல் படி (First Draft) - திருத்தப்படி (Revised Draft) - அடிக்குறிப்பு (Footnote) - துணைநூற்பட்டியல் (Bibliography) - குறுக்க விளக்கம் - முன்னுரை - முடிவுரை - பரிந்துரை - படங்கள் - அட்டவணைகள் - பொருட்குறிப்பு அகராதி.
- கூறு 5 : தமிழாய்வுப் பரப்பு - இலக்கிய ஆய்வு - ஒப்பிலக்கிய ஆய்வு - இலக்கிய வரலாற்று ஆய்வு - இலக்கண ஆய்வுமொழி வரலாற்று ஆய்வு - அகராதி ஆய்வு - தமிழியலும் மொழியியலும் - தமிழியலும் பண்பாட்டியலும் - தமிழியலும் நுண்கலைகளும் - தமிழியலும் உளவியலும் - தமிழியலும் தொல்பொருள் அகராதி.

பார்வை நூல்கள்:

1. டாக்டர் ச.வே. சுப்பிரமணியன் : ஆராய்ச்சி நெறிமுறைகள்,
(ப.ஆ) உலகத் தமிழாராய்ச்சி நிறுவனம்,
தரமணி, சென்னை, 1975.
2. டாக்டர் ஈ.சா. விசுவநாதன் : ஆய்வு நெறிமுறைகள்,
தமிழ்ப்புத்தகாலயம்,
சென்னை, 1986.
3. டாக்டர் முத்துச்சண்முகம் : ஆய்வுக்கட்டுரை எழுதும் முறை.
டாக்டர் ச. வேங்கடராமன் : முத்துப் பதிப்பகம்,
மதுரை, 1979.
4. டாக்டர் பொற்கோ : ஆராய்ச்சி நெறிமுறைகள்,
ஐந்திணைப் பதிப்பகம்.
279. பாரதி சாலை, திருவல்லிக்கேணி.
சென்னை - 5,2005.
5. டாக்டர் என். கணேசன் : ஆய்வியல் கோட்பாடுகளும் செயல்முறைகளும்,
பயோனியர் புக் சர்வீஸ், சென்னை - 5,
1991.
6. டாக்டர் வே. சிதம்பரநாதன் : ஆய்வியல் முறைகள்,
சுபா பதிப்பகம், நாகர்கோவில்,1987.
7. முனைவர் கு.வே. பாலசுப்பிரமணியன் : ஆய்வியல் நெறிகள்,
உமா நூல் வெளியீட்டகம்,
156, காமாட்சி அம்மன் கோயில் தெரு,
மருத்துவக் கல்லூரிச் சாலை, தஞ்சாவூர் - 4,
2004

தாள் -10

தொல்காப்பியம் - பொருளதிகாரம் I

கூறு 1	:	அகத்திணையியல்
கூறு 2	:	புறத்திணையியல்
கூறு 3	:	களவியல்
கூறு 4	:	கற்பியல்
கூறு 5	:	பொருளியல்

பார்வை நூல்கள்:

1. மு. சண்முகம் பிள்ளை(ப.ஆ) : தொல்காப்பியம் பொருளதிகாரம், 184, பிராடடவே, முல்லை நிலையம், சென்னை - 600 108.
2. ச.வே. சுப்பிரமணியம்(ப.ஆ) : தொல்காப்பியம் பொருளதிகாரம், உலகத் தமிழாராய்ச்சி நிறுவனம், தரமணி, சென்னை - 608 113.
3. சுந்தரமூர்த்தி (ப.ஆ) : தொல்காப்பியம் பொருளதிகாரம், அண்ணாமலைப் பல்கலைக்கழகம், அண்ணாமலை நகர் - 608 002.
4. டாக்டர் க.ப. அறவாணன் : அற்றைநாள் காதலும் வீரமும், தமிழ்கோட்டம், கஜபதி நாயுடு தெரு, அமைந்துரை, சென்னை - 600 030, 1971.
5. மொ.அ. துரை அரங்கனார் : தொல்காப்பிய நெறி.
6. ஆ. சிவலிங்கனார் : தொல்காப்பிய உரைவளம், உலகத் தமிழாராய்ச்சி நிறுவனம், தரமணி, சென்னை - 600 113, 1982.

விருப்பப்பாடம்

1. சிற்றிலக்கியம்

- கூறு 1 : கலம்பகம் - நந்திக்கலம்பகம்- 1-30 பாடல்கள்
- கூறு 2 : பிள்ளைத்தமிழ் - சேக்கிழார் பிள்ளைத்தமிழ் - கர்ப்பப்பருவம்
- கூறு 3 : பரணி கலிங்கத்துப்பரணி - கடை திறப்பு (21-74) காடு பாடியது (75-96)
- கூறு 4 : பள்ளு - முக்கூடற்பள்ளு - நாட்டு வளம், நகர் வளம் (16 -26)
- கூறு 5 : குற்றாலக் குறவஞ்சி - குறத்தி வருதல் முதல் குறி சொல்லுகல் வரை (39-69 வரை)

பார்வை நூல்கள்:

1. டாக்டர் இரா. கண்ணன் : சிற்றிலக்கிய ஆராய்ச்சி (2 தொகுதிகள்) அப்பர் பதிப்பகம், 3/401, வள்ளலார் தெரு, அண்ணாநகர், சென்னை - 55 முதற்பதிப்பு, 2002.
2. ந.வீ. செயராமன் : சிற்றிலக்கியச் செல்வம், மணிவாசகர் பதிப்பகம், சென்னை, 1969.
3. டாக்டர் அ. ஆனந்த நடராசன் : தமிழில் தூது இலக்கிய வளர்ச்சி, அண்ணாமலைப் பல்கலைக் கழகம், அண்ணாமலைநகர், 1997.
4. டாக்டர் நிர்மலா மோகன் : குறவஞ்சி இலக்கியம், மணிவாசகர் பதிப்பகம், சிதம்பரம், 1985.
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2 தமிழ் இலக்கண வரலாறு

- கூறு 1 : இலக்கண வரலாறு – முந்து நூல் - அகத்தியம் - தொல்காப்பியம்.
- கூறு 2 : பிறகால எழுத்து, சொல்லிலக்கண வளர்ச்சி – நன்னூல் - நேமிநாதம் - வீரசோழியம் - இலக்கண விளக்கம் - தொன்னூல் விளக்கம் - முத்துவீரியம் - சுவாமிநாதம்.
- கூறு 3 : பிற்காலப் பொருள் - யாப்பு அணியிலக்கண வளர்ச்சி
இறையனார் அகப்பொருள் - நம்பியகப்பொருள் - மாறன் அகப்பொருள் - புறப்பொருள் வெண்பாமாலை, வீரசோழியம் இலக்கண விளக்கம் - தொன்னூல் விளக்கம் - முத்துவீரியம் - சுவாமிநாதம் - யாப்பருங்கலம், யாப்பருங்கலக் காரிகை, தண்டியலங்காரம். மாறனலங்காரம்.
- கூறு 4 : பாட்டியல் நூல்களின் வளர்ச்சி
- கூறு 5 : நிகண்டுகள், அகராதிகள்

பார்வை நூல்கள்:

1. புலவர் இரா. இளங்குமரன் : இலக்கண வரலாறு, மணிவாசகர் பதிப்பகம், சென்னை – 600 001.
2. பேரா. சோம. இளவரசு : இலக்கண வரலாறு, மெய்யப்பன் பதிப்பகம், சென்னை – 608 001.
3. இரா. இளங்குமரன் : இணைச் சொல்லகராதி, கழகப் பதிப்பு, சென்னை, 1985.
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6. எ.ஸ். வையாபுரிப்பிள்ளை : அகராதி நினைவுகள், தமிழ்ப் புத்தகாலயம், சென்னை, முதற்பதிப்பு, 1959.
7. பெ. மாதையன் : தமிழ் அகராதிகளில் வினைப்பதிவமைப்பு நெறிமுறைகள், நியூ செஞ்சரி புக் ஹவுஸ் லிட், சென்னை, முதற்பதிப்பு, 2009.

OPEN ELECTIVE

Paper -3

1 பயன்பாட்டு நாட்டுப்புறவியல்

கூறு - 1 ஊடகங்களில் நாட்டுப்புறவியல்

பிரிவு - 1 இதழ்கள்

பிரிவு - 2 வானொலி

பிரிவு - 3 தொலைக்காட்சி

பிரிவு - 4 திரைப்படம்

கூறு - 2 விளம்பரங்களில் நாட்டுப்புறவியல்

பிரிவு - 1 கதைகள்

பிரிவு - 2 பாடல்கள்

பிரிவு - 3 கலைகள்

பிரிவு - 4 இசைக்கருவிகள்

கூறு - 3 தகவல் பரிமாற்றத்தில் நாட்டுப்புறவியல்

பிரிவு - 1 அரசின் திட்டங்கள்

பிரிவு - 2 விழிப்புணர்வு நிகழ்ச்சிகள்

பிரிவு - 3 உள்ளூர் விழாக்கள்

பிரிவு - 4 ஒளிநாடா, குறுந்தகடுகள்

கூறு - 4 நவீன நாடகங்களில் நாட்டுப்புறவியல்

பிரிவு - 1 கதைகள்

பிரிவு - 2 பாடல்கள்

பிரிவு - 3 கலைகள்

பிரிவு - 4 இசைக்கருவிகள்

கூறு - 5 இணையத்தில் நாட்டுப்புறவியல்

பிரிவு - 1 கட்டுரைகள்

பிரிவு - 2 படங்கள்

பிரிவு - 3 ஒலி, ஒளிப்படங்கள்

பிரிவு - 4 நிகழ்வுகள்

பார்வை நூல்கள்:

1. ஆறு. ராமநாதன், நாட்டுப்புறக் கலைகள் - நிகழ்த்து கலைகள்
மெய்யப்பன் தமிழாய்வலம், சிதம்பரம்.
- சேவியர் அந்தோணி, : ஈர்ப்பு விசை (பயன்பாட்டு நாட்டுப்புறவியலும்
ஆய்வும்)
வைகறைப்பதிப்பகம், திண்டுக்கல் - 1.
2. சே. ஏ. குணசேகரன் : நாட்டுப்புற நிகழ்கலைகள் ஒரு பார்வை
நியூ செஞ்சரி புக் ஹவுஸ்
சென்னை

2 அறிவியல் தமிழ்

- கூறு 1 : அறிவியலும் அறிவியல் சார்ந்த விளக்கங்களும்:
அறிவியல் சொல்லும் பொருளும் - அறிவியல் சிந்தினை மற்றும் அறிவியல் வரலாறு - அறிவியல் அறிஞர்கள் - தமிழில் வெளிவந்த அறிவியல் ஆய்வுகள், நூல்கள், கட்டுரைகள், இதழ்கள் ஆகியவற்றின் பங்கு பணி - அறிவியலின் இன்றியமையாமை
- கூறு 2 : தமிழும் அறிவியலும்
இலக்கண இலக்கியங்களில் பதிவாகியுள்ள அறிவியல் தகவல்கள் - தமிழும் கணிதமும் - தமிழும் மருத்துவமும் - தமிழும் வேளாண்மையும் - தமிழும் பொறியியலும் - தமிழும் உயிரியலும் - தமிழும் கணினியும்
- கூறு 3 : அறிவியலும் சித்தர்களும்
சித்தர்களின் அறிவியல் பதிவுகள் - சித்தர்களின் மருத்துவ அறிவு - சித்தர்களின் உயிரியல், உடலியல் அறிவு - சித்தர்களின் பன்முக அறிவியல் பார்வைகள்
- கூறு 4 : தமிழும் வானவியலும்
தமிழிலக்கிய இலக்கணங்களில் பதிவாகியுள்ள கோள்கள், நட்சத்திரங்கள் ஆகியன பற்றிய பதிவுகள் - வானியல் பதிவுகளின் வழியாகப் பண்டைத் தமிழர்களின் புலமையை எடுத்துரைத்தல் - சூரியன், சந்திரன்,
புதன், வியாழன், வெள்ளி, சனி, ஆகிய தலைமைக் கோள்களின் இயக்கங்களைப் பற்றிய குறிப்புகளை அறிதல் - சிறப்பாக வெள்ளியின் இயக்ககடையை வழிகெழும் மழை நிலையும் கண்டறிதல் - இன்ன பிற கோள்கள் பற்றிய குறிப்புகளையும் வானியல் தகவல்களையும் எடுத்துரைத்தல்.
- கூறு 5 : அறிவியல் கலைச் சொல்லாக்கம்
அறிவியல் துறைகளில் கலைச் சொல்லாக்கத்தின் பங்கும் பணியும் - அறிவியல், கணிதவியல், வானியல், கணினியியல் முதலான பல்துறைகளின் கலைச் சொல்லாக்கங்கள் - கலைச் சொற்களை ஒலி பெயர்ப்பும், மொழிபெயர்ப்பும் செய்தல் - புதுச் சொல்லாக்கம்.

பார்வை நூல்கள்:

1. கு.வி. கிருஷ்ணமூர்த்தி: அறிவியலின் வரலாறு
பேராசிரியர் -
தலைவர்
தாவர அறிவியல் துறை,பாரதிதாசன்
பல்கலைக்கழகம்
திருச்சிராப்பள்ளி - 620 024
2. கா.செ. செல்லமுத்து : கணிப்பொறியும் பேசிக் மொழியும்
தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்
3. சத்தியபாமா காமேஸ்வரன் : கணக்கதிகாரம்,
(பதிப்பாசிரியர்) சரசுவதி மகால் வெளியீடு,
தஞ்சாவூர், முதற்பதிப்பு - 1998
4. அ. சிவபெருமான் : இலக்கியங்களில் வானியல் பதிப்புத்துறை,
அண்ணாமலைப்
பல்கலைக்கழகம்,அண்ணாமலை நகர் - 608
002
முதற்பதிப்பு - 1997, விலை ரூ.30
5. ந. கடிகாசலம் : தமிழும் பிற துறைகளும்
(பதிப்பாசிரியர்) உலகத்தமிழ் ஆராய்ச்சி
நிறுவனம்,
தரமணி, சென்னை - 113, ஆகஸ்டு - 1994
6. இராதா செல்லப்பன் : கலைச் சொல்லாக்கம்
நவல் கட் பரிரிண்டர்ஸ் சென்னை - 14.
7. அ. சிவபெருமான் : தமிழரின் வானியல் திறன்
திருவருள் நிலைய
வெளியீட்டகம் முகையூர் -
அஞ்சல்
விழுப்புரம் மாவட்டம் - 606 306
முதற்பதிப்பு - 1993, விலை ரூ. 25
8. இராம. சுந்தரம் : தமிழக அறிவியல் வரலாறு
தமிழ்ப்பல்கலைக்கழகம்
மறுதோன்றிஅச்சகம், தஞ்சாவூர் -
5
ஆகஸ்டு - 2006
9. அ. சிவபெருமான் : தமிழும் அறிவியலும்
இணைப்பேராசிரியர், தமிழியல்
துறை, அண்ணாமலைப்
பல்கலைக்கழகம், முதற்பதிப்பு -
2006, விலை ரூ. 50
10. இரா. பாவேந்தன் : தமிழில் அறிவியல் இதழ்கள்
சாமுவேல் .பிஷ்கிர்ன் பதிப்பகம்,
தமிழ்நாடு வேளாண்
பல்கலைக்கழகம். கோவை ஆகஸ்டு
- 1998

11. இராம. சுந்தரம் : பொருள் புதிது வளம் புதிது
வசந்தம் வெளியீடு, 71, செல்லையா நகர்,
பிள்ளையார்பட்டி அஞ்சல்,
தஞ்சாவூர், ஆகஸ்டு - 1999
12. அனுபவ சித்த மருத்துவர்கள் சங்கம் : அனுபவ சித்த மருத்துவம்
ஐந்தாம் ஆண்டு மாநாட்டு மலர், நம்பகம்
61/58
பனந்தோப்புத் தெரு,
மயிலாடுதுறை, முதற்பதிப்பு -
2005
13. அனைத்திந்திய அறிவியல் : இலக்கியமும் வேளாண்மையும்
தமிழ்க்கழகம் அறிவியல் தமிழ் மற்றும் தமிழ்
வளர்ச்சித்துறை, தமிழ்ப்பல்கலைக்கழகம்,
தஞ்சாவூர் - 613 005
முதற்பதிப்பு - பிப்ரவரி 2000, விலை ரூ.190

**பருவம் நான்கு
தாள் -11
சங்க இலக்கியம் (புறம்)**

- கூறு 1 : புநானூறு – பரணர் பாடல்கள் - 4,63,141,142,144,145,336,341,343,348
பெருஞ்சித்திரனார் பாடல்கள் - 158,159.160,161,162,163,207,208,237,238
- கூறு 2 : புறநானூறு பெண்பாற்புலவர்கள்
ஒளவையார் - 91,92.93,94.95,96,97,98,99,100
மாதோக்கத்து நப்பசலையார் - 37,39.126,174,226,280,383
நக்கண்ணையார் - 83,84,85
- கூறு 3 : பதிற்றுப்பத்து – 3ம் பத்து முழுவதும்
- கூறு 4 : சிறுபாணாற்றுப்படை முழுவதும்
- கூறு 5 : பரிபாடல் - வையை – நல்லந்துவனர் - 6 ஆம் பாடல் - விரிகதிர்
செவ்வேள் - 5 ஆம்பாடல் - பாயிரும் பனிக்கடல்
திருமால் - 2 ஆம்பாடல் - (தொன்முறை தொடங்கும்)

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வரிசைகள்

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தாள் -12 தொல்காப்பியம் -
பொருளதிகாரம் II

கூறு 1	:	மெய்ப்பாட்டியல்
கூறு 2	:	உவமயியல்
கூறு 3	:	மரபியல்
கூறு 4	:	செய்யுளியல் - I சூத்திரம் 1 முதல் 118 வரை
கூறு 5	:	செய்யுளியல் - II சூத்திரம் 119 முதல் 235 வரை

பார்வை நூல்கள்

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2. ச.வே. சுப்பிரமணியம்(ப.ஆ) : தொல்காப்பியம் பொருளதிகாரம் (உரை வளங்கள்), உலகத் தமிழாராய்ச்சி நிறுவனம், தரமணி, சென்னை - 600 113.
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5. வ.சுப. மாணிக்கம் : தொல்காப்பியத் திறன், மணிவாசகர் பதிப்பகம், 31. சிங்கர் தெரு, பாரிமுனை, சென்னை - 600 108.

விருப்பப்பாடம் -3

இந்தியத் தத்துவங்கள்

- கூறு 1 : இந்தியத் தத்துவம், உலகாயதம், ஆசீவகம்
- கூறு 2 : சமணம், சிலம்பில் சமணம், பௌத்தம், யோகம், நியாயம்
- கூறு 3 : வைசேடிகம், பூர்வ மீமாம்சம், சத்த பிரமவாதம், வேதாந்தம், பரிணாமவாதம்
- கூறு 4 : காசுமீர், சைவ சித்தாந்தம், பாசுபத சைவம், வீரசைவம்
- கூறு 5 : வைணவம், துவைதம், சித்தர், சித்தாந்தம், வள்ளலரின் சன்மார்க்கம்.

பார்வைநூல்

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2. க.நெடுஞ்செழியன் : ஆசீவகமும் அய்யனார் வழிபாடும்
3. க.நெடுஞ்செழியன் : தமிழிலக்கியத்தில் உலகாயதவாதம்
ஆசீவகம் என்னும் தமிழர் அணுவியம்

2 கணினித் தமிழ்

- கூறு 1 : கணினி – பொது அறிமுகம் - கணினி வரலாறு – வன்பொருளும் மென்பொருளும் (Hardware and Spftware) – கணினியின் அமைப்புச் செயல்பாடு – கணினியின் இன்றைய வளர்ச்சி.
- கூறு 2 : கணினி மொழிகளும் நிரல் உருவாக்கமும் (Computer Languages & Programming), இயந்திர மொழி – சுட்டு மொழி – உணர்நிலை மொழி – மென்பொருள் நிரல் உருவாக்கம் (Software pProgramme) – செயற்பாட்டு மென்பொருள் (System Software) – பயன்பாட்டு மென்பொருள் (Application Software) – பல்லாடகம் (Multimedia) - இணையம் (Internet) – மின்னஞ்சல் (E-mail) – கணினியின் ஏனைய பயன்பாடுகள்.
- கூறு 3 : கணினி மொழியியல் (Computational Linguistics) இயற்கை மொழிகள் ஆய்வு (Natural Language Processing – NLP) - இயந்திர மொழிபெயர்ப்பு (Machine Translation) – கணினி அகராதியியல் (Computer Lexicography) – தரவு மொழியில் (Copus Linguistics) – சொல்பிரிப்பான் (Paser)
- கூறு 4 : ஒளி வழி எழுத்துப் படிப்பான் (Ootucak Character Recognizer) – கணினி நோக்கில் மொழி ஆய்வு – மொழி நோக்கில் கணினி ஆய்வு – செயற்கை அறிவுத் திறன் - கணினி இலக்கிய ஆய்வு
- கூறு 5 : தமிழ்ச் சொல்லாளர் - சொல்லாளரில் இடம் பெறும் மொழிக் கருவிகள் சொற்பிழை திருத்தி – சந்திப்பிழை திருத்தி - இலக்கணப்பிழை திருத்தி – பல்வேறு அகராதிகள் - சொல்லடைவு – அகரவரிசைப்படுமுத்தல் - ஏனைய மொழிக்கருவிகள் - பக்க வடிவமைப்பு - இடைவெளி அமைத்தல் - பத்தி வடிவமைப்பு – எழுத்துரு – படம், அட்டவணை இணைத்தல் - கோடு போன்றவை வரைதல் - அடைப்புப் பெட்டி உருவாக்குதல் - அடிக்குறி எண்ணிடல் - பொட்டிடல் - அச்சிடுதல்.

பார்வை நூல்கள்:

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2. கே. புவனேஸ்வரி : விஷ்வல் பேசிக், கலைஞன் பதிப்பகம், சென்னை – 17, பதிப்பு, 2005.
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நான்காம் பதிப்பு, 1994.
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19. எஸ். துணிக்கை அரசு: விண்டோஸ் 95 & 98,
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20. இராம்குமார் : கணிப்பொறி ஓர் அறிமுகம்,
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21. க. அபிராமி : மல்டிமீடியா கற்றுக் கொள்ளுங்கள்,
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OPEN ELECTIVE

Paper - 4

1. திருவள்ளுவம்

- கூறு 1 : திருக்குறள் உள்ளடக்கமும் அமைப்பும் - பால், இயல், அதிகாரப்பகுப்பு, வைப்புமுறை, பெரும்பான்மை சிறுபான்மைக் கருத்துகள் - பெண்ணியச் சிந்தனைகள் - அரசியல், சமூகப் பொருளாதாரச் சமயச் சிந்தனைகள்.
- கூறு 2 : திருக்குறள் உரைகள் - மொழிபெயர்ப்புகள், பதிப்புகள் - அமைப்புகள், பரிசுகள், ஆளுமைகள் - திறனாய்வுகள், ஆய்வுகள், நூல்கள், கட்டுரைகள்
- கூறு 3 : திருக்குறளில் இலக்கண மொழியியல் பார்வை: எழுத்து, சொல், தொடர், வாக்கியம் - கூற்று: ஒலியன், உருபன், தொடரன், பொருளன், கருத்தாடல் - புணர்ச்சி இலக்கணம் - உருபொலியன்கள்., திருக்குறள் அகராதிகள், சொல்லடைவுகள், பொருளடைவுகள்
- கூறு 4 : யாப்பியல் நோக்கு : எழுத்து, அசை, சீர், தளை, யாப்பு, அடி
- கூறு 5 : அழகியல் - அணியியல் நோக்கு - அணி வகைகள். சொல்லணிகள் - பொருளணிகள் - இசைக்கூறுகள் - ஒலிநயம் - தொடை வகைகள்

பார்வை நூல்கள்:

1. செ.வை. சண்முகம் : குறள் வாசிப்பு, மணிவாசகர் பதிப்பகம், 31, சிங்கர் தெரு, பாரிமுனை, சென்னை - 600 108, முதற்பதிப்பு, டிசம்பர் - 1984.
2. குன்றக்குடி அடிகளார் : குறட்செல்வம், கலைவாணி புத்தகாலயம், சென்னை, இரண்டாம் பதிப்பு, 1984.
3. மு. வரதராசன் : திருவள்ளுவர் அல்லது வாழ்க்கை விளக்கம், பாரி நிலையம். சென்னை, நான்காம் பதிப்பு, 1956.
4. பரிமேலழகர் : திருக்குறள் மூலமும் உரையும், கழக வெளியீடு, பதிப்பு, 1967.
5. க.த. திருநாவுக்கரசு : திருக்குறளும் இந்திய அறநூல்களும். மணியகம், சென்னை, முதற்பதிப்பு, 1978.
6. க.த. திருநாவுக்கரசு : திருக்குறள் நீதி இலக்கியம்,

- சென்னைப் பல்கலைக்கழகம்,
சென்னை, முதற்பதிப்பு, 1971.
7. ச. தண்டபாணி தேசிகர்: திருக்குறள் உரைக்களஞ்சியம் அறத்துப்பால்,
மதுரை காமராசர் பல்கலைக்கழகம்,
மதுரை, முதற்பதிப்பு, 1983.
8. சோ.ந. கந்தசாமி : திருக்குறள் கூறும் உறுதிப்பொருள்,
மெய்யப்பன் தமிழாய்வகம்,
53. புதுத்தெரு, சிதம்பரம் - 608
001. முதற்பதிப்பு, 2002.
9. கொற்றாங்காரி : திருக்குறள் வழங்கும் செய்தி,
மணிவாசகர் பதிப்பகம்.
சிதம்பரம், முதற்பதிப்பு, 2003.
10. க.ப. அறவாணன் : திருவள்ளுவர்,
தமிழ்க் கோட்டம், சென்னை -
29, முதற்பதிப்பு, 2006.
11. வ.சுப. மாணிக்கனார் : வள்ளுவம்,
மணிவாசகர் பதிப்பகம்.
55. லிங்கித் தெரு, சென்னை - 600 001,
இரண்டாம் பதிப்பு. 1993.
12. இரா. சாரங்கபாணி : வள்ளுவர் வகுத்த காமம்,
அண்ணாமலைப் பல்கலைக்கழகம்,
அண்ணாமலைநகர்.
முதற்பதிப்பு, 1994.
13. கவிக்குயில் பெ. வரதராசன் : திருவள்ளுவர் கூறும் இல்லற இன்பம்,
தேன்மொழிப் பதிப்பகம்,
கொழுந்தம்பட்டு அஞ்சல் - 606 706,
திருவண்ணாமலை மாவட்டம்.
14. மு. சண்முகம்பிள்ளை : திருக்குறள் அமைப்புமுறைகள்,
சென்னைப் பல்கலைக்கழகம், சென்னை.
முதற்பதிப்பு, 1971.
15. மு. வரதராசன் (பதி) : திருக்குறள் அணிநலம்.
சென்னைப் பல்கலைக்கழகம், சென்னை.
முதற்பதிப்பு.,
16. சாமி. வேலாயுதம் : திருக்குறள் சொல்லடைவு,
கழக வெளியீடு, சென்னை - 1, 2002.
17. R. Baskar : Computer Analisis of Thirukkural,
Thamil University, Thanjavur

4. இளங்கோவடிகள்

கூறு 1

இளங்கோவடிகள் வரலாறு - அரசர் வணிகர் சமயம் சைவம் - காலம் - இரண்டு
16ஆம்நூற்றாண்டு அகச்சான்று -புறச்சான்று - காப்பியகாலச்சூழல் - சமகால இலக்கியம்

கூறு 2

காப்பிய இலக்கணம் - காப்பிய வகைகள் - சிலம்பு பெறும் இடம் - குடிமக்கள் காப்பியம் -
தேசியக்காப்பியம் - ஒற்றுமைக்காப்பியம் - முத்தமிழ்க்காப்பியம் - வரலாற்றுக்காப்பியம் -
பிறமொழிக் காப்பியங்களுடன் ஒப்பீடு.

கூறு-3

சிலப்பதிகாரக்கதை - சங்கஇலக்கியம் கோவலன் கதை - கோவலன் கண்ணகி
நாடகம் - சிலம்பில் நாட்டுப்பறக்கூறுகள் - நாட்டுப்பறக்களங்கள் -
நாட்டுப்பறமாந்தர்கள் - பிறநாடுகளில் கண்ணகி கதை

கூறு-4

இளங்கோவடிகளின் பல்வேறு பரிணாமங்கள் - அரசியல் அறிஞர் - பொருளியல்
வல்லுநர் - சமூகச்சிந்தனைகள் - சாதிசமய பாகுபாடு கடந்தவர் -
பெண்மைபோற்றுபவர் - கவிஞர் -கலைஞர் - அறவோர் -துறவோர்

கூறு 5

சிலப்பதிகாரத்தின் அமைப்பு - காண்டம் - காதை வைப்பு முறை - தொடக்கம் -
முடிவு - மூன்று காண்டத்தின் சிறப்பில்பு - தமிழ் இலக்கியவரலாற்றிலும் தமிழக
வரலாற்றிலும் சிலப்பதிகாரம். இளங்கோவடிகள் குறித்த ஆய்வுகள்

பார்வை நூல்கள்

முனைவர் இராம குருநாதன் சிலப்பதிகாரம் ஆய்வுக்கோவை பழனியப்பா பிரதர்ஸ்
சென்னை 14

ரகுநாதன் இளங்கோவடிகள் யார்? மீனாட்சி புத்தக நிலையம் மதுரை
மது.ச.விமலானந்தம் சிலப்பதிகாரத்திறனாய்வு, மணிவாசகர் பதிப்பகம், சிதம்பரம்.
ச.வே. சுப்பிரமணியன் இளங்கோவின் உத்திகள், உலகத்தமிழாராய்ச்சி நிறுவனம்
சென்னை.

கு.முத்துராசன் காப்பியக் கருத்தோட்டங்கள்
மார்க்கப்பந்து சர்மா சிலம்பின் தனித்தன்மை, மணிவாசகர் நூலகம் ,சிதம்பரம்.
ஜீவப்பந்து ,ஸ்ரீபால் இளங்கோவடிகள் சமயம், ஜைன இளைஞர் மன்றம்,
சென்னை.

ம.பொ.சிவஞானம் சிலப்பதிகாரஆய்வுரை, பூங்கொடி பதிப்பகம்


ANNAMALAI UNIVERSITY

103 B.A. ENGLISH

Programme Structure and Scheme of Examinations (under CBCS)
(Applicable to the candidates admitted in Affiliated Colleges from the academic year
2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours/Week	Credit	Maximum Marks		
					CIA	ESE	Total
SEMESTER- I							
22UTAML11	I	Language Course - I: Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I: Communicative English I	5	3	25	75	100
22UENGC13	III	Core Course - I: Literary Genres and Forms	5	4	25	75	100
22UENGC14		Core Course - II: Symphony of Verse	5	4	25	75	100
22UENGA15		Allied Course -I: Social History of England I	5	3	25	75	100
22UENGS16	IV	Skill Based Course - I: English for Secretarial Practice	3	2	25	75	100
22UENV18	IV	Environmental Studies	2	2	25	75	100
Total			30	21			700
SEMESTER - II							
22UTAML21	I	Language Course - II: Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course - II: Communicative English II	5	3	25	75	100
22UENGC23	III	Core Course - III: Harmony of Prose	5	4	25	75	100
22UENGC24		Core Course -IV: Advanced English Grammar	5	4	25	75	100
22UENGA25		Allied Course - II: Social History of England II	4	3	25	75	100
22UENGS26	IV	Skill Based Course - II: Effective Business Writing	2	2	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28	IV	Soft Skills	2	1	25	75	100
Total			30	21			800

PROGRAMME OUTCOMES

PO1:	A comprehensive understanding of the discipline of literary studies and an awareness of the divergent and plural voices that come into the making of the corpus of literary studies.
PO2:	Analyse a broad range of literatures written in English (including representative authors and major literary periods), recognizing their temporal, social, political, and artistic contexts
PO3:	Utilize literary terminology, critical methods and various lenses of interpretation in their writing.
PO4:	Be able to think creatively and critically so as to write effectively within all these areas of English studies and also to recognise the nature and scope of translation.
PO5:	Apply the rules of English Grammar and Communicative skills for better employability and be inspired for life long learning along with capitalizing on the knowledge gained to address political, socio-economic and gender issues.

SEMESTER - I CORE - I PART - III	22UENGC13: LITERARY GENRES AND FORMS	CREDITS: 4 HOURS: 5
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COURSE OBJECTIVES

1. Introduce the variety of genres and make students familiar with them
2. Help students to get a comprehensive understanding of different forms of literature
3. Develop expertise in understanding specific genres and their characteristics
4. Help the students apply their knowledge of literary forms in speaking, reading, and writing
5. Help students appreciate the scope and richness of literature and its varied forms

Unit 1: Poetry

1. Lyric
2. Ode
3. Sonnet
4. Elegy

Unit 2: Poetry

1. Allegory
2. Satire
3. Ballad
4. Epic

Unit 3: Drama

1. Tragedy
2. Comedy
3. Tragi-Comedy
4. Farce and Melodrama
5. One Act Play

Unit 4: Prose

1. Essay
2. Biography
3. Autobiography

Unit 5: Fiction

1. Historical novel
2. Picaresque novel
3. Stream of Consciousness Novel
4. Short Story

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Exhibit literary competence to answer MCQs for different competitive Examinations.
2. Know about different literary forms
3. Appreciate literature through a study of these genres
4. Get an overall idea of the development and growth of the literary genres

5. Acquire skills in literary writing in the different types of genres of English literature

Text Books

1. Prasad, B. A Background to the Study of English Literature. Chennai: Macmillan, 2005.

Supplementary Readings

1. Abrams, M.H. *A Glossary of Literary Terms*, 7th edition. New Delhi: Cengage Learning India, 2015.
2. Cuddon. J. A. *The Penguin Dictionary of Literary Terms and Literary Theory*, 5th edition. New York: Penguin, 2015
3. Hudson, William Henry. *An Introduction to the Study of Literature*. New Delhi: Kalyani
4. Rees, R.J. *English Literature- An Introduction for Foreign Readers*. London: Macmillan Press, 2016.
5. Mikics, David. *A New Hand Book of Literary Terms*. New Haven: Yale UP, 2007

OUTCOME MAPPING

	P01	P02	P03	P04	P05
C01	3	3	3	2	2
C02	3	3	3	3	2
C03	3	3	3	3	2
C04	3	3	3	3	3
C05	3	3	3	2	2

SEMESTER - I CORE - I PART - III	22UENGC14: SYMPHONY OF VERSE – I	CREDITS: 4 HOURS: 5
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COURSE OBJECTIVES

By introducing the course, it is intended to:

1. Familiarize the historical phases of English poetry
2. Provide glimpses of writers and texts pivotal to an understanding of Literature
3. Highlight the development of poetry across time
4. Enable them to recognize poetry from a variety of cultures, languages, and historic periods
5. Make them understand and appreciate poetry as a literary form

Unit 1: Beginnings

- | | |
|----------------|---|
| 1. Deor's | Lament ; Old English poem from "Exeter Book |
| 2. Spenser | Sonnet 75 |
| 3. John Donne | The Relic |
| 4. John Milton | On His Blindness |

Unit 2: Romantic Poetry

- | | |
|-----------------------|-------------------------------|
| 1. William Wordsworth | Lines Written in Early Spring |
| 2. S.T.Coleridge | Kubla Khan |
| 3. John Keats | Meg Merrilies |
| 4. William Blake | The Poison Tree |

Unit 3: Victorian and Modern Poetry

- | | |
|---------------------------|-----------------------------|
| 1. Tennyson | Break, Break, Break |
| 2. Browning | My Last Duchess |
| 3. Dante Gabriel Rossetti | The Blessed Damozel |
| 4. W.H. Auden. | As I Walked Out One Evening |

Unit 4: American Poetry

- | | |
|---------------------|-----------------------|
| 1. John Berryman | Dream Song 14 |
| 2. James Dickey | The Heaven of Animals |
| 3. Jorie Graham | The Geese |
| 4. Theodore Roethke | My Papa's Waltz |

Unit 5: Indian Poetry

- | | |
|-------------------|--------------|
| 1. Toru Dutt | The Lotus |
| 2. Sarojini Naidu | Transience |
| 3. Arun Kolatkar | An Old Woman |

COURSE OUTCOMES

By the end of this course the students will,

1. Obtain a comprehensive knowledge of poetry over the ages to face MCQs of NET/SET examinations and other competitive examinations
2. Develop critical evaluation skills
3. Develop a deeper appreciation of cultural diversity by getting introduced to poetry from a variety of cultures
4. Develop their own creativity and enhance their writing skills

5. Identify the nuances of poetry that can be used when writing poems

Text Books

1. Green, David., ed. *The Winged Word*. Chennai: Macmillan,1971.
2. Nair, Ramachandran K.R *Gathered Grace: An Anthology of Indian Verse*. New Delhi: Sterling, 1991.
3. Thomas, C.T. *Twentieth Century Verse: An Anglo-American Anthology*. New Delhi: Macmillan, 2006.
4. <http://www.thehypertexts.com/Deor's%20Lament%20Translation.htm>
5. <https://www.poetryfoundation.org/poems/45952/a-poison-tree>
6. <https://poets.org/poem/i-walked-out-one-evening>
7. https://www.best-poems.net/sarojini_naidu/transcience.html
8. <https://www.poetrynook.com/poem/old-woman>

Supplementary Readings

1. Baym, Nina., ed. *The Norton Anthology of English Literature*. (Vol. A) New York www.norton,2012
2. *The Norton Anthology of American Literature*. (Vol. E) New York www.norton,2012

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	2	3
CO3	3	3	3	2	3
CO4	3	2	3	3	2
CO5	2	2	3	3	3

SEMESTER - I SKILL BASED COURSE - I PART - IV	22UENG16: ENGLISH FOR SECRETARIAL PRACTICE	CREDITS: 2 HOURS: 3
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COURSE OBJECTIVES

1. Make the students grasp the strategies involved in developing effective communication.
2. Augment students' language proficiency to meet the demands of the job market.
3. Help students develop management skills and enhance their personality.
4. Empower students' skills and personality.
5. Students get a chance to uplift their skills and gain knowledge in handling correspondence independently.

Unit 1

1. Speaking and expressing ideas and feelings effectively.
2. Listening carefully and providing feedback.
3. Planning and co-ordinating tasks.
4. Negotiating with and persuading others.

Unit 2

1. Business Writing Today.
2. Choosing the Right Word
3. Special Writing and Research projects

Unit 3

1. Working well under pressure and accepting responsibility
2. Ability to prioritise tasks on your own
3. Self-evaluation and decision making

Unit 4

1. Personality development
2. Creating and using blogs
3. E-learning

Unit 5

1. Technical Reports
2. Forms, Memos , E-mail
3. Business Letters
4. The Job Search Resumes and Letters

COURSE OUTCOMES

This course will enable students to

1. Read and interpret documents, plan and organise work processes, identify materials.
2. Perform tasks with due consideration.
3. Apply professional skill, knowledge and employability while performing jobs.
4. Understand the nature and scope for communication in different jobs.
5. Provide students a wide-range of writing knowledge in business communication

Text Books

1. Kumar, Sanjay. Communication Skills, 2nd edition, Oxford University Press,2015.
2. Mitra K.Barun. Personality Development.2nd edition,Oxford University Press,2016.
3. Jones K.Lawrence.Job Skills for the 21st Century; a Guide for Students. Greenwood Press, 1995.
4. Biech, Elaine. Skills for Career Success, Audio Book, narrated by Williams, Tiffany.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	3	3
CO2	2	2	3	3	3
CO3	2	2	3	3	3
CO4	2	2	3	2	3
CO5	2	2	3	3	3

SEMESTER- II CORE - III PART - III	22UENGC23: HARMONY OF PROSE I	CREDITS: 4 HOURS: 5
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COURSE OBJECTIVES

By introducing the course, it is intended to:

1. Introduce the learners to the various themes and techniques explored by popular prose writers
2. Conceive ideas about political and social situations of different periods
3. Help the students acquire the social and ethical values through the study of prose
4. Introduce the historical, cultural, and social contexts in English prose
5. Enable the students to acquire an adequate exposure to important prose writers of the English language

Unit 1: 17th and 18th centuries

- | | |
|-----------------------|-------------------------|
| 1. Francis Bacon | Of Studies |
| 2. Joseph Addison | Sir Roger At the Church |
| 3. Sir Richard Steele | The Coverley Household |

Unit 2: Neo classical Age

- | | |
|------------------------------|------------------|
| 1. Oliver Goldsmith | The Man in Black |
| 2. Thomas Babington Macaulay | Oliver Goldsmith |

Unit 3: Romantic Age

- | | |
|------------------|---------------------------|
| 1. Charles Lamb' | Dream Children, A Reverie |
| 2. E.V.Lucas | Third Thoughts |

Unit 4: Modern Age -I

- | | |
|--------------------|------------------|
| 1. G.K. Chesterton | A Piece of Chalk |
| 2. J.B. Priestley | Lectures |

Unit 5: Modern Age-II

- | | |
|-----------------|--------------------|
| 1. Robert Lynd | Forgetting |
| 2. A.G.Gardiner | A Fellow Traveller |

COURSE OUTCOMES

At the end of the course, the student will be able to:

1. Obtain a literary acumen that would help to face MCQs of NET/SET examinations and other competitive examinations
2. Understand the structure and techniques used in prose by different writers
3. Comprehend the social and cultural contexts of literature through prose writings
4. Appreciate the literary and philosophical thoughts of prose writers
5. Acquire a comprehensive knowledge of the various styles practised by the prose writers

Text Books

1. Nayar, M. G. Ed. A Galaxy of English Essayists: From Bacon to Beerbohm. Chennai: Macmillan, 2012.

Supplementary Readings

1. Bacon, Francis. *The Essays*. New York: Peacock, 2016.
2. Goldsmith, Oliver. *Oliver Goldsmith: A Selection from His Works with an Introduction by E. E. Hale*. New York: Forgotten Books, 2018.
3. Lamb, Charles. *Selected Prose*. New York: Penguin, 2014.
4. Chesterton, G. K. *The Selected Works of G. K. Chesterton*. New York: Wordsworth, 2008.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	2	3	2	3
CO3	3	3	3	3	3
CO4	3	2	3	2	3
CO5	2	3	2	3	2

SEMESTER - II CORE - IV PART - III	22UENGC24 - ADVANCED ENGLISH GRAMMAR	CREDITS: 4 HOURS: 5
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COURSE OBJECTIVES

1. Enable students to understand the rudiments of English Grammar.
2. Learners acquire a proper idea of Grammar and Linguistic conventions.
3. Obtain a distinct knowledge of how to use Grammar impeccably.
4. Enable them to write clearly, accurately and coherently.
5. Enhance their confidence in using English for communication.

Unit 1

Parts of speech – Noun – Verb – Adjective – Adverb – Preposition – Pronoun – Conjunction – Interjection – Definition – Types - Examples.

Unit 2

Types Sentences-Declaratives-Interrogatives-Imperative-Exclamatory and Question Tags-Sentence pattern.

Unit 3

Phrases, Clauses and Idiomatic Expressions.

Unit 4

Direct and Indirect Speech

Unit 5

Common Errors and correct English usage.

COURSE OUTCOMES

At the end of the course, the students will be able to:

1. Gain an explicit knowledge of how the language works.
2. Develop mastery over sentence pattern.
3. Enrich their vocabulary.
4. Acquire a strong command of the spoken and written language.
5. Develop competency over the right usage of English.

Text Books

1. Hewings, Martin. Advanced English Grammar, New Delhi: Cambridge University Press, 1999.
2. F.T .Wood .A Remedial English Grammar for Foreign Students .Macmillan Publishers, 2005.
3. Greenbaum, Sidney, Oxford English Grammar. Indian Edition. Oxford University Press, 2005.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	3
CO2	2	2	3	3	3
CO3	3	2	3	2	3
CO4	3	3	3	3	3
CO5	3	3	2	3	3

SEMESTER - II SKILL BASED COURSE- II PART - IV	22UENGS26: EFFECTIVE BUSINESS WRITING	CREDITS: 2 HOURS: 2
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COURSE OBJECTIVES

1. To make students acquire basic business writing skills.
2. To cater to the needs of intended audience.
3. To produce more focused, polished and effective business documents.
4. To teach them how to maintain consistency in writing
5. To know how to communicate ideas for maximum positive impact

Unit 1: Basics of Business English

1. Business English as a Genre
2. Importance of Effective Communication in Business Contexts
3. Face-to-Face Communication with customers and Visitors
4. Preparing Agenda for Meetings
5. Making Business Presentations
6. Brainstorming and Consensus-making Communications

Unit 2: Transactional Writing

1. Standard Business Letters
2. Answering Letters
3. Drafting E-mail for Business Correspondence
4. Writing Short Reports
5. Technical Writing

Unit 3: Business Discussions/ Meetings/ Team Skills

1. Making notes of Business Conventions
2. Business Promotions and Language for Advertising
3. Soft skills for Team Building
4. Making Appointments
5. Cancelling or postponing Appointments

Unit 4: Business Skills

1. Note Making
2. Report Writing
3. Format of Standard Business Letter
4. Resume Writing

Unit 5: Business Jobs & Careers

1. Applying for Jobs, Preparing Resumes
2. Writing Cover Letters for Resumes
3. Preparing for Interviews
4. Promotion Interviews

COURSE OUTCOMES

At the end of the course students will learn

1. The ability to write the business contents efficiently and appropriately.
2. To identify the skills of business writing.
3. Techniques for editing and proof reading.
4. To write effectively for their purpose: to inform, respond or persuade
5. The impact will be on their professional written communication.

Text Books

1. Dutt, Kiranmai. PandGeethaRajeevan. *Basic Communication Skills*. New Delhi: Cambridge University Press India Pvt. Ltd., 2007. Print.
2. Pillai, Radhakrishna.G, Rajeevan.K, BhaskaranNair.P. *Written English For You*. Madra: Emerald Publishers, 1994. Print.
3. Ravindran. Padma, M.D.V.Kalyani Annie and Board of Editors. *Interface I*.New Delhi: Cambridge University Pres India Pvt. Ltd., 2007. Print.
4. Samson.T, Geetha Rajeevan and Consultant Editor. *Interface 2*. New Delhi: Cambridge University Press India Pvt. Ltd., 2008. Print.
5. Samson.T,Geetah Rajeevan, M.D.V.K .Ayani Annie and Board of Editors. *English for Life 2*. New Delhi: Cambridge University press India Pvt. Ltd., 2008. Print.
6. Sharma.R.C. and Krishna Mohan. *Business Correspondence and Report Writing*. New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2010. Print.

Supplementary Readings

1. Pillai, Radhakrishna.G, Rajeevan.K, BhaskaranNair.P. *Written English For You*. Madra: Emerald Publishers, 1994. Print.
2. Ravindran. Padma, M.D.V.Kalyani Annie and Board of Editors. *Interface I*.New Delhi: Cambridge University Pres India Pvt. Ltd., 2007. Print.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	3	3
CO2	2	2	3	3	3
CO3	2	2	2	3	3
CO4	2	2	3	3	3
CO5	2	2	3	3	3

ANNAMALAI UNIVERSITY

BACHELOR OF ARTS

B.A. ENGLISH

DEGREE COURSE

CBCS PATTERN

(With effect from 2021 - 2022)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER III							CIA	Uni. Exam	Total
16.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-5	4	4	British literature II	25	75	100
19.	III	Core Theory	Paper-6	5	4	Introduction to English Phonetics	25	75	100
20.	III	ALLIED-2	Paper-3	5	3	History of English literature I	25	75	100
21.	IV	Skill based Subject	Paper-1	2	2	Skills for Employment	25	75	100
22.	IV	Non-major elective	Paper-1	2	2	Language skills and communication I	25	75	100
Sem. Total				30	23		175	525	700
SEMESTER IV							CIA	Uni. Exam	Total
23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
24.	II	English	Paper-4	6	4	English	25	75	100
25.	III	Core Theory	Paper-7	5	4	British literature III	25	75	100
26.	III	Core Theory	Paper-8	4	3	History of English Language	25	75	100
27.	III	ALLIED-2	Paper-4	5	5	History of English Literature II	25	75	100
28.	IV	Skill based Subject	Paper-2	2	2	Writing for special purpose	25	75	100
29.	IV	Non-major elective	Paper-2	2	2	Language skills and communication II	25	75	100
Sem. Total				30	24		175	525	700

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Electives	3	3	9	100	300
	Core	15	(3-5)	54	100	1500
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	43		140		4300

**ANNAMALAI UNIVERSITY
B.A. ENGLISH**

**SYLLABUS
UNDER CBCS
(With effect from 2020-2021)**

1. maniam, M.V Social History of England, Wardha Publishing House, Madras 1972.

**SECOND YEAR
SEMESTER III
CORE PAPER - 5**

BRITISH LITERATURE II

Objectives

1. To acquaint the students with the transformation of literature from neoclassicism to Romanticism
2. To make the students familiar with the poems of Romantic age
3. To understand the essays of Charles Lamb and Oliver Goldsmith
4. To understand the characteristic features of Anti Sentimental Comedy
5. To expose the students to genres, Travelogue and Bildungsroman

UNIT - I: POETRY

1. Lines written a few Miles above Tintern Abbey - William Wordsworth
2. Ode to The West Wind - P B Shelly

UNIT - II: POETRY

1. Ode on a Grecian Urn - John Keats
2. Kublakhan - Samuel Taylor Coleridge

UNIT - III: PROSE

1. A Dissertation Upon Roast Pig - Charles Lamb
2. A City Night Piece - Oliver Goldsmith

UNIT - IV: DRAMA

1. The Rivals - Richard Brinsley Sheriden

UNIT - V: NOVEL

1. Robinson Crusoe - Daniel Defoe

2. Jane Eyre - Charollette Bronte

Course Outcome:

Unit I

The students will be able to understand :

1. William Wordsworth as a Nature Poet
2. Autobiographical element found in Tintern Abbey
3. P.B. Shelly as a Revolutionary Romantic poet
4. Literary devices used in Ode to the West Wind
5. The theme of regeneration in Ode to the West Wind

Unit II

The students will be able to

1. Characteristic features of Romantic age
2. Appreciate Keats as a poet who is Known for his Odes
3. Understand “beauty is Truth, truth beauty” with reference to Ode on a Grecian Urn
4. Understand Samuel Taylor Coleridge as a romantic poet
5. Analyze the supernatural element in Kublakhan

Unit III

The students will be able to

1. Know the essayists of the Romantic Age
2. Appreciate Charles Lamb as an essayist
3. Analyze the humour in “A Dissertation Upon Roast Pig
4. Understand Oliver Goldsmith as an essayist
5. Critically analyze the essay, “A City Night Piece”

Unit IV

The students will be able to understand

1. Rivals as an anti sentimental comedy
2. Why Lydia wants to marry a poor man
3. The idea of malapropism
4. The concept of duel
5. How does Falkland’s plan backfire

Unit V

The students will be able to

1. Analyze Robinson Crusoe as a travelogue

2. Know whether Robinson Crusoe changed at the end of the novel
3. Critically analyze Jan Eyre as a gothic novel
4. Undersand how Jane Eyre fits into romantic Literature
5. Analyze the character of Jane Eyre

Text Book and Reference material

Palgrave , F.T Palgrave's Golden Treasury, Oxford Publisher,1997

Web Source:

<https://www.poetryfoundation.org/poems/45527/lines-composed-a-few-miles-above-tintern-abbey-on-revisiting-the-banks-of-the-wye-during-a-tour-july-13-1798>

<https://www.poetryfoundation.org/poems/45134/ode-to-the-west-wind>

<https://www.poetryfoundation.org/poems/44477/ode-on-a-grecian-urn>

<https://www.poetryfoundation.org/poems/43991/kubla-khan>

<https://www.bartleby.com/380/prose/491.html>

<http://www.blupete.com/Literature/Essays/Best/GoldsmithCity.htm>

<http://www.gutenberg.org/files/24761/24761.txt>

<https://www.planetebook.com/free-ebooks/robinson-crusoe.pdf>

<https://www.gutenberg.org/files/1260/1260-h/1260-h.htm>

CORE PAPER - 6

INTRODUCTION TO ENGLISH PHONETICS

Objectives

- 1) Students are exposed to the Evaluation of English Language at a deeper level, updating communication using Language, Spoken medium and Written medium.
- 2) Students enrich information about understanding English phonetics with information on general phonetics.
- 3) Illustrations facilitating readers comprehension of the subject both in orthography and in Phonetic transcription.
- 4) Student gets knowledge about medium of speech medium of writing.
- 5) Students attempt to the represent written language using marks on paper sounds used in spoken Language.

- 6) Students are thought about intricacies of articulating English sounds enabling them to speak better.
- 7) Students are thought about different levels of Linguistic analysis thereby preparing them to become effective speakers of English Language.
- 8) Students are exposed to the use of modern technology stressing the importance of speech using mobile phone, radio, tape recorder, multimedia, etc.,

SYLLABUS

UNIT - I

Introduction to Language - Arbitrariness - Duality - Displacement - Cultural Transmission.

UNIT - II

Phonetics - Phonology - Branches of Phonetics - Organs of Speech.

UNIT – III

Phonatory System and Articulatory System - Classification of Speech Sound - Consonants - Vowels.

UNIT - IV

Syllable and Syllabic Structure - Onset - Nucleus - Coda - Syllabic Consonants - Consonant Clusters - Abutting Consonants - Word accent - Rhythm and intonation.

UNIT - V

Place and Manner of articulation - Phonemic transcription.

References:

1. S. K. Verma and N. Krishnaswamy Modern Linguistics: An Introduction. New Delhi : OUP, 1989.28
2. H. A. Gleason: Linguistics and English Grammar. New York: Holt, Rinehart & Winston.Inc., 1965.
3. Radford A, Atkinson M, Britain D, Clahsen H and Spencer A: Linguistics - An Introduction. Cambridge University Press, Cambridge, 1999
4. Robins R H: General Linguistics: An Introductory Survey, Longman Group Limited, London:1971
5. Fasold R. W. And Connor-Linton J (ed.): An Introduction to Language and Linguistics, Cambridge University Press, Cambridge, 2006.
6. Daniel Jones: The Pronunciation of English. New Delhi: Blackie and Sons, 1976 A. C. Gimson. An Introduction to the Pronunciation of English. London: Methuen, 1980.

7. J. D. O'Conner. Better English Pronunciation. New Delhi: CUP, 2008. T. Balasubramanian. A Textbook of English Phonetics for Indian Students. New Delhi: Macmillan, 1981.
8. T. Balasubramanian. English Phonetics for Indian Students: A Workbook. New Delhi: Macmillan.
9. ABERCROMBIE, D., Elements of General Phonetics, Edinburgh, Edinburgh University Press, 1967.
10. BANSAL, R.K. AND J.B. HARRISON, Spoken English for India, Second Edition, Madras, Orient Longman, 1972.
11. GIMSON, A.C., An Introduction to the Pronunciation of English, London, Edward Arnold, 1962.
12. HEFFNER, R., General Phonetics, Madison, University of Wisconsin Press, 1949.
- JONEW, DANIEL, The Pronunciation of English, Eight Edition, Cambridge, Cambridge University Press, 1956.
13. _____, The Phoneme: Its Nature and Use, Cambridge, Heffer, 1950.
14. _____, An English Pronouncing Dictionary, London, Dent, 1917; ELBS, 1968.
15. LADEFOGED, P., A Course in Phonetics, New York, Harcourt Brace Jovanovich, 1975.
16. Vir Aggarwal & V.S.Gupta., Handbook of Journalism and Mass Communication. Concept Publishing Company, New Delhi.
17. Puri. G.K. Competition Success: Review Communication. New Delhi: Sudha Publication.
18. Roy, Baron, Beginner's Guide to Journalism, New Helhi: Pushtak Mahal, 2003.
19. Parthasarathy, Rangaswami. Basic Journalism, Macmillan Publications, New Delhi, 1984 Print.

ALLIED -2

PAPER- 3

HISTORY OF ENGLISH LITERATURE I

Course Objectives

- 1 To provide an extensive background to the course
- 2 To introduce the eminent writers of English Literature
- 3 To expose the students to the magnum opuses of the literary masters
- 4 To prepare the students to undergo the course thoroughly
- 5 To provide the nuances of the history of English Literature

UNIT - I

Introduction to English Literature - Old English Secular Poetry Beowulf - Old English War Poems - Old English Prose Writings - Old English Grammar - Old English dialects, The Age of Chaucer - Geoffrey Chaucer - His Life and Career - The Canterbury Tales, The Sonneteers - Wyatt - Surrey - Daniel , Dryden - Spenser as a Sonneteer and Shakespeare's Sonnets - Major poets in the Elizabethan Age - Spenser and Shakespeare - Their works

UNIT - II

Prose in Elizabethan Age: Roger Ascham - The Chronicles of the tutor period - Hall - Holinshed - The Bible - Wycliffe, Tyndale, Coverdale - King James I' s authorized version of the Bible. Francis Bacon - Literary Criticism - Sir. Philip Sydney's Apologie for Poetry - Puritanism - Ben Jonson - - The origin and growth of English Drama - Mysteries, Miracles, Moralities, Interludes - The first English Comedy and Tragedy.

UNIT - III

The University Wits - George Peale- Thomas Kyd - Christopher Marlowe - Robert Greene - Thomas Nash - Thomas Lodge - John Lyly - William Shakespeare - Life of Shakespeare - The four periods of Shakespeare's dramatic career - His contemporaries and successors - Elizabethan Prose Fiction, The Puritan Writers - John Bunyan, John Milton, George Herbert, Sir Thomas Browne - The Metaphysical poets - John Donne & Others

UNIT - IV

The Restoration Age: Poetry: John Dryden & Samuel Butler: Drama: The Comedy of Manners - William Congreve - Wycherley - Thomas Shadwell - Dryden. Augustan Age - Alexander Pope as a poet , Critic - Addison and Steele - Doctor Johnson, Goldsmith - Sheridan - Henry Fielding - Tobias Smollett, Lawrence Sterne, Horace Walpole

UNIT - V

Pre Romantic and the Romantic Age: Goldsmith - Thompson - Gray - Burns - Blake - William Wordsworth - S.T Coleridge - Lord Bryon - P.B Shelley and Keats - Charles Lamb - Hazlitt, De Quincey , Jane Austen, Sir Walter Scott.

Text Books

1. A History of English Literature by DR. A. Shanmugakani, Harrows Publications
2. An Outline History of English Literature by W.H Hudson, Mahaam Publishers
3. A.C Ward: Twentieth Century English Literature
4. Authur Compton - Rickett: History of English Literature

Reference Items: Books, Journal

An Outline History of English Literature by Hudson, Mahaam Publishers

E - Materials

Course out Come:

1. Students are able to have a vast knowledge in History of English Literature down the ages
2. Students are exposed to the major movements, changes and impacts in history.
3. The students gain confidence in their course of study.
4. It helps them in the long run to take up the competitive examination.
5. It enables them to pass in the entrance tests when they go for higher studies.

SKILLS BASED SUBJECT

PAPER - 2

SKILLS FOR EMPLOYMENT

Course Objectives

1. Learn what a group is and how individuals interact in a group
2. Know why interviews are held and what they are looking for
3. Have a good understanding of what your own priorities are in a job
4. Appreciate the importance of etiquette for a successful cause
5. Examine how work attitudes relate to job performance.

UNIT - I

1. Skills for Group Discussion
2. Leadership and problem-solving skills

UNIT - II

1. Purpose of Interviews
2. Before and after the Interview

UNIT - III

1. Preparing a Resume
2. Writing a cover Letter
3. Answering FAQs about you and your family

UNIT - IV

1. Answering FAQs about likes and dislikes
2. Answering FAQs on justifying candidature
3. Answering FAQs on priorities, attitudes and biases

UNIT – V

1. Workplace etiquette
2. Values and Ethics
3. Culture
4. Gender equality

Course out Come

Student is able to prepare her\him self

Unit - I

1. The student will be able to know types of GD
2. The student will be able to know about GD
3. The student will be able to know how to prepare for GD
4. The student will be able to understand leadership and problem solving skills
5. The student will be able to develop leadership and problem solving skills

Unit - II

1. The student will be able to discuss the purpose of interviews
2. What are the technique the student will be able to follow at the time of interviews
3. The student will be able know their strengths and weakness
4. The students will be able to focus purpose of interviews
5. The student will be able to concentrate do and don'ts while attending the interviews

Unit - III

1. The students will be able to Know how to lay out the details in a CV
2. The student will be able to learn how to organize information in an cover letter
3. The student will be able come to know how to write a covering letter
4. The student will be able to know FAOS about their family members
5. The student will be able to learn how to answer question about yourself and your family

Unit - IV

- 1.The students will be able to grasp the workplace etiquette.
- 2.The student will come to know values and Ethics
- 3.The student will be able to discuss culture issues.
- 4.The students will be able to know equal rights of boys and girls
- 5.The students will come to know empowerment of women

Unit - V

- 1.The students will be able to know ones likes and dislikes
- 2.The student will be able to understand their attitude.
- 3.They will be become familiar with things they need to talk about to answer a question.
- 4.They will be able to answer the question about the suitability of the job.
- 5.The student will be able to understand positive qualities that are valued at work.

Reference

Co, Lina Mukhopadhyay &. *Polyskills: A course in communication skills and life skills*.
Chennai:
Foundation, 2012. print.

NON-MAJOR ELECTIVE

PAPER - 1

LANGUAGE SKILLS AND COMMUNICATION I

Course Objectives

- To improve the ability of speaking skills.
- To provide training in developing the interpersonal skills.
- To develop communicative skills
- To make students confident in dealing with communicative skills
- To facilitate students practical social knowledge through conversations

UNIT - I

1. Meeting people
2. Exchanging greetings
3. Introducing, others, giving personal information, talking about people animals and places

UNIT - II

1. Answering telephone, asking for someone
2. Making enquiries on the phone
3. Dealing with wrong number
4. Taking and leaving messages

COURSE OUTCOMES

UNIT - I

1. Students will be able to know how to behave while meeting people.

2. Students will be able to understand the ways of exchanging greetings.
3. Students will be able to introduce them to a group of people.
4. Students will be able to understand how to introduce others in any situation.
5. Student will be able to understand how to give personal information in a coherent way.

UNIT - II

1. Students will be able to know how to converse over phone.
2. Students will be able to know how to enquire over phone in formal situation
3. Students will be able to know how to deal with wrong numbers in telephone.
4. Students will be able to know how to take and leave message after a telephonic conversation.
5. Students will be able to develop the skill of answering over phone.

Text books:

Mastering communication skills and soft skills

N.Krishnaswamy, Manju Dariwal, Lalitha Krishnaswamy (Bloomsbury)

SEMESTER IV

CORE PAPER - 7

BRITISH LITERATURE III

Objectives

The students learn

1. what makes the Victorian period unique in literature
2. the key themes of Victorian literature
3. to appreciate the plays of Victorian age
4. why this age is considered as the age of novels
5. to appreciate the novels of Dickens, Thomas Hardy and George Eliot.

SYLLABUS

UNIT - I: POETRY

1. Ulysses - Alfred Tennyson
2. The Scholar Gypsy - Mathew Arnold

UNIT - II: POETRY

1. Dover Beach - Mathew Arnold
2. My Last Duchess - Robert Browning

UNIT - III: POETRY

1. On Falling in Love-R.L. Stevenson
2. On Liberty-John Stuart Mill

UNIT - IV: DRAMA

1. The Importance of Being Ernest - Oscar Wilde

UNIT - V: NOVEL

1. Pickwick Papers -Charles Dickenson
2. The Mayor of Casterbridge- Thomas Hardy
3. Silas Marner - George Eliot

Course outcome:

Unit I

The students will be able to understand

1. the theme of Ulysses
2. Ulysses as a dramatic monologue
3. Character of Ulyses
4. What does the scholar gypsy symbolize
5. The “strange disease of modern life”

Unit II

The students will be able to understand

1. My Last Duchess as a dramatic monologue
2. critical appreciation of the poem My Last Duchess
3. Describe the social custom according to “My Last Duchess “ - Ferrara by Robert Browning
4. Theme of Darkling Thrush
5. Mood of the poem Darkling Thrush

Unit III

The students will be able to

1. Know the novelist R.L. Stevenson as a poet
2. Critically appreciate the poem On Falling in Love.
3. Analyze the poem On Liberty

4. Comprehend the style of John Stuart Mill's Poetry
5. Understand the social life of 19th Century.

Unit IV

The students will be able to

1. Identify targets of Wilde's satire and analyze the treatment of these targets.
2. Discuss the idea of art for art's sake.
3. Identify the pun central to the play and analyze its meaning
4. Who is the blocking figure in The Importance of Being Earnest?
5. What precisely is a Bunburyist?

Unit V

The students will be able to:

1. Identify who Charles Dickens was.
2. Summarize the characters and events of The Pickwick Papers.
3. understand that true happiness is achieved only through reciprocated love
4. See the tremendous impact that one person's life can have on the many people with whom he comes in contact.
5. Consider whether man or fate controls one's destiny.

Text Book and Reference material

Palgrave , F.T Palgrave's Golden Treasury, Oxford Publisher,1997

Web Source

<https://www.poetryfoundation.org/poems/43606/the-scholar-gipsy>

<https://www.poetryfoundation.org/poems/43588/dover-beach>

<https://www.poetryfoundation.org/poems/43768/my-last-duchess>

<https://deriv.nls.uk/dcn6/7869/78693125.6.pdf>

<https://www.gutenberg.org/files/34901/34901-h/34901-h.htm>

<https://www.gutenberg.org/files/844/844-h/844-h.htm>

<http://www.gutenberg.org/files/580/580-0.txt>

<https://www.fulltextarchive.com/page/The-Mayor-of-Casterbridge-by-Thomas-Hardy/>

<http://www.gutenberg.org/files/550/550-0.txt>

CORE PAPER 8 HISTORY OF ENGLISH

Objectives

The students are expected to know

1. General characteristics of English language
2. Development of vocabulary and change of meaning
3. Foreign influences on English language
4. Evolution of American English and standard English
5. Development of English as World language

SYLLABUS

UNIT - I

1. Characteristic features of English Language
2. Indo European Family of Languages

UNIT - II

1. The Growth of English Vocabulary
2. Change of Meaning

UNIT - III

1. History of English Spelling, Pronunciation and Dictionaries
2. Growth of Standard English

UNIT - IV

1. Contribution of Foreign languages
 - a. Latin
 - b. Greek
 - c. French
2. American English

UNIT - V

1. American English
2. English as world language

Course Outcome:

Unit I

The students will be able to know the

1. Characteristic features of English language like heterogeneousness, effect of loss of inflexions, simplicity of inflexions, gender system of English and development of periphrases
2. Indo European family of languages
3. Grimm's law
4. Verner's law
5. English as part of Indo European family of languages

Unit II

The students will be able to understand

1. various methods of development of vocabulary
2. words coined by imitation, abbreviation, initials, back formation
3. words coined by suffixes and prefixes, syncope, telescoping, metaanalysis, etc.
4. various methods of change of meaning
5. change of meaning listed by F.T. Wood,,

Unit III

The students will be able to understand

1. the impact of influences of foreign languages
2. the influence of Latin language
3. greek influence
4. French influence

Unit IV

The students will be able to understand

1. The history of English spelling
2. Reason for discrepancy between spelling and pronunciation
3. Development of dictionaries
4. Growth of Standard English
5. Received pronunciation

Unit V

The students will be able to understand

1. The reason for the development of American English
2. New coinages
3. Differences between American English and British English'
4. Evolution of English as world Language
5. Impact of English as universal language

ALLIED -2

PAPER - 4

HISTORY OF ENGLISH LITERATURE II

Course Objectives

1. To provide an extensive background to the course
2. To introduce the eminent writers of English Literature
- 3 .To expose the students to the magnum opuses of the literary masters
- 4 .To prepare the students to undergo the course thoroughly
- 5 .To provide the nuances of the history of English Literature

SYLLABUS

UNIT - I

1. The Victorian Age:
2. Poetry: Tennyson, Browning, Arnold and Hopkins.
3. Prose: Macaulay calyces Ruskin - Arnold - Walter Pater - R.L Stevenson:
4. Drama: Oscar Wilde
5. Fiction: Dickens, Thackeray - Mrs. Gaskell - Willkie Collins, Charlotte Bronte - George Eliot - Thomas Hardy - Author Canonon Doyle - Rudyard Kipling

UNIT - II

1. The Pre- Raphaelite Movement: Dante Gabriel Rossetti - Morris - Swinburne:
2. Georgian Poets: John Masefield, Walter de la More, Blunden, Housman, W.H Davies; Lascelles Abercrombie

UNIT - III : TWENTIETH CENTURY

1. Poetry: W. B Yeats, T. S Eliot - W. H Adden - Stephen Spender - Dylan Thomas - C.D Lewis, Ted Hughes - Philip Larkin
2. Prose: G.K Chesterton, Robert Lynd - A.G Gardiner, Lytton Strachey - T.E Lawrence - Hilairie Belloc.

UNIT - IV : DRAMA

1. Drama: Bernard Shaw - John Galsworthy - J. M Synge - Sean O' Casey - J.M Barrie - T.S Eliot - Christopher Fry - Beckett - John Osborne - Harold Pinter
2. Fiction: Arnold Bennett - H.G Wells - Graham Greene - Joseph Conrad - Somerset Maugham - E.M Forster - D.H Lawrence - Aldus Huxley - James Joyce - Virginia Wolf - George Orwell - P.G Wodehouse - Kinsley Amis - John Braine - William Golding

UNIT - V : 21ST CENTURY

1. **Poetry:** Carol Ann Duffy, Kathleen Raine, Edward Bond
2. **Prose:** Monica Ali, Martin Louis Amis, Diana Athill
3. **Fiction:** Margaret Allen, Paul Adam, Douglas Adam, J.K Rowling, Salmon Rushdie

4. **Drama:** Samantha Ellis, Christine Dennison, Alan Bennett & Angela Clarke

Course out Come

1. Students are able to have a vast knowledge in History of English Literature down the ages
2. Students are exposed to the major movements, changes and impacts in history.
3. The students gain confidence in their course of study.
4. It helps them in the long run to take up the competitive examination.
5. It enables them to pass in the entrance tests when they go for higher studies.

Text Books

Unit - 1,2,3,4:

A History of English Literature by DR. A. Shanmugakani, Harrows Publications

An Outline History of English Literature by W.H Hudson, Mahaam Publishers

A.C Ward: Twentieth Century English Literature

Authur Compton - Rickett: History of English Literature

Unit - 5

<https://oxfords.com>

<https://www.britanica.com>

Reference Items: Books, Journal

An Outline History of English Literature by W.H Hudson, Mahaam Publishers

E - Materials

<https://oxfords.com>

<https://www.britanica.com>

SKILL BASED SUBJECT

PAPER - 2

Writing for Specific Purpose

Course Objectives

1. To create a passion for writing in English for special purposes
2. Enable students to learn the techniques of writing
3. To learn the situations and choose the right type of words and wages
4. To create develop creative interest and encourage them to write or them own
5. To help them become more competent and confident writers

SYLLABUS

UNIT - I

- Getting started
- Gaining control
- Writing for a Diverse Audience
- Organizing your thought
- Managing the purpose of writing
- Overcoming the writes Block.

UNIT - II

- Making your message Accessible
- The subject time
- Beginning
- Endings
- Headings
- Graphic Devices
- Bullets

UNIT - III

- An easy to read style
- Strengthening a weak memo
- Writing for special purpose
- The executive summary
- Clear Instructions

UNIT - IV

- Good well letters
- Letter of congratulations
- Thank you notes
- Letter of apology
- Letter of recommendation
- Delivering welcome news

UNIT - V

- Letter of complaint
- Responses to letters of complaint
- Letter of request
- Persuasion : some practical pointer
- Shaping a persuasion message
- The sales letter
- International correspondence
- Message for email

Course Out Comes :

Student is able to prepare her\him self

Unit I

1. To start with work
2. Learns the methodical approach
3. Able to focus on the task
4. Gains control and get involved in the specific work
5. Understands the need of the reading
6. Gain control one writing and get involved in the specific work

Unit II

1. Learn to organize ideas and write
2. Known how to draft the message
3. Write the revised message
4. Known to edit the draft after proof-reading
5. Learn to overcome the writes block.

Unit III

1. Construct subject line the key lines of the message in a captive way.
2. Include the punctuation marks in the right place
3. Learn to use the tens in the items in the menu bar like headings endings bullets and graphic devices
4. Makes the message accessible
5. Learn to incorporate the special effect

Unit IV

1. Read their writing and make it clear
2. Analyze the structure and word choice
3. Able to give helpful information
4. Known to write quick clean and direct
5. Learn to write an easy to read style.

Unit V

1. Learn to deliver un- welcome news
2. Responses to letter of complaints
3. Shape a persuasive message
4. Draft sales letters
5. Interact with international correspondence

Text Book :

Reference: Effective business writing Maryann PIOTROWSKI, Harper Collins publisher. Inc. NY 10022

NON-MAJOR ELECTIVE

PAPER - 2

LANGUAGE SKILLS AND COMMUNICATION II

Course Objectives

1. To enable the students to improve both ability to communicate and linguistic competence in the language.
2. To study a language and various transferable skills as a part of this course

UNIT - I:

- 1. Getting people's attention and interrupting**
- 2. Giving instructions and seeking clarification**
- 3. Making requests, asking for directions and giving directions.**

UNIT - II:

1. Inviting, accepting and refusing invitation.
2. Apologizing and responding to an apology.
3. Congratulating and responding to congratulations.
4. Asking for, giving and refusing permission.

COURSE OUTCOMES

UNIT I

1. Students will be able to use expression to get someone's attention.

2. Students will be able to mention connecting word while giving instruction.
3. Students will be able to know the ways of making request, asking for directions, and also giving directions.
4. Students will be able to know how to give instruction and seek clarification.
5. Student will be able to grasp the procedures while present dialogues for any situation.

UNIT II

1. Students will be able to know how to invite, accept and refusing invitation.
2. Students will be able to develop the formal and informal ways for accepting and declining invitation.
3. Students will be able to know how to congratulate and how to respond to congratulations.
4. Students will be able to know how to ask, give and refuse permission in both formal and informal situations.
5. Students will be able to learn how to apologize and respond to apologize.

Text books:

KamleshSadam and SusheelaPunitha. Spoken English:
A Foundation Course (Part I). Orient black swan. 2014

THIRUVALLUVAR UNIVERSITY
BACHELOR OF ARTS - B.A. ENGLISH DEGREE COURSE
CBCS PATTERN

(With effect from 2022-2023)

Programme Objectives: (5 Points)

1. To acquaint students with the classics of literature.
2. To develop appreciation of literary texts.
3. To make them understand the vocabulary of literature.
4. To make them Learn language through literature.
5. To make them understand the fundamentals of English grammar.

Programme Educational Objectives: (5 Points)

1. To develop interest towards literature.
2. To develop social & linguistic awareness through Literature.
3. To improve communication skills in English.
4. To develop soft-skills to meet corporate needs.
5. To make them refined and responsible human beings.

Programme Specific Outcomes: (10 points)

On completing the course the students will be.

1. Able to understand and appreciate the language of literary works.
2. Able to communicate confidently in real life's situation.
3. Able to write in flawless language.
4. Able to interpret different genres.
5. Able to face the competitive job market.
6. Able to develop their personality.
7. Able to develop attitude in challenging situations.
8. Able to acquire analytical skills.
9. Able to comprehend the nuances of life.
10. Able to develop leadership qualities.

Programme Outcomes: (10 Points)

1. Able to have a holistic understanding of English literature.
2. Able to develop a sense of social responsibility.
3. Able to have environmental awareness.
4. Able to preserve cultural values.
5. Able to develop compassion for fellow human beings.
6. Able to learn lessons from the prescribed texts.
7. Able to motivate others.
8. Able to appreciate the positive traits.
9. Able to empower the weak towards betterment.
10. Able to live and motivate others to live.

BACHELOR OF ARTS - B.A. ENGLISH DEGREE COURSE

The Course of Study and the Scheme of Examinations

SEMESTER V						CIA	Uni. Exam	Total	
31.	III	Core Theory	Paper-9	5	4	British literature IV	25	75	100
32.	III	Core Theory	Paper-10	6	4	Shakespeare	25	75	100
33.	III	Core Theory	Paper-11	6	4	Literary Criticism.	25	75	100
34.	III	Core Theory	Paper-12	6	4	Subaltern Literature	25	75	100
35.	III	Internal Elective	Paper-1	4	3	(to choose one out f two) A. Children Literature B. Journalism	25	75	100
36.	IV	Skill based Subject	Paper-2	3	2	Content writing	25	75	100
Sem. Total				30	21		150	450	600
SEMESTER VI						CIA	Uni. Exam	Total	
37.	III	Core Theory	Paper-13	5	4	Contemporary Literature	25	75	100
38.	III	Core Theory	Paper-14	5	4	Indian Writing in Translation	25	75	100
39.	III	Core Theory	Paper-15	5	3	New Literatures in English	25	75	100
40.	III	Compulsory Project	Paper-16	5	5	Group / Individual Project	25	75	100
41.	III	Internal	Paper-2	4	3	(to choose one out f two)	25	75	100

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
		Elective				A. English Information Technology B. Film appreciation and book review			
42.	III	Internal Elective	Paper-3	3	3	(to choose one out f two) A. English for Specific Purpose B. Creative Writing	25	75	100
43.	IV	Skill based Subject	Paper-3	3	2	English Language Teaching	25	75	100
44.	V	Extension Activities		0	1		100	-	100
45.		NMSDC III : Employability Readiness		0	0	(choose any one) • Naandi • Unnati • Quest • Izpay • IBM Skills build	-	-	
Sem. Total				30	25		275	525	800
Grand Total					142				4300

THIRUVALLUVAR UNIVERSITY
B.A. ENGLISH

SYLLABUS
UNDER CBCS
(With effect from 2022-2023)

SEMESTER V

CORE PAPER - 9 BRITISH LITERATURE IV

Course Objectives

1. To introduce Twentieth century British literature.
2. To comprehend the development of trends in British literature.
3. To view British literature in its socio-cultural and political contexts.
4. To understand the theme, structure and style in twentieth century British literature.
5. To learn interpretative techniques like modernism and post-modernism in order to apply in the literary texts of various genres.

SYLLABUS

UNIT - I: POETRY

1. Second Coming - W.B Yeats
2. Tollund Man - Seamus Heaney
3. A Prayer for My Daughter- W.B.Yeats

UNIT - II: POETRY

1. God's Grandeur - Gerald Manley Hopkins
2. The Hound of heaven- Francis Thompson

UNIT - III: PROSE

1. The function of a Teacher- Bertrand Russell
2. Bookshop Memories - George Orwell
3. Notes on the English character - E.M.Foster

UNIT - IV: DRAMA

1. Pygmalion - G.B.Shaw

UNIT - V: NOVEL

1. Lord of the Flies - William Golding
2. 1984 - George Orwell

COURSE OUTCOMES

Unit - I

1. Students will be able to understand the coming of a new ominous reality.
2. Students will be able to understand the themes of the poems of W.B. Yeats with reference to "The Second Coming".
3. Students will be able to know the background of Irish literature with reference to Seamus Heaney.
4. Students will be able to understand the violence and murders in Northern Ireland with reference to "Tollund Man".
5. Students will be able to recognize the love of a father for his daughter through the poem "Prayer for My Daughter".

Unit - II

1. Students will be able to understand the theme of the poems of G.M. Hopkins.
2. Students will be able to appreciate the literary genre, Sonnet.
3. Students will be able to understand man's lack of awareness and his insensitivity to nature.
4. Students will be able to classify the poem, "Hound of Heaven" as an ode.
5. Students will be able to understand the pursuit of a sinner by a loving God.

UNIT - III

1. Students will be able to understand the role of a teacher in the society.
2. Students will be able to appreciate the responsibility of a teacher.
3. Students will be able to understand various kinds of people and their behaviour.
4. Students will be able to understand the idea of undeveloped heart.
5. Students will be able to understand the ways and means of expressing emotions through characters.

Unit - IV

1. Students will be able to appreciate G. B. Shaw as a Dramatist
2. Students will be able to understand various social issues in the plays of G.B. Shaw with reference to "Pygmalion"
3. Students will be able to understand the teacher- student relationship
4. Students will be able to recognize the sense of humour in the plays of G. B. Shaw.
5. Students will be able to understand the distinct social class system.

Unit - V

1. Students will be able to know the theme of the novels of William Golding with reference to “Lord of the Flies.”
2. Students will be able to understand the concept of bestial instinct and savagery.
3. Students will be able to understand the suitability of the novel for film making.
4. Students will be able to understand the concept of totalitarianism
5. Students will be able to understand how the views in the novels are relevant in the current scenerio.

TEXT BOOKS AND E- MATERIALS

Poetry down the Ages 2004. Orient Longman

George Bernard Shaw's **Pygmalion**. New York: Chelsea House **Publishers**, 1988.

Golding, William, and Edmund L. Epstein. **Lord of the Flies: A Novel**. New York: Perigee, 1954.

Orwell, George. **1984**. London: Secker and Warburg, 1949.

<https://www.gradesaver.com/the-second-coming/study-guide/poem-text>

<https://www.poetryinternational.org/pi/poem/23607/auto/0/0/Seamus-Heaney/THE-TOLLUND-MAN/en/tile>

<https://www.poetryfoundation.org/poems/44395/gods-grandeur>

<https://www.bartleby.com/236/239.html>

<http://www.askliterature.com/prose/functions-of-a-teacher-by-bertrand-russell/>

https://orwell.ru/library/articles/bookshop/english/e_shop

<https://sex-british.com/notes-on-the-english-character-e-m-forster/>

CORE PAPER - 10

SHAKESPEARE

Objectives

1. To make students understand the characteristics of Shakespearean tragedy
2. To stress the significance of filial love
3. To enable the students to appreciate the qualities of Shakespearean comedy
4. To show how Shakespeare excels as poet
5. To give a brief introduction to Shakespearean criticism

SYLLABUS

UNIT - I & II- King Lear

Unit III - A Midsummer Night' Dream

Unit IV - Sonnet 116, 130

Unit V - Shakespeare Criticism:

A Midsummer Night' Dream: The Round Table Characters of Shakespeare's Plays

A C Bradley Lecture VII

Course Outcome

Unit I and II

Students will be able to

1. grasp how Lear suffers from children's ingratitude
2. appreciate the innocence of Cordelia
3. appreciate the significance of fool
4. understand how hamartia leads to fall
5. understand the role of fate

UNIT - III

Students will be able to understand

1. Characteristic features of a romantic comedy
2. To appreciate the world of magic
3. The significance of love
4. Appreciate the role of Puck
5. Appreciate the role of songs

UNIT - IV

Students will be able to understand

1. the characteristics of sonnets
2. Shakespeare's views on love
3. Shakespeare's affection for the dark lady
4. The poetic language of Shakespeare

UNIT -V

Students will be able to understand

1. Hazlitt as a critic
2. Greatness of Shakespeare as playwright
3. Critically appreciate Midsummer Night's Dream as a comedy
4. Dequincy's views on Macbeth
5. Why the porter Scene is introduced after Duncan's death

CORE PAPER - 11

LITERARY CRITICISM

Objectives

1. Understand the relationship between literature and criticism
2. Understand Aristotle's concept of Tragedy
3. Understand that the end result of novel as the whole man alive
4. Understand T.S. Eliot as a modern critic
5. Understand current literary theory

UNIT - I

- Poetics - Aristotle

UNIT - II

- Preface to Lyrical Ballads -William Wordsworth

UNIT - III

- Why the Novel Matters D.H.Lawrence
- Tradition and the Individual Talent -T.S.Eliot

UNIT - IV

- New Criticism Structuralism- Post structuralism

UNIT - V

- Feminist Criticism - Post-Colonialism - Eco criticism

Course Outcome:

Unit I

The students will be able to understand

1. Aristotle's concept of tragedy
2. six formative element in tragedy
3. Aristotle's Plot, character and tragic hero
4. Functions tragedy

Unit II

The students will be able to

1. understand the genesis of the Preface to the Lyrical Ballads
2. know key concepts conversed in the Preface to the Lyrical Ballads

3. have Wordsworth's views on themes, subject matter, function & diction of poet

Unit III

1. Why does the novel matter?
2. How Lawrence highlight the superiority of the novel over other forms of literature
3. What according to Lawrence are the supreme old novels
4. The relation between tradition and individual talent
5. The concept of objective correlative

Unit IV

The students will be able to understand

1. John Crowe Ransom as a pioneer of New Criticism
2. The theory of new criticism
3. Ferdinand de Saussure as forerunner of Structuralism
4. The difference between new criticism and structuralism
5. The theory of post structuralism

- Unit V Feminist Criticism - Post-Colonialism - Eco criticism

The students are able

1. to assess the different concept of Feminist Criticism
2. To get identify the different impact of post colonialist features in literature
3. To learn Eurocentric concepts of criticism
4. To distinguish between impact of orientalism and European imperialism.
5. To understand the parallel between feminist criticism and eco criticism.

TEXTS

Reference books:

- Barry, Peter. *Beginning Theory*. Manchester University Press 2009.
- [Hans Bertens](#). *Literary Theory: The Basics*, 2013
- [M.H. Abrams](#) et al. *A Glossary of Literary Terms* 11th Edition.
- English Literary Criticism and Theory by M.S .Nagarajan
- BOOK: English Critical Texts : D.J Enright Ernst De Chickera

CORE PAPER - 12
SUBALTERN LITERATURE

Objectives

1. To know the themes of subaltern poetry
2. To critically analyse the poems of subaltern literature
3. To know the theme of marginalization in Chinua Achebe's The Sacrificial Egg and Mahaswetha devi's Draupadhi .
4. To appreciate the plays of subaltern playwrights, Asif Currimbhoy and Wole Soyinka
5. To know the theme of hegemony in the novels of Amitav Ghosh and Khalid Hosseini

SYLLABUS

UNIT - I

Poetry

1. The Dying Eagle by E.J. Pratt
2. Why have you left the Horse Alone by Mahmoud Darwish
3. Telephone Conversion by Wole Soyinka

UNIT - II

Non Fiction

Nickel and Dimed by Barbara Ehrenreich

UNIT - III

Short stories

1. The Sacrificial Egg by Chinua Achebe
2. Draupadhi by Mahaswetha Devi

UNIT – IV

Drama

1. Dumb Dancer by Asif Currimbhoy
2. Death and the King's Horseman by Wole Soyinka

UNIT –V

Fiction

1. Hungry Tide by Amitav Ghosh
2. The Kite Runner by Khalid Hosseini

Course Outcomes

Unit I

The students will be able to

1. Analyze the theme of loss of power
2. Know the inevitability of younger generatins overthrowing the older ones
3. Analyse myth and history in Mahmoud Darwish's poem, "Why have you left the horse alone"
4. Understand the pain of exile

5. Understand the theme of racial discrimination

Unit II

The students will be able to

1. understand the complications that arise from trying to survive on a minimum- job

Realize that work is not a way out of poverty, but a physically and emotionally damaging state in which the economic laws of supply and demand often simply don't apply.

2. Understand that low-wage workers are forced to fight an uphill, or even impossible, battle:
3. understand that their problems stem not from individual weaknesses or laziness but from entrenched structural issues that make working your way out of poverty excruciatingly difficult.

Unit III

The students are able to understand

1. the tug-of-war between Western influences and native traditions and beliefs.
2. Through Julius, that even decades of colonialism are incapable of erasing the rituals and beliefs of a people
3. The concept of emptiness and loss.
4. That Draupadi is an ironic tale of exploitation and struggle faced by a woman for being born in a low birth
5. And explore the traumas undertaken by the women protagonists to resist and survive.

Unit IV

The students are able to understand

1. How the psychological thriller, Dumb Dancers incorporate the element of valour from the Mahabharata,
2. the stigma and struggle attached with mental illnesses, expressed through the traditional *dance* form, kathakali.
3. the mingling of Western and Yoruban elements in Death and the King's Horseman
4. the universality of the theme of cultural responsibility
5. The values of Yoruban society

Unit V

The students will be able to understand

1. The Environmental problems which are often underestimated by the majority of mankind in Hungry Tide.
2. Corruption and bureaucracy as disease, which develops quickly, but takes a lot of time, efforts and determination to recover from it
3. The necessity of Responsibility.
4. The theme of betrayal The Kite Runner

5. The life of guilt moving towards redemption

Text Book and Web Source

1. https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html
2. <https://english2302.files.wordpress.com/2016/08/the-sacrificial-egg.pdf>
3. Currimboy, Asif. Dumb Dancers. Culcutta: Writers Workshop, 1992.
4. Ehrenreich, Barbara. Nickel and Dimed. Picador, n.d.
5. Gosh, Amitav. The Hungry Tide. Harper Collins, n.d.
6. Hosseini, Khaled. The Kite Runner. Bloomsbury Publishing , n.d.

INTERNAL ELECTIVE

PAPER - 1

(to choose one out of two)

A. CHILDREN LITERATURE

Objectives

1. To make the students read a broad range of children's literature from Fairy tales to recent books
2. it gives students appreciation about their own cultural heritage as well as those of others;
3. it helps students develop emotional intelligence and creativity;
4. to explore new vocabulary, to internalize grammar and linguistic structures,
5. to motivate the students to develop the habit of reading

SYLLABUS

UNIT - I

1. Little Women - Louisa May Alcott

UNIT - II

1. Anna of Green Gables (Book I)- Anne Montgommz

UNIT - III

1. Harry Potter and the Philosopher's Stone - J . K. Rowling

UNIT - IV

1. The Ugly Duckling - Hans Christian Andersen
2. Hansel and Gretel - Grimm's Fairy Tales

UNIT - V

1. C.S. Lewis- On Three ways of Writing for Children
2. Philip Pullman - On Children's Literature and the Critics Who Disdain It (From Daemon Voices: On Stories and Storytelling).

Course outcome:

Unit I

The students learn

1. Young woman's struggle between familial duty and personal wor

2. The danger of gender stereotyping
3. To find happiness through daily activities and dreams
4. The importance of being genuine
5. What they deserve depends on how hard they work

Unit II

The students are able to understand

1. How being good leads to problems
2. The traditional roles and propriety
3. The underlying moral character of Anne
4. How new moral codes perplex the traditional ones
5. Anne's vision of future

Unit III

The students are able to understand

1. How Harry learns that he is a wizard
2. Harry's first experience of wizarding
3. The character of Hermione Ganger and Professor Quirrell
4. The Significance of Harry's eleventh birthday
5. The importance Harry's vision on the Mirror Erised

Unit IV

The students will be able to:

1. identify and describe the moral of the story, The Ugly Duckling
2. analyze the characters of the story.
3. analyze the elements of a fairy tale.
4. Understand how to manage problematic situations
5. compare and contrast fairy tales

Unit V

The students understand

1. it's in the fantasy literature that we find a sense of sub-creating a world and the tales that inhabit it that both reveal and delight.
2. that it is a wrong conception that one is behind in his reading and one is ahead,
3. that there isn't a complete and unbridgeable gap between the books of the children, and the grown-
4. That we grow up by moving along a sort of timeline, like a monkey climbing a stick.
5. They should not criticize anyone for reading children's fiction

Web Source:

<https://www.catholicculture.org/culture/library/view.cfm?recnum=9117>

Alcott, Louisa May. Little Women. Fingerprint Publishing, n.d.

Montgomery, L M. Anna of Green Gables. Penguin UK, n.d.

Rowling, J K. Harry Potter and the Philosopher's Stone. Bloomsbury Press, n.d.

INTERNAL ELECTIVE

PAPER - 1

B. JOURNALISM

Objectives:

- 1) To give students a better understanding on the development of history journalism in global and Indian context.
- 2) Introduce students the concept related to News and Journalistic practice
- 3) Ignites knowledge of professional Journalism and helps students to strengthen the underpinnings of journalism.
- 4) Stimulates the students on getting knowledge about how newspaper encourages photo-journalism development.
- 5) Prepares students as a good reporter and capable interpreter of society
- 6) Imparts knowledge of sciences and history of arts to make one's way up in a world to meet out increasingly demanding competence in the field of journalism.
- 7) Modality prepares a student to learn how to write editorials columns and feature articles.

SYLLABUS

UNIT - I

History - Definition of News - News sources - News Values - Role and functions of Journalism - Canons of Journalism.

UNIT - II

Reporter - News Editor - Sub Editor - Anatomy of Editing - Language and Style - Organisation and Structure of the News paper.

UNIT - III

Introduction to Copy Editing - Preliminary Copy Editing - Design and Specimen Pages.

UNIT - IV

On Screen Copy Editing - Preparing Text for typesetter - Illustrations - Proof.

UNIT - V

House Style

- House Style and Preliminary Pages
- Cross references
- Date and Time
- Spelling and Punctuations
- Tittle Page
- Content List
- List of Illustrations

Literary Material

- Running Heads
- Page Number
- Heading
- Footnotes and Endnotes
- Tables
- Appendixes
- Glossaries

References:

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9. Dhavan, Rajeev; Only the Good News; (1987); bharat Enterprises
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11. Raghavan, G. N. S; PTi Story; (1987); Indraprastha Press
12. Rao, Amiya and Rao, B.G.; The Press she could not whip; (1977); Popular Prakashan
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Web Source:

copac.ac.uk:

copac@mimas.ac.uk

SKILL BASED PAPER SUBJECT

PAPER - 3

CONTENT WRITING

Course Objective

Expose students of English literature to the world of 'ideation and creation'. By providing a platform for writing contents for Advertisement, Websites, Product descriptions and Social media contents (for clients to express, inform, entertain or persuade the audience/ readers) enhances the artistic and analytic function of the student.

Course Outcome

Content Writing will play a vital role in the era of “start ups”. With technical expertise along with good writing skills can provide a great career opportunity to a student.

Unit I

Introduction

Writing for special purpose- nuances of technical writing- digital age writings- SEO- target identification and focus- various platforms. Types of Content Ads., Blogs, E-Books etc., Publication Platforms.

Unit II

Writing Tools, Tips, & Techniques.

Unit III

Advertising Objectives- Category of Ads. - Strategy - layout- language.

Unit IV

Social media and present day platforms. Social media tools.

Unit V

Content Writing Exercises, Commercials, Social Advertisements, Short films, Projects as teams.

Text Book

Reference Books.

- [Kristina Halvorson](#). *Content Strategy for the Web*.
- [Mark W. Schaefer](#). *The Content Code: Six essential strategies*. 2015.

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SEMESTER VI

COREPAPER -13

CONTEMPORARY LITERATURE

Course Objectives

1. To introduce a wide range of contemporary literature.
2. To understand the variety of existing literary culture.
3. To expose the students to know the development of English language.
4. To expose the students to know to variety of characters
5. To promote the students to read contemporary literature.

Syllabus

UNIT - I: POETRY

1. Rain - Don Patterson
2. Wedding - Alice Oswald

UNIT - II: POTERY

1. Though My Mother was Already Two Years Dead (Long Distance II)- Tony Harrison
2. Lonely Moon- Sandra Feldman

UNIT - III: PROSE

1. Through the Tunnel- Doris Lessing
2. Once Upon a Time- Nadine Gordimer

UNIT - IV: DRAMA

1. The Humans- Stephen Karam
2. England People Very Nice- Richard bean

UNIT - V: NOVEL

1. Life of pi- Yann Martel

2. The Alchemist- Paulo Coelho

COURSE OUTCOMES

UNIT I

1. Students will be able to understand contemporary American poetry with reference to Don Patterson.
2. Students will be able to analyze why Patterson love all films that starts with rain.
3. Students will be able to understand the poetic techniques used by Alice Oswald.
4. Students will be able to know how art attempts to make a sense of the transformation after wedding.
5. Students will be able to understand the transformation that love creates in one's life.

UNIT II

1. Students will be able to understand contemporary English literature with reference to Toni Harrison.
2. Students will be able to recognize the universality of motherhood.
3. Students will be able to understand how dead people live in the memories of people alive.
4. Students will be able to critically analyze the theme of loneliness.
5. Students will be able to have a glimpse of Jewish literature with reference to Sandra Feldman.

UNIT III

1. Students will be able to understand contemporary English short story with reference to Doris Lessing.
2. Students will be able to know the historical context of the short story "Through the Tunnel".
3. Students will be able to know the psychological implications of imaginary fears.
4. Students will be able to understand the South African literature with reference to Nadine Gordimer.
5. Students will be able to fix the story, "Once Upon A Time" in the frame work- bed time stories.

UNIT IV

1. Students will be able to understand the contemporary British drama with reference to Richard Bean.
2. Students will be able to know the existing racism among ethnic groups.

3. Students will be able to understand the theatre techniques used.
4. Students will be able to understand the contemporary American drama with reference to Stephen Karam.
5. Students will be able to know the concept of familial drama.

UNIT V

1. Students will be able to know the contemporary Canadian literature with reference to Yann Martel.
2. Students will be able to appreciate the story of an Indian teen ager with a Bengal Tiger in a life boat after a ship wreck.
3. Students will be able to understand the contemporary Brazilian literature with reference to Paulo Coelho.
4. Students will be able to comprehend the role of symbols and omens in one's life.
5. Students will be able to understand the suitability of the novels for film making.

TEXT BOOKS AND E- MATERIALS

<https://poets.org/poem/rain-0>

<https://www.poetrybyheart.org.uk/poems/wedding/>

<https://poets.org/poem/long-distance-ii>

<https://www.poemhunter.com/poem/lonely-moon-5/>

<https://www.bartleby.com/topics/through-the-tunnel>

https://archive.org/stream/GordimerOnceUponATime/Gordimer_Once_Upon_a_Time_djvu.txt

Martel, Yann. **Life of Pi**. New York: Harcourt, Inc., 2001.

Coelho, Paulo. **The Alchemist**. San Francisco: HarperSanFrancisco, 1998. Print.

CORE PAPER -14

INDIAN LITERATURE IN TRANSLATION

Course Objectives

1. To introduce the student to the polyphony of modern Indian literature in translation.
2. To understand the multi-faceted nature of cultural identities in the various Indian literature in translation.
3. To compare literary texts produced across Indian regional landscapes to seek similarities and differences in thematic and cultural perspectives.
4. To explore images in literary productions that express the writer's views on their society.
5. To enable the students to understand and appreciate the richness and complexities of the respective languages and their literature.

Syllabus

UNIT - I: POETRY

1. Kurunthogai Verse 40 (poem: “**Red Earth and pouring rain**”):What could my mother be to yours)- Translated by Dr. JayanthasriBalakrishnan
- 2.The modern woman by Bharathiyar. (puthumai Pen)
3. Thirukkural - The Possession of love

UNIT - II: NON-FICTION

The five steps to success by Yandamoori Veerandranath

UNIT - III

1. Chemmeen - ThakazhiSivasankaraPillai (Translated by Anita Nair)
2. GracharGochar -VivekShenbag (Translated by SrinathPrerur)

UNIT - IV

1. Sakunthalam - Kalidasa

2. EvamIndrajith - Badal Sarkar (Translated by GirishKarnad)

UNIT - V

1. Bridges - Sivashankari (Translated by Krisnan)
2. The Bait - Mahim Bora (Translated by LalithSaika)

COURSE OUTCOMES

UNIT I

Students will be able to

1. Learn the universal qualities of pure love irrespective of caste, creed and society.
2. Appreciate the poetic style and the indigenous metaphor
3. The concept of modern woman by Bharathiyar
4. The significance of selfless love
5. Thiruvalluvar as universal poet

UNIT II

Students will be able to know

1. how to overcome anger, laziness , fear and complexes
2. How to develop their leadership qualities
3. How to develop their relationships
4. Indian culture and tradition
5. Able to face life with confidence

UNIT III

- 1.Students will be able to understand the myths about chastity.
- 2.Students will be able to understand the customs, taboos, beliefs and rituals of fishermen community.
- 3.Students will be able to understand the socio-cultural background of India with reference to VivekShenbag.
- 4.Students will be able to face problems after marriage.
- 5.Students will be able to raise voice against domestic violence.

UNIT IV

1. Students will be able to understand the importance of culture depicted in the epic *Mahabaratha*.

2. Students will be able to develop a taste for language and literature with reference to *Sakuntalam*.
3. Students will be able to understand the sign of true love.
4. Students will be able to learn the genre absurd play and the stream of consciousness technique.
5. Students will be able to explore Sartrean existentialism.

UNIT V

1. Students will be able to understand Assamese literature with reference to Mahim Bora.
2. Students will be able to visualize the concept of first love.
3. Students will be able to know the importance of rural life.
4. Students will be able to know the practices and rituals of the Tamil ancestors.
5. Students will be able to understand the concept of birth and death.

TEXT BOOKS AND E MATERIALS

<https://www.worldcat.org/title/sins-of-appus-mother/oclc/309143>

<https://talesntunes.wordpress.com/2017/12/11/book-review-chemmeen-english-translation/>

<https://indianreview.in/fiction/indian-review-assamese-literature-the-bait-mahim-bora-translated-lalit-saikia/>

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Badal Sarkar, EvamIndrajith - translated by GirishKarnad. Oxford University Press, London 1974 Print.

<https://www.worldcat.org/title/bridges-paalangal/oclc/229343130>

https://www.academia.edu/9958506/TRANSLATION_OF_CLASSICS

COREPAPER -15

NEW LITERATURES IN ENGLISH

Course Objectives

1. To introduce the finest works in English belonging to various countries.
2. To give insight into the dogma free world of spiritualism.
3. To enable the students to analyze literary works from different environment and different cultures.
4. To show how English language has become a tool against colonialism.
5. To give an objective view of dichotomies in society.

UNIT - I: POETRY

Australia - A.D.Hope

Your Children are Not Your Children - Khalil Ghibran

UNIT - II: POETRY

A Far Cry From Africa - Derek Walcott

House and Land - Allen Curnow

UNIT - III: PROSE

A Black Grand Mother - Sally Morgan

Novelist as a Teacher - Chinua Achebe

UNIT - IV: DRAMA

Death and the King's Horseman - Wole Soyinka

UNIT - V: NOVEL

Cry, the Beloved Country - Allen P

COURSE OUTCOMES

UNIT I

1. Students will be able to understand the background of Australian literature with reference to A.D.Hope.
2. Students will be able to understand the satire in the poems of A.D.Hope.
3. Students will be able to understand the use of symbolism through the poem "Australia".

4. Students will be able to understand parental narcissism as a toxic quality through the poem “Your Children are not Your Children”.
5. Students will be able to know importance of children’s individual views and independent ideologies are not influenced by their parents.

UNIT II

1. Students will be able to understand the feelings of displacement through the poem “House and Land”.
2. Students will be able to know the New Zealand literature.
3. Students will be able to feel the state of immigrants.
4. Students will be able to understand the racial and cultural tensions in Africa.
5. Students will be able to understand the concept of colonialism.

UNIT III

Students will be able to understand how race plays an important role in works of African writers.

Students will be able to know the definition of emotional journey.

Students will be able to understand the importance of journey and its benefits.

Students will be able to understand how a writer takes up the role of a teacher.

Students will be able to differentiate post-colonial and western writers.

UNIT IV

1. Students will be able to understand the richness of the African literature.
2. Students will be able to develop taste for the techniques of drama with reference to *Death and the King’s Horseman*.
3. Students will be able to understand the concepts of anti-colonialism.
4. Students will be able to understand the background and rituals of Yoruba community.
5. Students will be able to analyze that the play as a bridge between African and European culture.

UNIT V

1. Students will be able to witness the background status of South Africa.
2. Students will be able to know the international attention to South Africa’s tragic history.
3. Students will be able to capture the extremes of human emotions.
4. Students will be able to comprehend African’s hope for their freedom from hatred, poverty and fear.
5. Students will be able to understand that the novel is a journey from rural life to urbanization.

TEXT BOOKS AND E MATERIALS

Soyinka, Wole. Death and the King's Horseman Norton critical edition. New York : Norton, 2003.

Paton, Alan. Cry, the Beloved Country. New York, N.Y: Scribner, 2003. Print.

<https://www.studymode.com/subjects/a-black-grandmother-by-sally-morgan-page1.html>

<http://mrhuman.weebly.com/uploads/2/1/5/1/21516316/thenovelistasteacher.pdf>

<https://cdn.auckland.ac.nz/assets/press/all-books/pdfs/2017/Appendix%20to%20Allen%20Curnow%20Collected%20Poems.pdf>

<https://poets.org/poem/far-cry-africa>

<https://sahyadriliterature.blogspot.com/2018/08/poem-analysis-of-australia-by-a.html>

<https://poets.org/poem/children-1>

INTERNAL ELECTIVE

PAPER - 2

(to choose one out of two)

A. ENGLISH FOR INFORMATION TECHNOLOGY

Objectives:

1. To make students familiar with internet and its usage
2. To help them learn the basic ways of exploring internet
3. To enhance their knowledge of using multimedia.
4. To improve their knowledge of computer in learning and teaching English
5. To enable them create their own blogs and web page

UNIT - I

1. World Wide Web & Email, Internet
2. Searching the Internet & Search FAQ's
3. The Internet as Resource Bank and classroom tool

UNIT - II

1. Introduction to NET (I)
2. Introduction to NET (II)
3. Writing Projects
4. Email projects and discussion lists

UNIT - III

Activities

1. Making news
2. Eco-tourism
3. Mystery Postcards
4. Classified ads
5. Puzzle Maker
6. Reviewing a website

UNIT - IV

Tools for Online works

1. Blogs and Wikis
2. Web Quest
3. Recent multimedia applications in everyday life.

UNIT - V

1. Professional development online
2. Listserv FAQs
3. Teaching online
4. Teaching development resources

Course Outcome:**Unit 1:**

- 1 Student is able to use internet.
- 2 Learn to send and receive e-mails
- 3 Identify similar problems and know the ways to solve through FAO's
- 4 Incorporate the required material from the web resource bank in learning English
- 5 Exchange ideas using e-mail

Unit 2:

- 1 Learn the history of computer and its gradual development till date.
- 2 Get educated in online quiz and enrich their knowledge
- 3 Get their educational resource materials.
- 4 Involve in creating and publishing their articles.
- 5 Know to participate in online discussion and get their doubts clarified

Unit 3:

- 1 Students are able to compose news and upload
- 2 They are able to locate popular places of tourism and learn their ecological significance
- 3 Learn to create postcards and develop related knowledge
- 4 Learn to draft classified ads for practical benefits
- 5 They are able to construct puzzles and derive English language knowledge

Unit 4:

- 1 To create blogs and wikis
- 2 Know to use web page
- 3 Learn to apply multimedia in their web based activities
- 4 Learn to edit content in wikis
- 5 Know to operate playstore and download different apps

Unit 5:

- 1 Analyse content wise websites
- 2 Know to browse profession related websites
- 3 Have discussion and exchange ideas
- 4 Get educated new techniques in teaching learning
- 5 Improve their teaching learning in class rooms situation
- 6 Get familiarized with ICT

Prescribed Text

The Internet and the Language Classroom - A Practical Guide for Teachers - II Edition - Gavin Dudency , Cambridge University Press, 2007.

INTERNAL ELECTIVE

PAPER - 2

B. FILM - APPRECIATION AND BOOK REVIEW

Objective:

- 1 To sensitize students in the nuances of cinema.
- 2 To introduce the semiotics of cinema to students
- 3 To introduce theories relevant to film appreciation
- 4 To expose students to the world of film language
- 5 To direct the massive influence of cinema towards the positive

UNIT - I

1. Film appreciation : An introduction
2. Reading the visual and visualizing the text: Film Language

UNIT - II

1. Cinema : Aesthetics, Religion and politics
2. A Classic film is a critique of the medium

UNIT - III

- 1 What's in a Name?
- 2 Brevity is the soul of wit
- 3 How you say a thing
- 4 Acting is believing

UNIT - IV

1. Watching the recommended movies and writing reviews

UNIT - V

Reading books and writing Reviews

1. Becoming by Michelle Obama
2. A walk to remember by Nicholas Sparks
3. Three women , three ponds by Sudha Murthy
4. One Indian girl by Chetan Bhagat

Course outcome

UNIT I:

1. Students is able to get an overall view of cinema as a massive influence in the society
2. Understand semi-idiomatic expressions coined through movies

3. Differentiate regional movies from World Cinema
4. Classify the important feature of cinema
5. Learn to appreciate film language

UNIT II:

- 1 Learn the basics of film - language and venture on to higher level.
- 2 Become knowledgeable in the trained areas of signs, codes and syntax of film-language
- 3 Identify the circuit of film experience connected to different fields of social political and religious life
- 4 Become more knowledgeable at cultural, social and political levels
- 5 Appreciate the interactive process between the visual and the viewer

UNIT III:

1. Differentiate the main text from multiple sub- texts.
2. Understand that cinema is used not only an entertainment but as laughter therapy
3. Develops positive attitude
4. Establish revolutionary ideas against the odds of life
5. Appreciate the effects of sound and music

UNIT IV:

1. Interpret the different concepts of the movie.
2. Apprehend the art and culture depicted through movie
3. Enlist the number of techniques used in cinema.
4. Get trained to choose apt titles and catchy phrases to be used.
5. Analyze the plot- structure of the movie

UNIT V:

1. Develop the habit of book reading
2. Know the nuances and techniques of reading
3. Learn their intricacies of characterization
4. Learn to analyze the book critically
5. Analyze the plot-structure of the movie

Text Prescribed

1. Prof.N,Ilango,*Film- Appreciation for Beginners*, Manimekala Publishing House, Madurai, 2017.

BOOK RECOMMENDED:

- 1 Becoming by Michelle Obama
- 2 A walk to remember by Nicholas Sparks
- 3 Three women , three ponds by Sudha Murthy
- 4 One Indian girl by Chetan Bhagat

Movies Recommended:

1. Harry Potter, goblet of Fire directed by mike Newell
2. The Chronicle of Narnia directed by Andrew Adamson
3. Jungle Book, directed by Jon Favreau
4. Gandhi ,directed by Richard Attenborough
5. Ten Commandment directed by Cecil B.Demille
6. The Hound of Baskervilles directed by Sidney Lanfield
7. Schindler's List directed by Steven Spielberg

INTERNAL ELECTIVE

PAPER - 3

(to choose one out of two)

A. WRITING FOR SPECIFIC PURPOSE

Course Objectives

1. To create a passion for writing in English for special purposes
2. Enable students to learn the techniques of writing
3. To learn the situations and choose the right type of words and wages
4. To create develop creative interest and encourage them to write or them own
5. To help them become more competent and confident writers

UNIT - I

- Getting started
- Gaining control
- Writing for a Diverse Audience
- Organizing your thought
- Managing the purpose of writing
- Overcoming the writer's Block.

UNIT - II

- Making your message Accessible
- The subject time
- Beginning
- Endings
- Headings
- Graphic Devices
- Bullets

UNIT - III

- An easy to read style
- Strengthening a weak memo
- Writing for special purpose
- The executive summary
- Clear Instructions

UNIT - IV

- Good well letters

- Letter of congratulations
- Thank you notes
- Letter of apology
- Letter of recommendation
- Delivering welcome news

UNIT - V

- Letter of complaint
- Responses to letters of complaint
- Letter of request
- Persuasion : some practical pointer
- Shaping a persuasion message
- The sales letter
- International correspondence
- Message for email

Reference: Effective business writing Maryann PIOTROWSKI, Harper Collins publisher.
Inc. NY 10022

Course Out Comes (five outcomes for each units should be mentioned)

Student is able to prepare her\him self

Unit - I

1. To start with work
2. Learns the methodical approach
3. Able to focus on the task
4. Gains control and get involved in the specific work
5. Understands the need of the reading
6. Gain control one writing and get involved in the specific work

Unit II

1. Learn to organize ideas and write
2. Known how to draft the message
3. Write the revised message
4. Known to edit the draft after proof-reading
5. Learn to overcome the writes block.

Unit III

1. Construct subject arrange the key lines of the message in a captive way.
2. Include the punctuation marks in the right place
3. Learn to use the tens in the items in the menu bar like headings endings bullets and graphic devices
4. Makes the message accessible
5. Learn the incorporate the special effect

Unit IV

1. Read their writing and make it clear
2. Analyze the structure and word choice
3. Able to give helpful information
4. Known to write quick clean and direct
5. Learn to write an easy to read style.

Unit V

1. Learn to deliver un- welcome news
2. Responses to letter of complaints
3. Shape a persuasive message
4. Draft sales letters
5. Interact with international correspondence

INTERNAL ELECTIVE

PAPER - 3

B. CREATIVE WRITING

Course Objectives

1. To know the process of beginning and growth of English language.
2. To know about various innovative ways of using English language in verbal and non-verbal communications.
3. To write clearly effectively and creatively and adjust writing style appropriately, to the content the context and nature of the subject
4. To write travelogues and advertisements
5. To write scripts for TV and Radio programmes

UNIT - I

1. Various kinds of writing
2. The creative Impulse, Creative ability
3. Tools and Techniques

UNIT - II

1. Poetry
2. Prose
3. Features and non - features
4. Writing for the Media

UNIT - III

1. Sketching the plot, conflict, climax, resolution
2. Character Sketch
3. Action Description
4. Dialogue

UNIT - IV

1. Travelogue
2. Writing Advertisements
3. Writing for Newspapers

i) News ii) Articles

UNIT - V

1. Writing Documentaries

2. Writing for Television and Radio

Course Outcomes

Unit I

1. The student will be able to know various dimensions of creativity
2. The student will be able to develop creative impulse ability Geniuses and talent
3. The student will be able to grasp the tools and techniques of creative writing
4. The student will be able to appreciate the tools and techniques of writing
5. The student will be able to appreciate the talent of geniuses

Unit II

1. The student will be able to grasp the lyrical richness of the poetry
2. The student will come to know the literary devices of the poetry
3. The student will be able to understand the features of prose
4. The student will be able to focus on the multiple features of creative writing.
5. The student will be able to know the principles of writing for digital media.

Unit III

1. The student will be able to understand the different elements and attributes of drama
2. The student will be able to understand various genres of fiction
3. The student will be able to analyze the character speech
4. The student will be able to form dramatic devices used in conjunction with the episodic and climactic plot forms
5. The student will be able to form action description in creative writing.

Unit IV

1. The students will be able to write a Photographic Description of places
2. The students will be able to highlight the Various Attractions.
3. The students will be able to give some cultural background of the places
4. the students will be able to write catchy advertisements
5. the students will be able to write articles for newspapers

Unit V

1. Students will be able to understand documentaries
2. Students will be able to write documentaries
3. The Students will be able to write scripts for Television programmes
4. The students will be able to write scripts for radio programmes
5. The students will be able to organize TV and Radio programmes.

References

Creative writing - Person by Dev

Ailsa Cox: Writing Short Stories.

Thomas S. Kane: The Oxford Essential Guide to Writing.

William Strunk, Jr. and E. B. White: The Elements of Style.

William Zinsser: On Writing Well: The Classic Guide to Writing Nonfiction.

**SKILL BASED SUBJECT
PAPER - 4**

ENGLISH LANGUAGE TEACHING - ELT

Course Objectives

1. To acquaint the learner with the theories and practices of teaching English.
2. To explain various methods of teaching and learning the English language.
3. To make our students familiar with teaching processes involved in English language teaching.
4. To learn the natural approach in communicative English
5. To make the student learn the competence based language teaching
6. To channelize their academic vision towards the language teaching and learning in a better way

UNIT - I

1. A Brief History of Language Teaching
2. Language Teaching Innovations
3. Objectives of Teaching English

UNIT - II

1. Interference and Transfer from the Mother Tongue
2. Listening Activities
3. Techniques in Teaching - Speaking
4. Barriers of Effective Communication

UNIT - III

1. Methods and Approaches in Teaching English
2. Translation Methods
3. Direct Methods
4. Bilingual Approaches
5. Situational Approaches
6. Eclectic Approaches

UNIT - IV

1. Communicative Language Teaching
2. Cooperative Language Teaching
3. Content - Based Language Teaching
4. Task-Based Language Teaching

UNIT - V

1. English Language Teaching in India
2. English as a World Language
3. English for Specific Purposes
4. Technological Influences on English
5. Media and Cyber Influences on English

Text Books

Unit-I:

1. Howatt, A. P. R., A History of English Language Teaching, Oxford: OUS
2. Stern, H. H., Fundamental Concepts of Language Teaching. Oxford: OUS

Unit-II:

1. David Nunan, Language Teaching Methodologies, Prentice Hall Publishers
2. Mackay, Ray. A Basic Introduction to English Language Teaching. Oxford: OUS

Unit III:

1. Jack. C. Richards and Theodore S. Rogers, Approaches and Methods in Language Teaching, 2nd Edition, Cambridge: Cambridge University Press
2. Halliday, M. A. K. Language on Social Semiotic, London : Edward Arnold

Unit- IV:

1. S P Dhanavel. English Language Teaching in India - The Shifting Paradigms. McGraw Hill Education Publisher
2. Slavin, R. Cooperative Learning: Theory, Research and Practice. 2nd Ed. New York: Prentice Hall

Unit - V:

1. Widdowson, H. Learning Purpose and Learning Use. Oxford: OUS
2. Wrenn, C.L. The English Language. Delhi: Vikas Publishing House Pvt Ltd.

Reference Items: books, Journal

1. Penny Ur, A Course in English Language Teaching. Cambridge: Cambridge University Press
2. Diane Larsen - Freeman and Marti Anderson. Techniques & Principles in Language Teaching. Oxford: OUS
3. Navita Arora. English Language Teaching - Approaches and Methodologies. Mcgrawhill Publisher
4. Dr. Praveen M Jain. Methodology of Teaching English - Tools, Techniques and Methods. Raj Publications

5. Dr. Meena Sehrawat and Dr. Subodh K. Jha. English Language Teaching. Lakshi Publishers
6. M L Tickoo. Teaching and Learning English - A Sourcebook for Teachers and Teacher - Learners. Orient Blackswan Publishers
7. Widdowson, H.G., Teaching Language as Communication. Oxford: OUS
8. Ashok Kumar. English Language Teaching: New Perspectives. Oxford: OUS
9. Jeremy Harmer. The Practice of English Language Teaching - 5th Ed with DVD. Pearson Publishers
10. Dr. Adi Ramesh Babu. English Language Teaching and Learning - Problems and Remedies. Pointer Publishers.

E- Materials

1. <https://eltbylinablog.wordpress.com>
2. <https://eltnotes.wordpress.com>
3. <https://medium.com/eltnotes>
4. <https://talimenam.blogspot.com>
5. <https://www.eltnotes.blogspot.com>
6. <https://www.teachingenglish.org.uk>.
7. <https://www.scribd.com>
8. <https://opencourse.uoa.org>
9. <https://news.collindelt.com>
10. <https://en.m.wikipedia.org>
11. <https://www.eltresearchbites.com>
12. <https://eltnotesfrombelow.org>
13. <https://shop.scholastic.co.uk.elt>
14. <https://eltaypwip.org.webnotes>
15. <https://www.cambridge.org.elt>

Course Out Comes

After studying

Unit - I

1. the student will be able to understand the brief history of language learning
2. the student will be able to know that language can be acquired as a skill not as a knowledge
3. the student will come to know the various innovative methods available in learning and teaching the language
4. the student will be able to develop a taste for language learning and teaching
5. the student will understand the objectives of teaching and learning English

Unit - II

1. the student will be able to understand the mother tongue influence on the English language and how to avoid this as this is a major problem for non native English speakers

2. the student will come to know the various listening activities as listening plays a very vital role in learning any language
3. the student will get inspiration to learn native English language with correct accent
4. the student will learn the techniques of spoken English
5. the student will remove the barriers that come across in effective communication

Unit - III

1. the student will be able to understand the methods and approaches in teaching English
2. the student will understand the translational method to learn the language
3. the student will get inspiration through the direct methods of learning the language
4. the student will understand the bilingual, situational and eclectic approaches of learning the language
5. the students by learning these approaches and methods easily learn the language.

Unit - IV

1. the student will be able to learn various methods of learning the language
2. the student will come to know the basis of communicative language teaching
3. the student will understand the cooperative language teaching
4. the student will get inspiration through the task-based and content-based teaching of English language
5. the student will be able to approach the learning of a language in an easy manner through learning these teaching methodologies

Unit - V

1. the student will be able to understand the status of English in the world as English has become a world language
2. the student will come to know the usage of English language in specific purposes related to all fields
3. the student will understand the methods of approaches practiced in India to teach the English language
4. the student will get inspiration through the various influences like technology, media and cyber on the English language
5. the student will be able use the language in all specific purposes



ANNAMALAI UNIVERSITY

302_M.A. English

Programme Structure and Scheme of Examination (under CBCS)
(Applicable to the candidates admitted in Affiliated Colleges
from the Academic year 2022 -2023 onwards)

Course Code	Study Components & Course Title	Hours/Week	Credit	Maximum Marks		
				CIA	ESE	Total
Semester I						
22PENG11	Core Course – I: Chaucer and Elizabethan Age	6	4	25	75	100
22PENG12	Core Course – II: Jacobean and Restoration Age	6	4	25	75	100
22PENG13	Core Course – III: Shakespeare	5	4	25	75	100
22PENG14	Core Course – IV: Phonetics and History of English Language	5	4	25	75	100
22PENG15	Core Elective – I	5	4	25	75	100
	Open Elective – I	3	3	25	75	100
	Total	30	23			600
Semester II						
22PENG21	Core Course -V: The Romantic Age	6	4	25	75	100
22PENG22	Core Course – VI: The Victorian Age	6	4	25	75	100
22PENG23	Core Course – VII: Eco Literature	6	4	25	75	100
22PENG24	Core Course – VIII: Fantasy and Horror Literature	5	4	25	75	100
22PENG25	Core Elective – II	5	4	25	75	100
22PFLDC26	Field Study	-	2	25	75	100
22PHUMR27	Compulsory Course: Human Rights	2	2	25	75	100
	Total	30	24			700

List of Core Electives (Internal Elective for Same Major Students)
(Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22PENG15-1	Technical Writing	5	4	25	75	100
	22PENG15-2	Post-Colonial Literature	5	4	25	75	100
	22PENG15-3	World Popular Short Stories	5	4	25	75	100
II	22PENG25-1	Oral Narratives	5	4	25	75	100
	22PENG25-2	Translation Theory and Practice	5	4	25	75	100
	22PENG25-3	Women's Writing	5	4	25	75	100

List of Open Electives
(External Elective for Other Major Students – Inter/Multi-Disciplinary Courses)
(Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22PENG16-1	Public Speaking	3	3	25	75	100
	22PENG16-2	Film Study	3	3	25	75	100
	22PENG16-3	English for Tourism	3	3	25	75	100

Semester I Core I	22PENG11 - CHAUCER AND ELIZABETHAN AGE	Credits: 4 Hours: 6
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Course Objectives:

The overall objective of this course is to:

1. Acquaint the students with the literary forms woven in English language and the literary contribution during the age of Chaucer.
2. Enable the student to understand the historical and cultural heritage of the ages
3. Familiarize them with the canons of British literature produced during the age of Chaucer.
4. Help the students familiarize with the diction and the literary technique employed by the writers of the era.
5. Improve the skills of reading, analyzing and understanding the specific scope of literature.

Unit I: Poetry

Geoffrey Chaucer	:	Prologue to the Canterbury Tales.
Sir Thomas Wyatt	:	<i>Farewell Love and all thy Laws for Ever.</i> <i>The Long Love that in my thought I Harbor.</i>
Earl of Surrey	:	<i>Give Place, Ye Lovers.</i> <i>When Raging love with Extreme Pain.</i>

Unit II: Poetry

Edmund Spenser	:	Prothalamion
Shakespeare's Sonnets	:	18, 54, 73, 147.
Sir Walter Raleigh	:	<i>The Passionate man's Pilgrimage</i>

Unit III: Prose/Essay

Francis Bacon	:	<i>Of Studies</i> <i>Of Friendship</i> <i>Of Truth</i>
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Unit IV: Drama

Christopher Marlowe	:	Doctor Faustus
Thomas Kyd	:	The Spanish Tragedy

Unit V: Drama

John Webster	:	The Duchess of Malfi
Ben Jonson	:	Every Man in his Humour

Suggested Reading:

1. Dodd, E.F. From Harmony to Harmony, Chennai, Mac Millan, Publication, 1964.
2. Mehl, Dieter, English Literature in the age of Chaucer. New York: Routledge, 2020.

Course Outcomes:

At the end of the course, the students shall be able to:

1. Obtain a literary acumen to race MCQs of competitive examinations.
2. Analyze literary texts
3. Understand significant developments in the literature during the period of Chaucer and Elizabeth.
4. Create imaginative and original literature in at least one genre.
5. Apply theoretical approaches to critical reading of literary texts.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	2				
CO 2		3			
CO 3			2		
CO 4				3	
CO 5					3

Semester I Core II	22PENG12 - JACOBEAN AND RESTORATION AGE	Credits: 4 Hours: 6
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Course Objectives:

By introducing the course, it is intended to:

1. Gain awareness about the themes and writing styles of the period
2. Understand the socio political background of the age
3. Identify the influence of literature of the period on modern times
4. Understand the similarities of the themes till date
5. Gain the spirit of the ages

Unit I

John Milton : *Paradise Lost - Book IX*
 John Dryden : *Mac Flecknoe*

Unit II

John Donne : *A Valediction Forbidding Mourning*
 Andrew Marvell : *To His Coy Mistress*
 George Herbert : *The Pulley*
 Henry Vaughan : *Peace*
 Richard Crashaw : *The Infant Martyrs*
 Alexander Pope : *Epistle to Dr. Arbuthnot*

Unit III

John Dryden : *Preface to the Fables*
 Jonathan Swift : *The Battle of the Books*

Unit IV

Daniel Defoe : *Robinson Crusoe*
 Samuel Richardson : *Pamela*

Unit V

Oliver Goldsmith : *The Good Natur'd Man*
 R. B. Sheridan : *The Rivals*

Suggested Reading:

1. Drabble, Margaret. Oxford Companion to English Literature
2. Dodd, E.F. From Harmony to Harmony, Chennai, Mac Milan, Publication, 1964.
3. Mehl, Dieter, English Literature in the age of Chaucer. New York: Routeledge, 2020.

Course Outcomes:

At the end of the course, the students shall be able to:

1. Enjoy the writing of Milton
2. Learn the lateral thinking
3. Enjoy the humour of Goldsmith
4. Estimate the Metaphysical thinking
5. Learn about the greatness of the writers of the ages

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		2			
CO 3			2		
CO 4				3	
CO 5					3

Semester: I Core: III	22PENG13– SHAKESPEARE	Credits: 4 Hours: 5
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Course Objectives:

By introducing the course, it is intended to:

1. Enable the students to appreciate the genius of Shakespeare which has made him
a classic of eternal value
2. Enable them to know the historical and present day value of Shakespeare, the
Poet-dramatist
3. Trace the evolution of Shakespeare's vision and art
4. Help the student to acquire first-hand knowledge of the plays and poetry of
Shakespeare
6. Make the students familiar with the critical judgment through ages

Unit I

Taming of the Shrew

Unit II

Hamlet

Unit III

Antony and Cleopatra

Unit IV

Measure for Measure

Unit V

Samuel Johnson – Preface to Shakespeare
A.C. Bradley – The Substance of Shakespeare Tragedy
T.S. Eliot – Hamlet and His Problems

Suggested Reading:

1. Greenblatt, Stephen. Ed. *The Norton Shakespeare*. 3rd edition. New York: W.W Norton, 2016.
2. Taylor, Michale. *Shakespeare Criticism in the Twentieth Century*. London: Oxford, 2018.
3. Knight, Wilson G. *The Wheel of Fire*. New York: Routledge, 2001
4. Bradley A. C. *Shakespearean Tragedy Lectures on Hamlet, Othello, King Lear and Macbeth*, Macmillan & Co Ltd, 1963.
5. Chickera De Ernst and Enright D. J. *English Critical Essays*, Oxford University Press, Madras, 1986.

Course Outcomes:

At the end of the course, the student will be able to:

- and
1. Obtain literary acumen in answering multiple choice questions for SET/NET other competitive examination.
 2. Appreciate the literary and philosophical merits of Shakespeare's plays.
 3. Acquire a comprehensive knowledge of the subtleties and nuances of the language of Shakespeare.
 4. Gather various interpretations by various critics of Shakespeare from the study of his plays and sonnets.
 5. Acquire an idea of the Elizabethan Theatre.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		2			
CO 3			3		
CO 4				3	
CO 5					2

Semester I Core IV	22PENG14– PHONETICS AND HISTORY OF ENGLISH LANGUAGE	Credits: 4 Hours: 5
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Course Objectives:

By introducing the course, it is intended to:

1. Enable the students to have an idea of the growth of English as the world language.
2. Enable the students to have an idea as a great borrower, an assimilator, and a propagator.
3. Enable the students to have an idea as an assimilator and a propagator.
4. Impart proficiency in pronunciation and oral communication.
5. Enable the students to train them in the sounds of the language

Unit I

The Organs of Speech
The Description and Classification of the Sounds of English
Phonemic Transcription

Unit II

Vowels, Pure Vowels
Consonants, Consonant Cluster
Diphthongs, Intonation
The Phoneme
The Syllable
Word Accent

Unit III

Place of English in the Indo-European Family of Languages
Characteristics of Old English
Characteristics of Middle English

Unit IV

Word Borrowing (Scandinavian, French, Latin and Greek)
Makers of English (Shakespeare, Milton, Bible Translators)
History of English Spelling and Spelling Reforms
Changes in Meaning of Words

Unit V

Dictionaries and the Growth of Vocabulary
Evolution of Standard English
Growth of American English
English as a Universal Language

Suggested Reading:

1. Sethi, J. and P.V. Dhamija. A Course in Phonetics and Spoken English. New Delhi: Prentice – Hall, 2005.
2. Jones, Daniel. The Pronunciation of English. Cambridge: Cambridge UP, 1998.

3. Wood, F.T. An Outline History of the English Language. Chennai: Macmillan, 1967.
4. A.C. Baugh, A History of the English Language. New Delhi: Allied Publishers, 1997.
5. O' Connor, J.D.O. Better English Pronunciation. New Delhi: Universal Books, 1997.

Course Outcomes:

At the end of the course, the students will be able to:

1. Know the different sounds and symbols of English.
2. Know structure of words.
3. Know the origin of Language.
4. Know about borrowing of words from other languages.
5. Know the value of language.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	2				
CO 2		3			
CO 3			2		
CO 4				3	
CO 5					2

<p>Semester: I Core Elective: I</p>	<p>22PENGE15-1-TECHNICAL WRITING</p>	<p>Credits: 4 Hours: 5</p>
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Course Objectives:

By introducing this course, it is intended to:

1. Understand the format requirements
2. Know how to present the information intelligently
3. Estimate the structure formation
4. Understand how to convey the message to the readers
5. Know how to articulate the subject matter lucid manner

Unit I

Defining Technical Writing
Audience Language and Style, Organization

Unit II

Writing Elements
Technical Definitions
Technical Descriptions
Summaries
Graphics
Instructions
Comparison and Contrast

Unit III

Forms of Technical Communication
Technical Reports
Forms, Memos, E-mail
Business Letters
Presentations
The Job Search: Resumes and Letters

Unit IV

Subjects and Verbs – Subjects/Verbs Agreement – Prepositional Phrases –
Pronouns- Pronoun References – Avoiding Shifts – Avoiding Sexism – Modifiers
– The Clause and Simple Sentences – Compound Sentences – Complex and
Compound-Complex Sentences – Fragments, Run-ons, and Comma Splices –
Transition Words - Parallelism

Unit V

Mechanics of Writings – Capital Letters – Abbreviations and Acronyms – End Punctuation – Commas – Colons and Semicolons – Parenthesis, Dashes, Brackets, Ellipses, Slashes, and Hyphens – Apostrophe – Quotations

Suggested Reading:

1. Rutherford, Andrea J. *Basic Communication Skills for Technology*. Delhi:Pearsons, 2001.
2. Mohan, Krishna, and Meenakshi Raman. *Effective English Communication*. New Delhi: Tata McGraw-Hill, 2000.
3. Kinsella, Paul. *The Techniques of Writing*. New York: Harcourt, 1975.
4. Krammer. G. Melinda, et al. *Prentice Hall Handbook for Writers*. New Jersey, 1995.
5. Langan, John. *Sentence Skills with Readings*. New York: McGraw-Hill, 2001.
6. Mohan, Krishna &Meenakshi Raman. *Effective English Communication*. New Delhi: McGraw-Hill, 2000.

Course Outcomes:

At the end of the course, the students will be able to:

1. Construct a variety of flawless sentences in English using appropriate grammatical structures
2. Earn their skills in Technical Writing
3. Draft effective research proposals/reports
4. Exploit the resources of English language for professional development
5. Develop effective introduction and conclusion

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		3			
CO 3			2		
CO 4				2	
CO 5					3

Semester: I Core Elective: I	22PENGE15-2– POST COLONIAL LITERATURE	Credits: 4 Hours: 5
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Course Objectives:

By introducing this course, it is intended to:

1. Identify the key concepts and literary forms in postcolonial literatures.
2. Discuss and analyse colonial and postcolonial discourse.
3. Distinguish how race, class, gender, history and identity are presented and problematized in the literary texts.
4. Examine the texts critically in relation to postcolonial theory.
5. Evaluate and formulate arguments about postcolonial literatures and texts.

Unit-I: Poetry

Gabriel Okara	:	"You Laughed and Laughed and Laughed"
Chinua Achebe	:	"Refugee Mother and the Child"
Derek Walcott	:	"A Far Cry from Africa"
Margaret Atwood	:	"Journey to the Interior"

Unit-II: Poetry

A.D. Hope	:	"Australia"
Faiz Ahmed Faiz	:	"Do not ask, my love"
Judith Wright	:	"Typists in the Phoenix Building"
David Diop	:	"Africa"
Arun Kolatkar	:	"The Bus"

Unit-III: Drama

Wole Soyinka	:	Death and the King's Horseman
Girish Karnad	:	Tughlaq

Unit-IV: Prose:

Edward Said	:	"Orientalism" (Introductory Part)
Ngugi Wa Thiongo	:	"Decolonizing the Mind" (Introduction)

Unit-V: Fiction

Chinua Achebe	:	<i>Things Fall Apart</i>
Isabel Allende	:	<i>The House of the Spirits</i>
Patrick White	:	<i>The Tree of Man</i>
Chimamanda Ngozi Adichie	:	<i>Purple Hibiscus</i>

Suggested Reading:

1. Ryga, George. *The Ecstasy of Rita Joe*. Talonbooks, 2013. Unit- III

2. Soyinka, Wole, and Jane Plastow. *Death and the King's Horseman*, Bloomsbury Methuen Drama, 2017. Unit- III
3. Karnad, Girish. *Tughlaq*. 1989. Unit- III
4. Rušdie Salman. *Midnight's Children*. Vintage, 2013, Unit-V
5. Booker, M. Keith. *Things Fall Apart, by Chinua Achebe*. Salem Press, 2Unit-V
6. Dhawan, Rajinder K. *Commonwealth Fiction*. Classical Publ. Co., 1988.
7. Said, Edward Wadie. *The World, the Text, and the Critic*. Vintage, 1991.
8. Ashcroft, Bill, et al. *The Post-Colonial Studies Reader*. Routledge. Taylor & Francis Group, 2006.
9. Walsh, William. *Commonwealth Literature*. St James Press, 1985.

Web Resource:

1. *Australian Poetry Library*, www.poetrylibrary.edu.au/poets/hope-a-d/australia-0146006.
2. *Internet Encyclopedia of Philosophy*, www.iep.utm.edu/literary.
3. "Postcolonial Literature." *Wikipedia*, Wikimedia Foundation, 18 Apr. 2021, en.wikipedia.org/wiki/Postcolonial_literature.

Course Outcomes:

At the end of the course, the students will be able to:

1. Appreciate literary works under Post-Colonial literature
2. Understand global relevance and significance of the Post-Colonial literature.
3. Appreciate the contribution of the writers with a common colonial past.
4. Analyse and evaluate Post-Colonial aspects of literary works.
5. Critically analyse the relevance of the works in the light of globalization.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		2			
CO 3			3		
CO 4				3	
CO 5					2

Semester: I Core Elective: I	22PENGE15-3–WORLD POPULAR SHORT STORIES	Credits: 4 Hours: 5
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COURSE OBJECTIVES:

BY INTRODUCING THE COURSE, IT IS INTENDED TO:

1. Introduce students to some of the important short stories of the world.
2. Enable the students to study the various techniques and styles employed by the authors.
3. Help them in gaining some insights into the socio-cultural aspects of the regions from where the texts are chosen.
4. Stimulate the sympathetic / empathetic imagination by allowing them to see the world through other's eyes.
5. Induce them to apply their analytical, critical and creative skills in interpreting a work.

UNIT I:

CHINUA ACHEBE (NIGERIAN) : MARRIAGE IS A PRIVATE AFFAIR

Zacharias Topelius (Finnish) : The Birch and the Star

Luigi Pirandello (Italian) : War

ANATOLE FRANCE (FRENCH) : OUR LADY'S JUGGLER

UNIT II

LU HSN (CHINESE) : MEDICINE

HJALMAR SODERBERG (SWEDISH) : THE BURNING CITY

FRANZ KAFKA (GERMAN) : THE OUTLAWS

HANS CHRISTIAN ANDERSON (DANISH) : WHAT THE OLD MAN DOES IS ALWAYS RIGHT

UNIT III

Maxim Gorky : The Mother of a Traitor

Leo Tolstoy : The Candle

Anton Chekov : Misery

Unit IV

William Faulkner : Barn Burning

Edgar Allan Poe : The Black Cat

John Stein Beck : The Chrysanthemums

Unit V

P. G. Wodehouse	:	Leave it to Jeeves
Arthur Conan Doyle	:	A Case of Identity
Frank O' Conner (Irish)	:	The Idealist

Suggested Reading:

1. Frederick.V. *A Pinch of Snuff*, Orient Longman, Chennai, 1990.
2. Modern Short Stories-A Reader, S.Chandand Co, NewDelhi, 1986.
3. Sasikumar.J, Paul Gunasekar, *Spectrum an anthology of Prose*, Orient Longman, Kolkata, 2007.
4. Selected Short Stories of the World. Maples Press, 2010.

Web Sources:

1. https://en.wikisource.org/wiki/My_Man_Jeeves/Leave_it_to_Jeeves
2. <https://www.accuracyproject.org/t-France.Anatole-OurLadysJuggler.html>
3. <https://jerrywbrown.com/wp-content/uploads/2020/02/War-Pirandello-Luigi.pdf>
4. <https://cyc-net.org/cyc-online/cycol-0102-soderberg.html>
5. https://standardebooks.org/ebooks/selma-lagerlof/short-fiction/pauline-bancroft-flach_jessie-brochner_velma-swanston-howard/text/the-outlaws
6. https://andersen.sdu.dk/vaerk/hersholt/WhatTheOldManDoesIsAlways_e.html

COURSE OUTCOMES:

AT THE END OF THE COURSE THE STUDENT WILL BE ABLE TO:

1. Develop a critical understanding of fiction.
2. Compare their indigenous literature and culture with other literatures and cultures
3. Gain knowledge about sensitive issues that are dealt with by the writers.
4. Get motivated to explore more works on their own.
5. Write critical, analytical and interpretive articles

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		2			
CO 3			3		
CO 4				3	
CO 5					2

Semester: II Core: V	22PENG21: THE ROMANTIC AGE	Credits: 4 Hours: 6
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Course Objectives:

By introducing this course, it is intended to:

1. Enable the learners to get acquainted with the unique characteristics of the literature of the Romantic Ages.
2. Enable the learners to get acquainted the knowledge of the Literature.
3. Enable the learners to appreciate and enjoy nature.
4. Enable the learners to have a chance to learn aesthetic pleasure.
5. Enable the learners to know about the romantic movements.

Unit I

Williams Collins:	Ode to Evening
Thomas Gray:	Elegy Written in a Country Churchyard
William Wordsworth:	Ode on the Intimations of Immortality

Unit II

P. B. Shelley:	Ode to Skylark
John Keats:	Ode on a Grecian Urn
Lord Byron:	On this day I complete my thirty sixth year

Unit III

Wordsworth:	Preface to the Lyrical Ballads
S.T. Coleridge:	Biographia Literaria - Chapters IV, XIV, XVIII

Unit IV

P.B. Shelley:	Prometheus Unbound.
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Unit V

Jane Austen:	Pride and Prejudice
Walter Scott:	Kenilworth

Suggested Reading:

1. Willey, Basil. (1972) Samuel Taylor Coleridge, London: Chatto and Windus.
2. King-Hele, Desmond, (1960) Shelley: His Thought and Work, Second Edition London: Macmillan.
3. Abrams, M.H. (1953) The Mirror and the Lamp: Romantic Theory and the Critical Tradition, New York.
4. Willey, Basil (1940) The Eighteenth-Century Background, London.
5. Eliot, T.S. (1933) The Use of Poetry and the Use of Criticism, London: Faber and Faber.

Course Outcomes

At the end of the course, the students will be able to:

1. Know the salient features of romantic poetry.
2. Understand special poetic talents of the poets.
3. Know the features of romantic age.
4. Understand the literary background.
5. Know the basic aspects of life.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		3			
CO 3			2		
CO 4				3	
CO 5					2

Semester: II Core: VI	22PENG22: THE VICTORIAN AGE	Credits: 4 Hours: 6
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Course Objectives:

By introducing this course, it is intended to:

1. Enable learners to understand the spirit of Victorian England and its influence on poetry
2. Enable the students to see the relevance of the Victorian times to modern times
3. Make the students to study in details the literary background of the Victorian era and its feature
4. Introduce through the key texts the development of the Victorian era
5. Keep a focus on the concept Victorian age

Unit I

Matthew Arnold	:	“The Scholar Gypsy”
Elizabeth Barrett Browning	:	“If thou must love me”
Alfred Tennyson	:	“Tithonus”

Unit II

D G Rossetti	:	Blessed Damozel
G. M. Hopkins	:	The Pied Beauty
Robert Browning	:	My last Ride Together

Unit III

Mathew Arnold	:	The Study of poetry
Ruskin	:	Seasame and lilies
Thomas Carlyle	:	Hero as man of Letters

Unit IV

George Eliot	:	The Mill on the Floss
Dickens	:	Hard Times

Unit V

Oscar Wilde	:	A Woman of No Importance
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Suggested Readings:

1. Batho, Edith C, Bonamy Dobrée, and Guy Chapman. The Victorians and After, 1830-1914. London: Cresset, 1962.
2. Cecil, David. Early Victorian Novelists: Essays in Revaluation. London: Constable & Co., Ltd, 1934.

3. Colin Clarke. ed. D.H. Lawrence: The Rainbow and Women in Love. London: Macmillan, 1979.
4. Gassner, John. An Anthology. Introduction to the Drama. New York: Holt, Rinehart and Winston, 1963.
5. Gassner, John. An Anthology. Introduction to the Drama. New York: Holt, Rinehart and Winston, 1963.
6. Leavis, F R, and Q D. Leavis. Dickens, the Novelist. New York: Pantheon Books, 1971.

Course Outcomes

At the end of the course, the students will be able to:

1. Equip their knowledge of The Victorian era
2. Analyse the literary texts.
3. Know the difference styles of the writers.
4. Have a critical mind.
5. Learn the technics of poetry

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		2			
CO 3			3		
CO 4				2	
CO 5					3

Semester: II Core: VII	22PENG C23: ECO LITERATURE	Credits: 4 Hours: 6
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Course Objectives:

By introducing this course, it is intended to:

1. Enable the students to get acquainted with ecological issues.
2. Introduce them to eco literary theory so as to understand Eco literature.
3. Introduce the students, to Eco criticism, which is one of the most relevant critical theories of the post-modern era.
4. Trains them to approach social issues eco-critically.
5. Articulate a deeper understanding of topics, issues, and themes as expressed in environmental literature.

Unit I

Introduction to Eco-Criticism – Definition, Scope and Importance of Eco-Criticism.

William Howarth	Some Principles of Eco-Criticism
William Rueckert	Literature & Ecology: An Experiment in Eco-Criticism
Jonathan Bates	A Language that is Evergreen

Unit II

Rayson K Alex	Towards Green Education
Cheryll Glotfelty	Strong Green Thread
Nirmal Selvamony	Thinai – 1

Unit III

William Wordsworth	“The Solitary Reaper”
Ted Hughes	“Thrushes”
Toru Dutt	“Our Casuarina Tree”
Robert Frost	“Birches”

Unit IV (Non-Fiction)

Amitav Gosh	<i>The Great Derangement</i>
Thoreau	“Higher Laws” From Walden
Wangari Mathai	Nobel Lecture

Unit V

Gita Mehta	A River Sutra
Thakazhi S Pillai	Chemmeen

Suggested Reading:

1. Romantic Ecology: Wordsworth and the Environmental Tradition. London: Routledge, 2013. Print Berg, Peter.
2. Alex, Rayson K., S. Susan Deborah and Sachindev P.S. ed. Culture and Media: Explorations in Ecocriticism.
3. Selvamony, Nirmal, Nirmaldasan and Rayson K. Alex. Essays in Ecocriticism. New Delhi: Sarup and Sons and OSLE-India, 2008. Print. Selvamony, Nirmal and Nirmaldasan. Tinai I, II and III. Chennai: PASO, 2003. Print.
4. The Cambridge Companion to Environmental Literature
5. Beginning Theory – Peter Barry Buell, Lawrence. The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture. Cambridge, MA and London, England: Harvard UP, 1995.
6. Williams, Raymond. The Country and the City. London: Chatto and Windus, 1973.
7. Clark, Thomas. The Cambridge Introduction to Literature and the Environment. Cambridge: Cambridge UP, 2011.
8. Glotfelty, C., & Fromm, H. The Eco-criticism reader: Landmarks in literary ecology. Athens: University of Georgia Press, 1996

Course Outcomes

At the end of the course, the students will be able to:

1. Acquire knowledge in Environmental literature.
2. Apply various approaches to the aesthetic and poetic judgement.
3. Obtain new views on culture, including writers, books and reviewing them as connected to environment.
4. Get acquainted with intra-textual and the extra-textual form of new methodological sequence.
5. Student becomes aware of the cultural ecological system.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		3			
CO 3			2		
CO 4				3	
CO 5					2

Semester: II	22PENG24 - FANTASY AND HORROR LITERATURE	Credits: 4
Core: VIII		Hours: 5

Course Objectives:

By introducing the course, it is intended to:

1. Familiarise the students to the theories and practice of fantasy literature
2. Enable the students to get acquainted with the various theories of fantasy literature
3. Make the students comprehend the different concepts, approaches, and critical practices of fantasy literature
4. Motivate the students to understand the importance of fantasy literary studies

Unit-I

Introduction - What is Fantasy Fiction?

Definitions and Genres of Fantasy

History of Fantasy Literature

Unit-II

Kinds of Fantasy Fiction

1. Children's fantasy
2. Adult fantasy
3. Science fiction
4. Magical Realism

Unit-III

1. Dracula - Bram Stoker

2. The Tell Tale Heart – Edgar Allen Poe

3. The Monkey's Paw – W. W. Jacobs

Unit-IV

Hobbit – J R R Tolkien

The Lion, the Witch and the Wardrobe – C. S. Lewis

The Magician's Nephew - C. S. Lewis

Unit-V

Harry Potter and the Philosopher's Stone – J K Rowling

The Dispossessed – Ursula K. Le. Guinn

Suggested Readings:

1. *The Fantastic*- Tzvetan Todorov. Translated by Richard Howard.
2. *The Cambridge Companion to Fantasy*. Ed. Farah Mendlesohn
3. *The Cambridge Companion to Horror Literature*.

Course Outcomes:

At the end of the course, the students will be able to:

1. Place representative works of science fiction and fantasy in a larger cultural, intellectual, and aesthetic context.
2. Analyse science fiction and fantasy themes, tropes, and modes of expression
3. Understand various fantasy literary theories.
4. Acquire knowledge about various fantasy genres.
5. Express in writing a sound knowledge of the development of science fiction and fantasy.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		2			
CO 3			3		
CO 4				2	
CO 5					3

Semester: II	22PENGE25-1 - ORAL NARRATIVES	Credits: 4
Core Elective: II		Hours: 5

COURSE OBJECTIVES:

By introducing the course, it is intended to:

1. Familiarize the genres of oral literature.
2. Enable them to find connection and continuities as well as to identify the disjuncture between oral and written texts viz. past and present.
3. Develop a sense of appreciation and the aesthetics
4. Encourage the free and independent thought to any research orientation
5. Develop the skills of interpretation, appreciation of literature as well as writing and presentation skills.

Unit I

A general introduction to oral literature as a genre of literature.
 Role of story tellers, musicians, griot, praise-singers, and oral historians in presenting the genealogies
 Historical narratives and oral literature
 Components of oral literature
 Recent developments in the study of oral literature
 Nature and scopes
 Oral literature and society.

Unit II: Myth & Folklore

From The Bhilli Mahabharat : By Bhagavodas Patel
 Trans. By Ajay Dandiker

From The Kunkana Ramayana: By Dahyabhai Vadhu
 Trans. By Jenni Rathod

From the Panchatantra : I Strategy - The Elephant and the Sparrow
 (Discord among Friends)
 II Strategy – Shandili and Sesame Seeds
 (Gaining Friends)
 III Strategy – The Tale of Two Friends
 (War and Peace)
 IV Strategy – The Lion and Foolish Donkey
 (Loss of Gains)
 V Strategy – The Miserly Father
 (Impudence)

Unit III: Legend

Tejan Bal	:	Subhash Pawra Aruna Joshi
Mansinha and Salvan	:	Dahyabhai Vadhu
		Trans. By Avneesh Bhatt

Unit IV: Drama

Budhan	:	A Play by Denotified Chharas
Tagore	:	Chitra

Unit V: Short Forms of Oral Literature

1. Proverbs with stories
2. Riddles
3. Popular Sayings
4. Chant, Slogans., Etc
5. Epithalamium, Lullaby

Suggested Readings:

1. Devy, G.N.Ed. Painted Words: An Anthology of Tribal Literature. New Delhi: Penguin, 2002.
2. [https://rohithdankar.files.wordpress.com/2016/01/reading-2_the-great-panchatantra-tales_complet.pdf](https://rohithdankar.files.wordpress.com/2016/01/reading-2_the-great-panchatantra-<u>tales_complet.pdf</u>)

Course Outcomes:

By the end of the course, the students shall be able to:

1. Identify the various genres of oral literature
2. Know India's age old literary tradition and cultural traditions through their exposure to oral literature in tradition in English
3. Oral literary text as a tool of cultural study will help students to challenge the differences in social traditions and scientific beliefs.
4. Learn various language patterns and dialogue forms of oral narratives.
5. Able to recognize and completed different variations regional languages and learn the narrative techniques employed by the story tellers, singers, genealogist etc.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	2				
CO 2		3			
CO 3			3		
CO 4				2	
CO 5					3

Semester: II Core Elective: II	22PENGE25-2: TRANSLATION THEORY AND PRACTICE	Credits: 4 Hours: 5
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Course Objectives:

By introducing this course, it is intended to:

1. Introduce the students to the different theories of translation
2. Enable the students to understand the significance of translation studies in general
3. Encourage the students to acknowledge the importance of translation in a multilingual country like India
4. Familiarize them with the theories of translation and the current practices
5. Inspire the students to critically evaluate and appreciate the translated genres

Unit I

History of Translation, Problems of Period Study
Types of Translation

Unit II

Meaning – Linguistic meaning
Denotative meaning and Connotative meaning
Equivalence in Translation

Unit III

Problems in Translation, Untranslatability
Transference and Transcription

Unit IV

Translations

1. Scar – Translated by V. Kadambari
2. Thirukkural – Translated by V.V. S Aiyar, Chapters: 11-Gratitude, 16 - Patience
3. Short Stories
“Poisoned Bread” – Arjun Dangle
“Draupadi” – MahaswetaDevi
“The World is Yours” – Translated by Dr. A. Dakshinamurthy

Unit V

Translation Practice
A brief passage or short poem to be given for translation (English to Tamil, Tamil to English) and the problems in translation identified

Suggested Reading:

1. Bassnett, Susan. *Translation Studies*, London: Routledge, 2002
2. Catford, J.C. *A Linguistic Theory of Translation*. Delhi: OUP, 2000.
3. Das, Bijay Kumar. *A Handbook of Translation Studies*. 3rd Revised Ed. Delhi: Atlantic Publishers & Distributors, 2001.
4. Kuhiwazak, Piotr & Karin Littau. *A Companion to Translation Studies*. Hyderabad: Orient BlackSwan, 2011.
5. Nida, Eugene, *Towards a Science of Translating*. Leiden: Brill, 1964.
6. Sawant, Sunil. *Translation Studies: Theories and Applications*. Delhi: Atlantic Publishers 2013.

Course Outcomes

At the end of the course, the student will be able to:

1. Understand the significance of translation work in literary field and acknowledge the various theories of translation studies
2. Understand how literary translation can work as a medium for cultural exchange between countries
3. Obtain skill to translate different genres and forms of literary works, applying the different theories
4. Evaluate and appreciate translated literary works
5. Obtain literary acumen in answering multiple choice questions for SET/NET and other competitive examinations

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	2				
CO 2		3			
CO 3			3		
CO 4				2	
CO 5					3

Semester: II Core Elective: II	22PENGE25-3: WOMENS WRITING	Credits: 4 Hours: 5
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Course Objectives:

By introducing this course, it is intended to:

1. Introduce the learners to the major literary endeavors of women authors.
2. Initiate discussion on issues addressed in the works of women authors.
3. Know the recent developments, in terms of themes, and narrative techniques adapted by the women writers.
4. Enable them to analyze literary texts through the perspective of gender.
5. Know the central points of womanism and feminism.

Unit I: Poetry

Elizabeth Barrett Browning	:	“How Do I Love Thee?” (sonnet 43) “If Thou must Love Me” “The Cry of the Children”
Sylvia Plath	:	Lady Lazarus
Kamala das	:	The Old Play House
Maya Angelo	:	Phenomenal Women

Unit II: Prose

Arunthathi Roy	:	The Greater Common Good
Virginia Woolf	:	Sojourner Truth; Ain't I A Woman?

UNIT III: Drama

Caryl Churchill	:	Top Girls
Lorraine Hensberry	:	A Raisin in the Sun.

UNIT IV: Novel

Mahasweta Devi	:	Rudali
Rupa Bajwa	:	Sari Shop

UNIT V: General

1. Historical Overview and Major Themes in Women's Writing
2. Mary Woolstone Craft : The Vindication of the Rights of Women
3. Elain Showalter : Toward a Feminist Poetics

Suggested Reading:

1. A Hand book of Critical Approaches to Literature, ed.WilfredI.Guerin.etal. Pages. 196-215.
2. An anthology of Literary Theory and Criticism, eds.R.Warkol and Diane. Price Henrdl.p.279-291.

Course Outcomes

At the end of the course, the student will be able to:

1. Interpret literary works by women authors at an advanced level
2. Compare how women authors have represented women in their writings and their relationship with male counterpart.
3. Know how women have been marginalized and denied a voice of their own in canonical literature.
4. Understand how women's writings reflect sociological issue.
5. Apprehend women author's commentary about societal norms.

Outcome Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3				
CO 2		3			
CO 3			2		
CO 4				3	
CO 5					2

ANNAMALAI UNIVERSITY

M.A. ENGLISH

SYLLABUS

UNDER CBCS

(With effect from 2021-2022)

PROGRAMME OBJECTIVES

The Programme aims to develop the ability of the student to critically examine and restate his/her understanding of literary texts, employing individual linguistic skills, engendering literary concepts and critical approaches to arrive at the core and essence of narratives. The learning process would also lead to a larger comprehension of global, national, social issues and thereby facilitate the students to address the issues proactively and gain a reasonable command of the language.

PROGRAMME OUTCOME

- On completion of the programme the student will be able to:
- Interpret his/her understanding of form, structure, narrative technique, devices and style.
- Analyze and apply various literary concepts and critical approaches.
- Appreciate the importance of English as an international language, to benefit from the achievements of other cultures in accordance with various life situations.
- Organize and integrate the acquired knowledge towards individualistic compositions.
- Present, appraise and defend arguments with conviction and confidence.

M.A. ENGLISH EMPLOYMENT AREAS

1. Advertising Industry
2. Corporate Communication
3. Communications Industry
4. Indian Civil Services
5. Journalism
6. Online Tutoring
7. Politics
8. Publication Houses
9. Public Relations
10. Research

11. TV & Media
12. Translation Agencies

M.A ENGLISH JOB TYPES

1. IELTS trainer
2. English Translator
3. Junior Parliamentary Reporter (English)
4. English Editor
5. Translator/Interpreter
6. English Teacher
7. Content Writer/Trainer
8. English Tutor
9. Customer Support Executive
10. English Proof Reader
11. English Language Specialist
12. Media Analyst
13. Stenographer (English)

The Course of Study and the Scheme of Examination

SEMESTER III								
14.	Core	Paper-8	5	4	Non- Fiction & Prose	25	75	100
15.		Paper-9	5	4	Research Methodology	25	75	100
16.		Paper-10	5	4	Contemporary Literary Theory - II	25	75	100
17.		Paper-11	5	4	African and Canadian Writings	25	75	100
Internal Elective for same major students								
18.	Core Elective	Paper - 3	5	3	(To choose one out of 3) A. Popular Literature B. Children’s Literature C. Preparatory Exam for NET/SET/TRB – Paper II	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
19.	Open Elective	Paper - 3	5	3	(To choose one out of 3) A. Soft Skills B Theorising Sexualities C. Preparatory Exam for NET/SET – Paper I	25	75	100
20.	**MOOC courses		-	-		-	-	100
			30	22		150	450	700

SEMESTER IV								
21.	Core	Paper-12	6	5	World Literature in Translation	25	75	100
22.		Paper-13	6	4	Shakespeare Studies	25	75	100
23.		Paper-14	6	4	Single Author Study	25	75	100
24.	Core	Project	5	5	Project with Viva voce	100 (75 Project +25 viva)		100
Internal Elective for same major students								
25.	Core Elective	Paper - 4	4	3	(To choose one out of 3) A. Post-Colonial Studies B. Gender Studies C. English Language Teaching - Theory and Practice	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
26.	Open Elective	Paper - 4	3	3	(To choose one out of 3) A. Film Studies B. English for Media C. Fantasy Fiction	25	75	100
			30	24		150	450	600
			120	90				2600

*** Field Study**

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than

25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

- (i). Head of the respective department
- (ii). Mentor
- (iii). One faculty from other department

****Mooc Courses**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

SEMESTER III

PAPER - 8

NON-FICTION AND PROSE

COURSE OBJECTIVES

- To familiarize the student with the essays of Francis Bacon, his-epigrammatic style and aphorisms.
- To acquaint the student with the Holy Bible, its language and the Utopia as an ideal state.
- To enjoy autobiographical elements of Charles Lamb's essays, his unique style, pathos and humor, the personal essay of the Romantic age.
- To probe the philosophical thought of Russell, the Post Colonial aspects as highlighted in George Orwell.
- To acquaint the students with the critical views of T.S. Eliot on the metaphysical poets like Donne and assimilate their literary content
- To impart the role of humor in everyday life - how an ordinary incident acquires philosophical dimensions in G.K Chesterton.

UNIT PLAN

- ❖ To understand the enrichment of English vocabulary and religious connotation of the period.
- ❖ To learn More's positive views on an Ideal State.
- ❖ To evaluate More as an essayist of the Middle English Period.
- ❖ To enjoy the Auto-biographical style of Lamb and Huxley.
- ❖ To understand the pathos in Lamb.
- ❖ To critically appreciate the humor in Lamb and Hazlitt.

COURSE OUTCOME

- To learn the writing style from Russell's model.
- To learn the value of lateral thinking.
- To enjoy the humor of Orwell.
- To critically evaluate the Post Colonial issues presented in Orwell's essay.
- To estimate T.S. Eliot as a scholarly critic.
- To learn about the greatness of the Metaphysical poets like Donne.

UNIT 1 - BRITISH LITERATURE-NON – FICTION

<i>Great Contemporaries</i>	-	Winstn Churchill (Detailed)
<i>Seven Pillars of Wisdom</i>	-	T.E. Lawrence (Detail)
<i>Life of Mr. Richard Savage</i>	-	Samuel Johnson (Non- Detail)

UNIT 2- AMERICAN LITERATURE- NON – FICTION

- In Cold Blood* - Thumam capote **(Detail)**
- Two Kinds of Truth* - Michael Connelly **(Detail)**
- White trash* - Nancy IsenBery **(Non-Detail)**
- (The 400 – Year untold History of class in America)

UNIT 3- INDIAN WRITING IN ENGLISH-NON- FICTION

- India After Gandhi* - Ramachandra Guha **(Detail)**
- An ordinary person’s Guide to Empire* - Arundhadhi Roy **(Detail)**
- Freedom at Midnight* - Larry Collins and Dominique
Lappierre **(Non-Detail)**

UNIT 4- COMMONWEALTH LITERATURE -NON- FICTION

- Descent into Chaos* - Ahmed Rashid **(Detail)**
- Reading Lolita in Tehran* : A Memoir Books - AzarNatisi **(Detail)**
- The Home that was Our country :* A Memoir of Syria-Alia Malek**(Non Detail)**

UNIT 5- CHINESE NON-FICTION

- The Soong Dynasty* - Sterling Seagrame **(Detail)**
- Factory Girls; From village to city in a changing China* - Leslie T. Chang **(Detail)**
- Haunted by Chaos: China’s Grand Strategy from Mao Zedong to Xi* – SulmaanWasif
Khan **(Non Detail)**

PAPER -9

RESEARCH METHODOLOGY

OBJECTIVES

- To help students prepare a Dissertation of their own
- To prepare students for quality research in future
- To train students in using parenthetical documentation as recommended in MLA Hand Book

UNIT PLAN

- ❖ To learn regarding the concept, definition and variable.
- ❖ Experimental Design of Independent and Dependence of Variables
- ❖ Giving an idea of Validity and Reality.
- ❖ To collect the Data and how to represent them.
- ❖ Giving the vivid Software and Paper format.

COURE OBJECTIVES

- The learners are introduced to the Definitions, Variables and Research questions, etc.
- The learner can explore the Research Design, the difference between Quantative and Qualitative Research.
- The Concept of Measurement is introduced to the Learners.
- The learners are taught to interpret the data and Layout.
- The usage of the sources is taught to the Learners.

Unit– I

Research and Writing

Plagiarism and Academic Integrity

Unit– II

The Mechanics of Writing

Unit– III

The Format of the Research Paper Abbreviations

Unit– IV

Documentation: Preparing the list of Works Cited

Unit– V

Documentation: Citing Sources in the text

REFERENCE

1. Modern Language Assn. Of America, “*M.L.A Hand Book*”, Macmillan. 8th edition.
2. Anderson, Durston & Poole, “*Thesis & Assignment Writing*”, Easter Limited, New Delhi. 1970 rpt. 1985.
3. Parsons C J, “*Thesis &Project Work*”, Unwin Brothers Ltd., Gresham Press. 1973.
4. Rajanna, Busangi, “*Fundamentals of Research*”, American Studies Research Centre, 1983.
5. *Research Methodology* – C.R. Kothari

PAPER - 10

CONTEMPORARY LITERARY THEORY - II

OBJECTIVES

- The aim of this course is to familiarize students with major trends in twentieth century literary Theory in order to explore ongoing debates in literary criticism and their application in critical practice.
- Students would be expected to acquaint themselves with the principal hypotheses and reading strategies of the following schools to see how each critical practice includes and excludes issues relevant to other practices.

UNIT PLAN

- ❖ Enhances the students to develop critical skills, analysis and many other communication skills, oral and written.
- ❖ The students are firmly equipped with various tools, techniques and strategies of interpretation.

COURSE OUTCOME:

- It reinforces the student's literary competence.
- The students will develop an independent critical persona.
- The students can understand the various types of theories
- Theories after the 20th century are learned

UNIT I

Structuralism, Post structuralism and Deconstruction

(Barthes, Lacan, Derrida, Foucault)

UNIT II

Marxism and Ideological Criticism

UNIT III

New Historicism and Cultural Materialism

UNIT IV

Post – colonialism

UNIT V

Feminism

LGBTQ studies.

TEXT BOOKS

- Barry, Peter. *Beginning Theory* (Routledge, London, 2010)
- Selden, Raman. *A Reader's Guide to Contemporary Literary Theory*. (Pearson, Singapore, 2009)

REFERENCE

1. Lodge, David and Nigel Wood (ed.). *Modern Criticism and Theory*
(Pearson, Essex, 2008)
2. Waugh, Patricia. *Literary Criticism and Theory*. (Oxford University Press, Oxford, 2008)

PAPER -11

AFRICAN AND CANADIAN WRITINGS

OBJECTIVES

- To make the students acquainted with the emerging literatures of the particular countries.
- To know more about the exploited people.
- Open up new avenues for their future research work.

UNIT PLAN

- ❖ Pictorial representation of the pain of the people.
- ❖ Exposure to thoughts of the oppressed.
- ❖ Reaction of the Colonized people.
- ❖ Seeking for recognition.

COURSE OUTCOME

- The pain of the exploited is taught via Poetry.
- The Situation of Woman in the Colonies is taught.
- The reaction of the Colonizers against the capture is sketched.
- Abuse of Colonial people for the trade of the Capitalist is highlighted.

UNIT – I: POETRY (DETAILED STUDY)

Okot Bitek	–	My Husband’s Tongue is Bitter (selection from Song of Lawino)
J.P.Clark	–	Casualties – Part – II
Gabriel Okara	–	You Laughed and laughed and laughed
Daniel David Moses	–	Inukshuk
Margaret Atwood	–	Journey to the Interior
Sir Charles G.D. Roberts –		The Solitary Woodsman

UNIT – II: PROSE (DETAILED STUDY)

Brian Chikwava	–	<i>Seventh Street Alchemy</i>
Mary Watson	–	<i>Jungfrau</i>
Uma Parameswaran	–	<i>16th July</i>
Renee Hulan	–	<i>Everybody Likes the Inuit</i>

UNIT – III: DRAMA

- Chinua Achebe – *Things Fall Apart*
Joan Macleod – *Toronto, Mississippi*

UNIT – IV: FICTION

- Margaret Laurence – *The Stone Angel*
L.M. Montgomery – *Anne of Green Gables*

UNIT – V: CRITICISM

- John Povey – The Novels of Chinua Achebe
Northrop Frye – “Conclusion to A Literary History of Canada” The Bush
Garden: Essays on the Canadian Imagination. Pp. 213-252.
Richard Wright – Blue Print for Negro Writing

CORE ELECTIVE

PAPER –3

(to choose one out of 3)

A. POPULAR LITERATURE

COURSE OBJECTIVE

- To make learners aware of the popular works in literature and what made those works popular.
- To expose the learners to the salient features of literature.
- To enable readers to appreciate the popular works in literature
- To expose the changing trends in English literature.

UNIT PLAN

- ❖ To understand modern literature
- ❖ To emphasize the reading skill
- ❖ Struggles and the progress of Malala
- ❖ The conflict of rootless souls.

COURSE OUTCOME

- The learners will be aware of the new features of literature.
- To students can understand the changing trends in English literature.
- The readers will be able to appreciate the works in literature from the point of view of the refugees.
- The learners can be aware of the popular works in literature and what made those works popular.

UNIT 1

Tuesdays with Morie – Mitch Albom
Roadless Travel – M. Scott Peck
The Monk Who Sold His Ferrari – Robin Sharma

UNIT 2

An Unexpected Gift – Ajay K. Pandey
I Too Had A Love Story – Ravinder Singh
You are Trending In My Dreams – Sudeep Nagarkar

UNIT 3

Something I Never Told You – Shravya Bhinder
Jonathan Livingston Seagull – Richard Bach
Count Your Chickens Before They Hatch – Arindam Chaudhuri

UNIT 4

I Am Malala – Malala Yousafzai
*The Last Girl: My Story of Captivity, and My Fight Against
The Islamic State* – Nadia Murad
Long Walk to Freedom – Nelson Mandela

UNIT 5

Controversially Yours – Shoaib Akhtat
Always Another Country: A Memoir of Exile and Home – Sisonke Msimang
This Divided Island: Stories from the Sri Lankan War - Samanth Subramanian

CORE ELECTIVE

PAPER -3

B. CHILDRENS LITERATURE

OBJECTIVES

- To expose students to apparently simplistic narratives that have become important area of literary/cultural scholarship in recent times.
- To let the students acquire knowledge about children's poetry.

UNIT PLAN

- ❖ To enable students to get a glimpse of worldwide trends in children's prose
- ❖ To let the students aware of the variety of children's fiction
- ❖ To enable the students to understand and appreciate world drama meant for children
- ❖ To enlighten students about the richness of folk tales and wonder of comic strips

COURSE OUTCOME

- The student will be inspired to pay more attention to nature
- The student will be motivated to visualise a world devoid of fears
- The student will understand the contrast between worlds of childhood and reality
- The student will learn to appreciate how the poet deals with a simple idea in an extraordinary way.
- The students will be inspired by the thought and words of true genius
- The student will appreciate the importance of honest work and responsibility

UNIT I – POETRY

Lewis Carroll	–	A Strange Wild Song
Robert Louis Stevenson	–	1. The Flowers
		2. Night and Day
Sylvia Plath		1. Balloons

UNIT II – PROSE

Anne Frank	–	<i>The Diary of a Young girl</i>
Tetsuko Kuroyanagi	–	Totto Chan: <i>The Little Girl at the Window</i> (Translated by Dorothy Britton)
Abdul Kalam	–	<i>Inspiring Thoughts</i>

UNIT III – DRAMA

Vijay Tendulkar	–	“The King and the Queen want Sweat”
Mark Twain	–	<i>The Prince and the Pauper</i>

UNIT IV – FICTION

Laura Ingalls Wilder	–	<i>Little House on the Prairie</i>
C.S Lewis	–	<i>Chronicles of Narnia- The Lion, Witch and the Wardrobe</i>
Harriet Beecher Stowe	–	<i>Uncle Tom’s Cabin</i>
Markus Zusak	–	<i>The Book Thief</i>
J.R.R Tolkein	–	<i>The Hobbit</i>

UNIT V – FOLK LITERATURE, FAIRY TALES AND COMIC STRIPS

Perrault’s Fairy Tales	–	1. <i>Cinderella</i> 2. <i>Little Red Riding Hood</i> 3. <i>Hansel and Gretel</i>
L.Frank Baum	–	<i>The Wonderful Wizard of OZ</i>
Jataka Tales	–	1. <i>The Monkey’s Heart</i> 2. <i>The Talkative Tortoise</i> 3. <i>The Mosquito and the Carpenter</i> [Translated by Ellen C.Babbit]
Herge	–	<i>Tintin ; The Secret of the Unicorn</i>
Lee Falk	–	<i>The Story of the Phantom</i>

REFERENCE ITEM: BOOKS

1. *A Child’s Garden of Verses: Selected Poems- Robert Louis Stevenson, Simon & Schuster Books for young readers*
2. *The Diary of a Young Girl- Anne Frank, Bantam Publishers, 1993*
3. *The Little Girl At the Window- Tetsuko Kuroyanagi (Translated by Dorothy Britton), Kodansha Publishers, USA, 2011*
4. *Inspiring Thoughts – Abdul Kalam, Penguin Books, 2017*
5. *Little House on the Prairie- Laura Ingalls Wilder, Penguin Publishers,*
6. *Chronicles of Narnia- The Lion, the Witch and the Wardrobe , U.K Children’s Publishers, 2010*
7. *Uncle Tom’s Cabin- Beecher Stowe- Fingerprint Publishing, 2019*
8. *The Book Thief – Markus Zusak, Random House, UK,*
9. *The Hobbit- J.R.R, Tolkein, Harper Collins, 2011*

10. *The Complete Jataka Tales*, Translated by Edward Byles Cowell, Jazzybee Verlag Publishers, 2016
11. *Tintin: The Secret of the Unicorn*- Herge, Egmont Publishers, 2011
12. *Phantom Series*- Lee Falk, Harper Collins, 1973

E-MATERIALS:

1. <https://www.poemhunter.com>
2. <https://www.lieder.net>
3. <https://www.genius.com>
4. <https://www.poetryfoundation.org>

CORE ELECTIVE

PAPER -3

C. PREPARATORY EXAM FOR NET/ SET/TRB – PAPER-II

OBJECTIVE

- To enable students to face NET/SET and PG-TRB examinations.
- To help the students gain knowledge and assist them in gaining knowledge of the major and minor writers of every age.
- To teach the various literary terms that are employed in various genres of literary works.
- To inform the students of the various schools of poetry and literary movements.

UNIT PLAN

- ❖ Concentration on Periodical writings.
- ❖ American literature and New literature writings will be given an outlook
- ❖ Criticism to Contemporary theory will be focused

COURSE OUTCOME

- The students learn about the importance of the Chaucer to the Shakespearean age
- The learner can experience the important features of the Romantic and the Victorian period.
- The students can acquaint the knowledge over the Modern and Contemporary Period.
- The students are taught about the American Literature and the learner also can develop his knowledge in the field of translation studies too.
- The learner explores the various forms of Criticism and the contemporary Theories.

UNIT I

Chaucer to Shakespeare

Jacobean to Restoration

UNIT II

Romantic Period

Victorian Period

UNIT III

Modern Period

Contemporary Period

UNIT IV

American Literature

New Literature in English (Indian, Canadian, African, Australian)

English Language Teaching

Translation Studies

UNIT V

Classicism to New Criticism

Contemporary Theory

REFERENCE

- D. Benet E., and Samuel Rufus. *NET. SET..GO... English*. N.p.,2014.
- Masih, K. Ivan. Et.al. *An Objective Approach to English Literature: For NET. SET.JRF.SLET AND Pre-Ph.D*
- *Registration Test*. New Delhi . Atlantic Publishers, 2007.

OPEN ELECTIVE

PAPER -3

(to choose one out of 3)

A. SOFT SKILLS

OBJECTIVE

- To enhance the language skill of the learner
- To provide LSRW skills.
- To build the Fluency of the learner.

UNIT PLAN

- ❖ The capability of fluency in students is analyzed.
- ❖ Emphasis on LSRW skills.
- ❖ Role of Public speaking and telephonic conversation.
- ❖ Highlighting Business presentation.

COURSE OUTCOME

- The students can recap the language skills, Grammar, Vocabulary, Phrase, Clause and sentences.
- The learner can build his fluency gradually.
- The students can acquaint with LSRW skills and can also develop his Non- Verbal Communication.
- The students are taught about the Learning etiquettes
- The student can also learn about the importance of Business Etiquette.

UNIT – I

Recap of language skills – Speech, Grammar, Vocabulary, Phrase, Clause, Sentence.

UNIT – II

Fluency building

What is fluency- Why is fluency important – Types of Fluency – Oral fluency – Reading fluency – Writing fluency – Barriers of Fluency – How to develop Fluency.

UNIT- III

Principles of Communication: LSRW in communication.

What is meant by LSRW skills – Why it is important – How is it useful – How to develop the skills?

Oral – Speaking words, articulation, speaking clearly.

Written communication – Generating ideas/ gathering data organising ideas, Setting goals, Note taking, Outlining, Drafting, Revising, Editing and Proof reading.

Non-Verbal Communication – Body Language, Signs and symbols, Territory/ Zone, Object language

UNIT – IV

Etiquettes for Public Speaking (extempore and lectures), Interviews and Group Discussions, Telephone conversations and Business Meetings.

UNIT – V

Etiquettes for Business presentations – Team presentations and Individual presentation.

REFERENCE

1. Powell. *In Company*.
2. MacMillan. Cotton, et al. *Market Leader*.
3. Longman. Pease, Allan. 1998. *Body Language*:
4. *How to Read Others Thoughts by their Gestures*. Suda Publications. New Delhi.
5. Gardner, Howard. 1993. *Multiple Intelligences: The Theory in Practice: A Reader Basic Book*. New York.
6. De Bono, Edward. 2000. *Six Thinking Hats*. 2nd Edition. Penguin Books.
7. De Bono, Edward. 1993. *Serious Creativity*. Re print. Harper Business.

OPEN ELECTIVE

PAPER -3

B. THEORISING SEXUALITIES

OBJECTIVES

- To demonstrate an awareness of biological, social, and grammatical gender as being three different categories.
- To give a basic awareness of struggles and attainment of people with alternative sexualities in civil rights in various parts of the world
- To help the students view with skepticism the simplistic conflation of biological sex with socially and culturally conditioned gender

UNIT PLAN

- ❖ Defining the types of genders.
- ❖ The poetic mysticism of the female.
- ❖ The grace of feminism from the modern writers.
- ❖ Contribution of women writers on uplifting women.

COURSE OUTCOMES

- Appreciate, if not accept the viewing of gender as a continuum
- Critically analyze different gender self-identification preferences such as transgender and inter-genders rather than seeing the polar genders male and female as the only 'natural' ones
- To show sensitivity to the legal and social persecution faced by persons belonging to the LGBTQ or simply, Queer, community in societies across the world and view their rights as human rights
- To Exercise an enhanced openness and honesty when encountering/ generating discourse on matters of sexuality and gender roles

UNIT I: INTRODUCING SEXUALITY

Sexological types: Sexual classifications, sexual development, sexual orientation, gender identity, sexual relationship, sexual activities, paraphilias, atypical sexual interests

Psychoanalytic drives: Freud and Lacan.

Bristow, Joseph, Introduction, *Sexuality: The New Critical Idiom Series*. 1997. 2nd ed. London: Routledge, 2011.1-11, Print.

Butler, Judith. *Introduction, Bodies That Matter: On the discursive Limits of "Sex."*

London: Routledge, 1993.xi –xx

UNIT II – POETRY

The songs of songs – the sufi and Bhakthi Tradition – the concepts of adhavbhaav

Shakespeare : Sonnet 73 That time of the year

Emily Dickinson : Her breast is fit for pearls

Adrienne Rich : Diving into the deck

Walt Whitman : The wounded Dresser

Siegfried Sassoon : The Last Meeting

UNIT III – PROSE

Manoj Nair : Rite of Passage

Chimamanda N. Adichie : On Monday of Last Week

Mukul Kesavan : Nowhere to Call Home

Shyam Selvadurai : Cinnamon Gardens

Ismat Chughtai : The Quilt

UNIT IV DRAMA

Edward Albee : *Who is Afraid of Virginia Woolf*

Amiri Baraka : *Most Dangerous man in America*

UNIT V FICTION

Moses Tulasi : *Walking the Walk*

REFERENCE

1. De lauretis, Teresa, *Technologies of gender: essay on theory, Film and Fiction*, Bloomington: Indiana Up, 1987. Print
2. Dollimore, Jonathan, *Sexual Dissidence: Augustine to Wilde, Freud to Foucault*, Oxford Clarendon, 1991. Print.
3. Foucault, Micheal. *A History of Sexuality, 3vols*. Trans. Robert Hurley. New York: Vintage, 1978. Print.
4. Kapoor, Shekar, dir. *Bandit Queen*. Perf. Seema Biswas, Nirmal Pandey, Rakesh Vivek.
5. 1004. DVD. Film.
6. Mehta, Deepa, dir. *Fire*. Perf. Shabana Azmi, Nandita Das, Karishma Jhalani. 1996. DVD. Film.
7. Meht, Hansal, dir. Aligarh. Script. Apurva Asrani. Pref. Manoj Bajpayee and Rajkummar Rao. 2016. DVD.
8. Nair, Manoj. "Rite of Passage." *Yaraana: Gay Writing from India*. Ed. Hoshang Merchant. New Delhi: Penguin, 1999. 171-79. Print.

OPEN ELECTIVE

PAPER -3

C. PREPARATORY EXAM FOR NET/ SET/TRB – PAPER-I

OBJECTIVE

- To enable students to face NET/SET and PG-TRB examinations.
- To help the students gain knowledge and assist them in gaining knowledge of the Logic and Reasoning Ability.
- To teach the students about Data interpretation.
- To inform the students of the various aspects of Information and Communication Technology.

UNIT PLAN

- ❖ Identification of reasoning
- ❖ Deduction of logical Coherence
- ❖ Mathematical reasonings are developed.
- ❖ Error analysis are concentrated.

COURSE OUTCOME

- The students are taught about the Teaching and Research Aptitude.
- The learners can attempt the Comprehension passages and understand the Communication patterns.
- The students are introduced to Mathematical Reasoning, Logical Reasoning and General aptitude.
- The students can interpret the data and learn the various aspects of Information and Communication Technology.
- The students are taught about the higher education system and the people

UNIT- I

Teaching Aptitude
Research Aptitude

UNIT- II

Comprehension
Communication

UNIT- III

Mathematical Reasoning and Aptitude
Logical Reasoning

UNIT- IV

Data Interpretation
Information and Communication Technology.

UNIT- V

People, Development, and Environment

Higher Education System.

REFERENCE

1. Kaur, Harpeet- *NTA UGC NET/SET/JRF – Paper 1 Teaching and Research Aptitude*, Oxford Publishers. 2019.

SEMESTER IV

PAPER - 12

WORLD LITERATURE IN TRANSLATION.

OBJECTIVES

- Translation theory helps the students to learn it as an interdisciplinary study and to borrow from the various fields of study that supports translation
- It helps the students to learn the theory of description and application of translation to interpret and localize.
- It disseminates literatures around the world

UNIT PLAN

- ❖ Making the students to enjoying Classical Literature.
- ❖ Inducing the habit of reading Khalil Gibran.
- ❖ An Introduction to the concept of Oedipus complex
- ❖ The outlook of short stories in translated works

OUTCOME

- Helps the students to works in various fields of translation studies, comparative literature and world literature.
- To know the importance of Classical literature.
- To give a world outlook to the learners.
- Challenges the hegemony of English in world literature
- Make the students to learn the political values and emphasize on global processes over national traditions.

UNIT I – POETRY

Virgil : *The Aeneid*, Book IV (438-563)

UNIT II – PROSE

Khalil Gibran : *The Prophet* (prose – poetry essays)

Viktor Schklovsky : Art as a Technique

Goethe : *Shakuntala*

UNIT III – DRAMA

Sophocles : *Oedipus Rex*

Goethe : *Faust – Part I*

UNIT IV – SHORT STORIES

Charles Perrault : Blue Beard

Juan Manuel : The Man who Tamed a Shrew

Giovanni Baccaccio : The Stone of Invisibility

Eliza Oreszkowa : Do You Remember?

Emile Verhaeren : The Horse Fair at Opdrop

Louis Couperus : About Myself and Others

Hans Christian Anderson : What the Old Man does I always Right

Jonas Lie : The Story of a Chicken

UNIT V – FICTION

Fyodor Dostoevsky : *Crime and Punishment*

Albert Camus : *The Outsider*

REFERENCE

1. Virgil, *The Aeneid*, [Net source} The Internet Classics Archive: Classic. Merit.edu./Virgil/Aeneid.html, 2015.
2. Kahlil Gibran, *The Prophet*, Rupa, 2002.
3. Viktor Schklovsky, *Art as Technique*, [Net source]: paradise. caltech. edu / ist4lectures / Viktor_Sklovsky. "Art_as_Technique":.pdf, 2015.
4. Sophocles, *Oedipus Rex*, Dover Publications; Unabridged edition, 2012.
5. Goethe, *I Faust – part*, RHUS Publications, 1988.
6. Gealdine McCaughrean, *Classic Stories Around the World*, Leopard Books, 1996.
7. Fyodor Dostoevsky, *Crime and Punishment*, Penguin, 2003.

SHAKESPEARE STUDIES

COURSE OBJECTIVES

- To know about the English folklore and Shakespeare's use of illusions in the form of fairies.
- To know about the use of catharsis in tragedy through the character of Hamlet.
- To enable students to learn about the history of Henry IV presented in the art form of drama.
- To enable students learn about political intrigue, power struggles, war and the plight of impassioned lovers.
- To make students learn about the varieties of interpretations on the works of Shakespeare and encourage them to critically appreciate his work.

UNIT PLAN

- ❖ Marriage, themes, Hippolyta, Egeus, Lysander, chastity, comic fantasy, four lovers, bewitched, fairies, love, jealousy.
- ❖ Tragedy, Oedipus complex, revenge, ghost, avenging father's death.
- ❖ Dramatic battle, father, son, strained relationship, rebellion.
- ❖ East West clash, honor, reason versus emotion, power struggle.
- ❖ Interpretation, critical analysis, critical theory applied on Shakespeare's work, structuralism, Marxism, feminism.

COURSE OUTCOME

- Learn as to how Shakespearean comedy is interwoven with obstacles, misunderstanding, jealousy, disguise which ultimately leads to fictional nature of the characters in the play
- Learn how Shakespeare has used revenge tragedy in extensively to make the audience learn and correct themselves through Aristotle's principle of catharsis.
- Learn the genre of Historical plays of Shakespeare. Shakespeare's inspiration from chronicles of Holinshed to draw plots for his Historical plays is vividly presented in such a way that it will make even commoners learn about their king's history.
- Learn the struggle between reason and emotion, the clash of east and west and the very definition of honor, while all the way they are exposed to political intrigue, power struggle and struggle between the lovers.

UNIT I

Sonnets	Sonnets – 12,65,86,130 (Detail)
Comedies	<i>Much Ado About Nothing</i> <i>Winter's Tale</i>

UNIT II

Tragedy	<i>Othello (Detail)</i>
UNIT III	
Roman	<i>Coriolanus (Detail)</i>
UNIT IV	
History	<i>Henry IV Part I (Detail)</i>
UNIT V	
SHAKESPEARE CRITICISM	

Modern approaches – mythical, archetypal, feminist, post – colonial, New Historicist;

A.C. Bradley (extract) Chapter V&VI and the New Introduction by John
Russell Brown in **Shakespearean Tragedy** by
A.C. Bradley, London, Macmillan, Third Edition,
1992

Wilson Knight Macbeth and the Metaphysic of Evil (1976, V.S.
Seturaman & S. Ramaswamy **English Critical
Traditon Vol. I.** Chennai, Macmilla).

Stephen Greenblatt Invisible Bullets: Renaissance Authority and its
Subversion, Henry IV & Henry V, in
Shakespearean Negotiations. New York: Oxford
University Press, 1988
Also in **Political Shakespeare: New Essays in
Cultural Materialism.** Eds. Jonathan Dollimore
and Alan Sinfield Manchester University Press,
1994

Ania Loomba Sexuality and Racial Difference in **Gender, Race,
And Renaissance Drama,** Manchester UP, 1989.

REFERENCE

1. Stephen Greenblatt, ed., 1997. **The Norton Shakespeare,** (Romance & Poems, Tragedies, Comedies), W.W. Norton & Co., London.
2. Bradley, A.C., 1904, **Shakespearean Tragedy,** Macmillan, London.

PAPER – 14

SINGLE AUTHOR STUDY

OBJECTIVE

- To make the students learn the various forms of genre of a single author
- To make the students explore the works of Rabindranath Tagore.

UNIT PLAN

- ❖ The poetic outburst of Tagore
- ❖ Tagore's foreseeing in his works.
- ❖ Global views of Tagore's Modernity in his writings.
- ❖ The sound exposure and experience of the Tagore's dramatic views.
- ❖ The style of Tagore's writings in his novels

COURSE OUTCOME

- The learners are exposed to the poetry of Tagore
- The essays of Tagore are introduced to the learners.
- The students can experience the rich themes and characterization in the plays of Tagore.
- The writing style of Tagore can be explored in the Short stories.
- The learners can also understand the style of Tagore in his Novels.

UNIT I - POETRY

Gitanjali – Song Offerings 1996
The Broken Heart

UNIT II ESSAY (NON-DETAIL)

Literature
Five Elements
Ancient Literature
Modern Literature
Literature of the People
Tribute to Great Lives

UNIT III DRAMA (DETAILED)

Sacrifice
The Untouchable Woman (Non-Detail)
Raja O Rani
Malini
Muktadhara (1992)

UNIT IV - SHORT STORY (NON DEATILED)

My Lord, the Baby
Kahini
The Post Master
Kabuliwallah
Subha
The Babus of Nayanjore

UNIT V NOVEL (NON-DETAIL)

The Wreck
The Bachelor's Club
Gora

REFERENCE

1. Chatterji, David. *World literature and Tagore*: Visva Bharati, Ravindra- Bharati. Santiniketan: Visva Bharati, 1971.
2. Kripalani, Krishna. *Rabindranath Tagore: A Biography* London: Oxford University Press, 1962.
3. Tagore, Rabindranath. *Selected writings on literature and Language*. Ed. Sisir Kumar Das and Sukanta Chaudhuri. (2001). New Delhi: Oxford University Press. 2010.
4. Chaudhuri, Sutapa. Reading Rabindranath: *The Myriad Shades of Genius*.
5. Dalta, Rama: Seely, Clinton (2009). *Celebrating Tagore: A collection of Essays*. Allied Publishers. ISBN 9788184244243.
6. Dutta, Krishna: Robinson, Andrew (1997). *Rabindranath Tagore: An Anthology of his learning* contribution to South Asian studies.
7. The Roy, Kshitis, *Rabindranath Tagore: A life story Publications Divison Ministry of Information & Broadcasting*, 2017.
8. *The Complete works of Rabindranath Tagore* (All short stories, poetry, Novels, Plays & Essays) Edit. General Press- 18 Oct 2019

CORE ELECTIVE

PAPER - 4

(to choose one out of 3)

A. POST COLONIAL STUDIES

OBJECTIVES OF THE COURSE

- To introduce the students to some key theoretical formulations in the field
- To help develop an awareness of issues – social, political, cultural and economic – relating to the experience of colonial and after
- To encourage dialogue on conditions of marginality and plurality and to question metanarratives

UNIT PLAN

- General Introduction and Critical terms
- Deduction of opposition to the Colonizer's approach
- Poetical anecdote post colonial thoughts.
- To give the vast experiences of the marginalized through drama.

COURSE OUTCOMES

- Analyze texts using key concepts and theories in the field
- Interrogate dominant discourse in texts influenced by colonial ideologies
- Appreciate texts emerging from postcolonial nations
- Engage with the interplay of issues of race, colour, caste and gender in a neo – colonial world
- Challenge social inequalities existing in colonized regions and communities in the age of post colonialist.

UNIT 1 – ESSAYS

Edward Said Introduction (from *Orientalism*)

Robert J.C. Young Post – colonialism (from *Post - colonialism: An Historical Introduction*)

– Ania Loomba Defining the Terms: Colonialism, Imperialism, Neo-Colonialism, Post colonialism (from Chapter 1 “*Colonialism/Post – colonialism*”)

UNIT 2 –PROSE

Nadine Gordimer *The Train from Rhodesia* (from The Harper Anthology of Fiction)

John Kelly *We are All in the Ojibway Circle* (*The Faber Book of Contemporary Canadian Short Stories*)

Witi Ihimaera *The Whale (from The Harper Anthology of Fiction)*

UNIT 3 – POETRY

Lisa Belleair : Women’s Liberation
Judith Wright : At Cooloola
Derek Walcott : Ruins of a Great House
Gabriel Okara : Piano and Drums

UNIT 4 – DRAMA

Wole Soyinka : *Death and the King’s Horseman*
Louis Nowra : Radiance

UNIT 5 – FICTION

Jhumpa Lahiri : Unaccustomed Earth (from Unaccustomed Earth)
Chimamanda N. Adichie: *Americannah*

BOOKS FOR REFERENCE

1. Ashcroft, Bill. *On Post-Colonial Futures: Transformations of Colonial Culture*. Continuum, 2001.
2. Ashcroft, Bill, et al. *Post-colonial Studies: The Key Concepts*. 2nd ed., Routledge, 2007.
3. Barker, Francis. Et al. editor. *Colonial Discourse/Postcolonial Theory*. Manchester UP, 1994.
4. Bayard, Caroline. *The New Poetics in Canadian and Quebec: From Concretism to Post-Modernism*. University of Toronto Press, 1989.
5. Bennett, Bruce, editor. *A Sense of Exile*. Centre for Studies in Australian Literature, 1988.
6. Chew, Shirley, and David Richards, editors. *A Concise Companion to Postcolonial Literature*. Wiley Blackwell, 2010.
7. Irvine, Lorna L. Sub/version: *Canadian Fiction by Women*. ECW Press, 1986.
8. Jahabegloo, Raman. *Indian Revised: Conversations on Continuity and Change*. Oxford UP, 2008.
9. Juneja, Om Prakash. *Post Colonial Novel: Narratives OF Colonial Consciousness, Creation, 1995*.
10. King, Bruce. *New National and Post-Colonial Literatures: An Introduction*. Clarendon Press, 1996.
11. Kudchedkar, Shirin and Jameela Begam, editors. *Canadian Voices*, Pencraft, 1996.
12. Lazarus, Neil, editor. *The Cambridge Companion to Postcolonial Literary Studies*. Cambridge UP, 2004.
13. Nkosi, Lewis. *Tasks and Masks: Themes and Styles of African Literature*. Longman, 1981.
14. Pandey, Sudhakar. *Perspectives on Canadian Fiction*. Prestige Books, 1994.
15. Schwarz, Henry and Sangeeta Ray. *A Companion to Postcolonial Studies*. Blackwell, 2000.
16. Soyinka, Wole. *Art, Dialogue and Outrage: Essays on Literature and Culture*. Methuen, 1993.
17. Tanti, Melissa et al., editors. *Beyond “Understanding Canada”: Transnational Perspectives on Canadian Literature*. U of Alberta Press, 2017.
18. Walder, Dennis. *Post-Colonial Literatures in English: History, Language and Theory*.
19. Blackwell, 1998.
20. young, Robert J.C. *Post - colonialism: An Historical Introduction*. Blackwell, 2001.

JOURNALS

1. *ARIEL: A Review of International English Literature*
2. *Journal of Commonwealth Literature*
3. *Postcolonial Studies*
4. *Wasafiri*

WEB RESOURCES

1. http://www.mohamedrabeea.com/books/book1_3985.pdf
2. <http://www.udel.edu/ArtHistory/ARTH435/Ashcroft.pdf>
3. [http://faculty.ksu.edu.sa/Nugali/English%20461/Post - colonialism.pdf](http://faculty.ksu.edu.sa/Nugali/English%20461/Post-colonialism.pdf)

CORE ELECTIVE

PAPER - 4

B. GENDER STUDIES

OBJECTIVES

- To make students familiarize themselves with different waves of feminism, demonstrate logical reasoning regarding the perception of the female sex by the male. Beginning of the second wave of feminism.
- A lecture which emphasizes the need for a woman to own a room and money to be able to write. Brings an understanding of women's plight in the male dominated society.
- Women's struggle to succeed amidst the stereotypes, especially that of Virginia Woolf whilst suffering from man's dominance.
- A rewriting of mythological stories. Revisiting myth and presenting them through the feminist eyes.
- A symbolic representation of women trapped in a male body to portray the real.
- Oppression of women at the hands of men through a transgender

UNIT PLAN

- ❖ Second wave feminism, treatment of women through history.
- ❖ Money and room as initial needs for women's success
- ❖ Revisit myth, *Draupadi* standing against men.
- ❖ Rewriting myth, *Mahabharata*, Divakaruni's voice of *Panchali*.
- ❖ Struggle of transgender, representing women in the grasp of men.

COURSE OUTCOME

- To learn as to how the second wave of feminism kick-started its course with the publication of *The Second sex*. Women's struggle throughout history is brought out.
- The difference between feminism and womenism. Womenism as a separate entity to bring out the double suppression of black women in the hands of white and black men.
- Learn the plight of women who are physically harassed to keep them under the control of men. However they are revisited in recorded history to stand against men, despite their physical indifference,
- Learn the importance and the role of myth in the control of women throughout history while also learning a need to rewrite the changes in the myth via Panchali from The Mahabharatam
- Learn the struggles of transgender so as to face problems from within and also from the society to find their own identity, an identity crisis marred constantly due to the bias in society towards the classification of sex.

UNIT 1

Simone de Beauvoir *Introduction: The Second Sex*

Virginia Woolf *A Room of One's Own* (Chapter I &VI)

Elaine Showalter extract from *Woolf and the Flight into Androgyny*

UNIT 2

David S Gutterman "Postmodernism and the Interrogation of Masculinity" (From *Theorizing Masculinities* ed. Michael Kaufman, Harry Brod)

Bell hooks *Black Women: Shaping Feminist Theory*

Judith Butler *Interiority to Gender Performatives* (from *Gender Trouble*)

UNIT 3

Mahasweta Devi : *Draupadi* (Short Story)

Maya Angelou : Still I Rise Our Grandmothers

Adrienne Rich : When We Dead Awaken: Writing as Revision

UNIT 4

Chitra Bannerjee Divakaruni : *The Palace of Illusions*

Laura Esquivel : *Malinche*

UNIT 5

Manobi Bandyopadhyay : *A Gift of Goddess Lakshmi* (trans. Jhimli Mukerjee
Pandey & Manobi Bandhopadhyay)

Alice Walker : *In Search of Mother's Garden*

BOOKS FOR REFERENCE

1. Gilbert, Sandra & Susan Gubar. *Madwoman in the Attic: The Woman Writer and the Nineteenth-Century Literary Imagination*. Yale Nota Bene, 2000.
2. James, Joy and T Denean Sharpley-Whiting. Eds. *The Black Feminist Reader*. Blackwell, 2000.
3. Rahman, Momin and Stevi Jackson. *Gender and Sexuality: Sociological Approaches*. Polity Press. 2010.
4. Rooney, Ellen. Ed. *The Cambridge Companion to Feminist Literary Theory*. Cambridge U P, 2008.
5. Schneir, Miriam. Ed. *The Vintage Book of Feminism: The Essential Writings of the Contemporary Women's Movement*. Vintage, 1995.
6. Tharu, Susie & K Lalitha. *Women Writing in India*. Oxford UP, 1991

CORE ELECTIVE

PAPER - 4

C. ENGLISH LANGUAGE TEACHING – THEORY AND PRACTICE

OBJECTIVES

- To acquaint students with the history of the English Language
- To help students learn the essential aspects of ELT and the different types of language testing and evaluation

UNIT PLAN

- ❖ The role of Translation method and Audio-lingual methods
- ❖ Importance of teaching methods.
- ❖ To exercise Language learning theories.
- ❖ To inculcate testing and evaluation.
- ❖ Role of education in technology.

COURSE OUTCOME

- The students were taught how the English Language Teaching takes place in India.
- The learners are introduced to several teaching Methods.
- The learners are exposed to different language teaching theories.
- The language testing and Evaluation is taught to the students.
- Teaching aids are introduced to the learners.

UNIT I ENGLISH LANGUAGE TEACHING IN INDIA

Grammar Translation Method

Reform Movement

Direct Method

20th Century Trends (Situational methods)

Audio-Lingual Method

Communicative Approach

UNIT II OTHER TEACHING METHODS:

Total Physical Response

The Silent Way

Suggestopedia

Community Language Learning

Community Language Teaching

Natural Approach

UNIT III LANGUAGE LEARNING THEORIES

Behaviorism

Cognitive Approach

Natural Approach and their Educational Implications

Principles of Syllabus Construction

Structural Syllabus, Situational Syllabus, Notional Syllabus

UNIT IV LANGUAGE TESTING AND EVALUATION

Kinds of Tests, Aptitude, Proficiency, Achievement

Different Types of Multiple Choice – Questions

Evaluation

- a) Formative
- b) Summative
- c) Norm-based
- d) Criterion- based

UNIT V USE OF TEACHING AIDS INCLUDING EDUCATIONAL TECHNOLOGY

Language Laboratory

Audio-Visual

Aids

OHP-Black Board

Map and Charts

Computer etc.

REFERENCE

1. Jack C.Richards & Theodore S. Rodgers. *Approaches and Methods in Language Teaching*
2. Harria David. P *Testing English as Second Language*
3. Howatt. A. P. R. *A History of English Language Teaching*
4. Nunan. D. *Syllabus Design*
5. Wilkins, D. A. *Notional Syllabus*
6. Little word, W.T. *Communicative Language Teaching*

OPEN ELECTIVE

PAPER - 4

(to choose one out of 3)

A. FILM STUDIES

OBJECTIVES

- To introduce students to the evolution of films and to significant movements in cinema.
- To help students analyze films as an art form, using film language, editing, camera angles and movements as well as the sound in cinema.

UNIT PLAN

- ❖ To enable students to study various forms of representation in films.
- ❖ To enable students to analyze the relationship between literature and films through adaptations
- ❖ To enhance the students understanding of representation in cinema through the prescribed texts

COURSE LEARNING OUTCOMES

- On successful completion of the course, students will be able to trace the evolution of cinema and major film movements critically.
- Analyze cinema from various perspectives.
- To identify various technical aspects of cinema.
- Appreciate and develop an academic discourse on cinema.
- Analyze the relationship between films and literature through adaptations

UNIT 1 EVOLUTION OF FILMS

Evolution of films from still to moving pictures

Evolution of films from black and white to colour

Evolution of films from silent movies to talkies
Texts to be discussed: Lumière Brothers
The Arrival of a Train George Melies *A Trip to the Moon* Edwin Porter *The Great Train Robbery*
(1903) Dadasaheb Phalke *Growth of a Pea Plant*

UNIT 2 HOW TO READ A FILM

Film Language – aspect ratio, mis-en-scène, montage, etc.

Editing – montage, jump cut, cross cut, fade, dissolve, iris in/out, etc.

Cinematography-camera movements and angles

Sound-diegetic and non-diegetic sound

UNIT 3 GLOBAL CINEMATIC MOVEMENTS

Italian Neo-realism -Vittorio De Sica *Ladri di Biciclette*

French New Wave -François Truffaut *Les Quatre Cents Coups*

Iranian New Wave- Jafar Panahi *Offside*

UNIT 4 REPRESENTATION IN INDIAN CINEMA

Tom Emmatty *Our Mexican Aparatha*

Mari Selvaraj *Pariyerum Perumal*

Karan Johar *AjeebDastaan Hai Ye* from Bombay Talkies Zoya Akhtar *Sheila Ki Jawaani*
from Bombay Talkies

Alankrita Shrivastava *Lipstick Under My Burkha*

UNIT 5 ADAPTATIONS

Vishal Bharadwaj *Maqbool*

Danny DeVito *Matilda*

REFERENCE

1. Abrahams, Nathan, et al. *Studying Film*. Arnold: Hodder Headline Group, 2001.
2. Aitken, Ian. *European Film Theory and Cinema: A Critical Introduction*. Edinburgh University Press, 2001.
3. Andrew, Dudley. *Concepts in Film Theory*. Oxford University Press, 1984.
4. Bazin, Andre. *What is Cinema? Vol. I*. University of California Press, 2005.
5. Bhaskar, Ira. 09 Apr 2013,
6. *The Indian New Wave*. Routledge Handbook of Indian Cinemas. edited by K. Moti Gokulsing and Wimal Dissanayake. Routledge, 2019. pp.19-34
7. Buckland, Warren, editor. *Film Theory and Contemporary Hollywood Movies*. Routledge, 2009.
8. Butler, Andrew. *Film Studies*. Pocket Essentials, 2005.
9. Dixon. Wheeler Winston and Foster, Gwendolyn. *A Short History of Film*. Rutgers University Press, 2018.
10. Elsaesser, Thomas, and Malte Hagener. *Film Theory: An Introduction Through the Senses*. Routledge, 2010.
11. Hutcheon, Linda. *In Defence of Literary Adaptation as Cultural Production*. *Media Culture Journal*, Vol. 10, no. 2, May 2007.
12. <http://journal.media-culture.org.au/0705/01-hutcheon.php>Kuhn.
13. Annette, Guy Westwell. *A Dictionary of Film Studies*. OUP, 2012.
14. Monaco, James. *How to Read a Film: The World of Movies, Media, and Multimedia: and Language, History, Theory*. Oxford University Press, 2000.
15. Nichols, Bill. *Movies and Methods*. University of California Press, 1976.
16. Nichols, Bill. *Engaging Cinema: An Introduction to Film Studies*. W. W. Norton and Company, 2010

OPEN ELECTIVE

PAPER - 4

B. ENGLISH FOR MEDIA

OBJECTIVES

- Introduction to Mass Media
- Mass media is a form of communication that reaches a large people in a short time. For e.g.: TV, Newspaper, Radio and so on to communicate to the people. It very easy to reach all the people.
- Types of news analysis: News analysis may be for sentiment or business motive. It may be spoke or in the written form.
- Reviews: To design articles, advertisement, business, column, letters and novels.
- Report in the media English about the crime, election, sports and news. It can be in different font and style.
- Writing and learning – writing the news in English and editing it, it can be easily communicated to the public.

UNIT PLAN

- ❖ Introduction to media in English, definition of media, function
- ❖ Types of news in English, speaking in English and writing in English
- ❖ Reviews of media in English, editing, articles, novels and letters.
- ❖ Crime, public election, public matters, font, caption and style.
- ❖ Writing the news in English editing with grammar, to communicate easily to public.

COURSE OUTCOME

- The student is introduced to the essence of the Mass media and its definitions and its function.
- The learner learns the News Analysis and its types.
- In this the learner knows about the review, editorial columns etc.
- Different kinds of reports are taught like election, crime report etc.
- Writing and editing of T.V, Radio etc. is taught the learners.

UNIT I INTRODUCTION TO MASS MEDIA

Definition of Mass Media - Functions - Public Opinion

UNIT II TYPES OF NEWS ANALYSIS

Hard and soft news - Expected and Unexpected News - Box News -

Follow up news - Scoop - Filters - News Analysis and Evaluation.

UNIT III REVIEWS

Editorial - Columns - Articles - Reviews - Features – Letters

UNIT IV REPORTS

Reporting - Crime, Court, Election, Legislative, Sports, Investigative -

Font, Caption, Style - Emphasis of News and Reports - Principles of Editing.

UNIT V

Writing and Editing - TV/Radio-News and News Headlines,

Documentaries, TV/Radio Features

REFERENCE

1. Keval J.Kumar – *Mass Communications in India* (Bombay: Jacco 1981)
2. MacBride – *Many Voices, One world* (London: Kagan Press, 1980)
3. D.S.Metha – *Mass Communication and Journalism*
4. James M.Neel – *News Writing and Reporting*

OPEN ELECTIVE

PAPER - 4

FANTASY FICTION

COURSE OBJECTIVES

- To introduce students to various definitions of fantasy fiction
- To improve the imagination of students.
- To introduce students to the history of fantasy fiction

UNIT PLAN

- ❖ To Sketch the growth of fantasy Fiction through ages.
- ❖ To Build their imagination through the story.
- ❖ To realize the importance of creativity.
- ❖ To built socialization

COURSE OUTCOMES

- On successful completion of the course, students will be able to
- Demonstrate a basic understanding of the sub-genre of fantasy fiction
- Identify the genre and features of fantasy fiction
- Discuss the evolution of fantasy fiction
- Evaluate and discuss a work of fantasy fiction using prescribed texts
- Discuss the socio-cultural contexts and their impact on works of fantasy fiction.

UNIT 1

Introduction to Fantasy Fiction

Evolution of Fantasy Fiction

UNIT 2

Ursula K Le Guin Dragonfly

UNIT 3

Nnedi Okarofor - *Akata Witch*

UNIT 4

Terry Pratchett - *The Colour of Magic*

UNIT 5

Robin Hobb - *Assassin's Apprentice*

REFERENCE

1. Card, Orson Scott. *The Infinite Boundary*.
2. *How to Write Science Fiction and Fantasy*. Writers' Digest Books. 1990.
3. Dalton, A. J. *Sub Genres of British Fantasy Literature*. Luna Press Publishing, 2017.
4. Hume, Kathryn. *Fantasy and Mimesis*. Methuen, 1984.
5. Mendelsohn, Farah, Edward James. *A Short History of Fantasy*. Middlesex University Press,

- 2009.
6. Reid, Robin Anne. *Women in Science Fiction and Fantasy (Vol. 1 & 2)*. Greenwood Press, 2009.
 7. Sinclair, Frances. *Fantasy Fiction*. School Library Association, 2008.
 8. Tableford, Brian. *The A to Z of Fantasy Literature*. The Scarecrow Press, Inc., 2009.
 9. Swinfen, Ann. *In Defense of Fantasy: A Study of the Genre in English and American Literature Since 1945*. Routledge & Kegan Paul, 1984

201 - B. Sc. MATHEMATICS

Programme Structure and Scheme of Examination (under CBCS)
(Applicable to the candidates admitted in Affiliated Colleges from
the academic year 2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours/ Week	Credit	Maximum Marks		
					CIA	ESE	Total
SEMESTER - I							
22UTAML11	I	Language Course - I : Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I : Communicative English I	5	3	25	75	100
22UMATC13	III	Core Course - I : Classical Algebra	5	4	25	75	100
22UMATC14		Core Course - II : Differential Calculus and Trigonometry	5	4	25	75	100
		Allied - I : Paper – 1: Numerical Methods using Python I / Physis-I	4	4	25	75	100
		Allied Practical – I: Numerical Methods with Python / Physics	4	-	-	-	-
22UENV18	IV	Environmental Studies	2	2	25	75	100
Total			30	20			600
SEMESTER - II							
22UTAML21	I	Language Course - II : Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course - II : Communicative English II	5	3	25	75	100
22UMATC23	III	Core Course – III : Integral Calculus	4	4	25	75	100
22UMATC24		Core Course – IV : Analytical Geometry 3D	3	3	25	75	100
		Allied – I : Paper -2: Numerical Methods using Python – II / Physics – II	4	4	25	75	100
		Allied Practical – I : Numerical Methods with Python / Physics	2	3	40	60	100
22UMATE27		Internal Elective – I : (Choose any 1 out of 3)	3	3	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28		Soft Skill	2	1	25	75	100
Total			30	25			900

Internal Elective Courses

22UMATE27-1	Internal Elective - I	1. Fourier Series and Fourier Transform
22UMATE27-2		2. Matrix Theory
22UMATE27-3		3. Number Theory

Allied Courses

22UNUMA01	Theory	1. Numerical Methods using Python - I
22UPHYA01		2. Physics - I
22UNUMA02	Theory	1. Numerical Methods using Python - II
22UPHYA02		2. Physics - II
22UNUMPO2	Practical	1. Practical – Numerical Methods with Python
22UPHYP02		2. Physics Practical

Allied Courses offered by the Department of Mathematics

22UNUMA01	Theory	Numerical Methods using Python - I
22UNUMA02	Theory	Numerical Methods using Python - II
22UNUMPO2	Practical	Numerical Methods using Python
22UMATA01	Theory	Mathematics – I (For B.Sc. Physics, Chemistry, Statistics and Computer Science)
22UMATA02	Theory	Mathematics – II (For B.Sc. Physics, Chemistry, Statistics and Computer Science)
22UMAF01	Theory	Mathematical Foundations – I (For B.Sc Computer Science & BCA)
22UMAF02	Theory	Mathematical Foundations – II (For B.Sc Computer Science)
22UBUMA01	Theory	Business Mathematics (For B.Com I Year)

YEAR - I	CLASSICAL ALGEBRA	22UMATC13
SEMESTER - I		HRS/WK – 5
CORE- I		CREDIT – 4

COURSE OBJECTIVES

In this course students are exposed to topics like Theory of Equations, Summation of Series, Matrices and Elementary Number Theory. The stress is on the development of problem solving skills.

Unit-1: Theory of Equations

Polynomial Equations - Symmetric Functions of roots in terms of Coefficients - Sum of r-th powers of roots - Reciprocal Equations - Transformation of Equations.

Unit-2: Theory of Equations (Contd...)

Descartes Rule of Signs - Approximate Solutions of Polynomials by Horner's method - Newton - Raphson method of Solution of a Cubic Polynomial.

Unit-3: Summation of Series

Summation of series using Binomial - Exponential and Logarithmic series (Theorems without proofs) - Approximation using Binomial & Exponential series.

Unit-4: Elementary Number Theory

Prime Number - Composite Number - Decomposition of a Composite Number as a Product of Primes uniquely (without proof) - Divisors of a Positive Integer - simple problems.

Unit-5: Elementary Number Theory (Contd.)

Congruence Modulo n - Euler Function (without Proof) - Highest Power of a Prime Number p contained in n! - Fermat's and Wilson's Theorems (statements only).

Text Books

- 1) P. Kandasamy, K. Thilagavathy, Content and treatment as in the book Mathematics for B.Sc. Vol-I, II, III & IV, S.Chand & Company Ltd., New Delhi-55 (2004).
- 2) S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay and Dr. P. Kandaswamy, Ancillary Mathematics, Volume-I, S. Viswanathan (Printers & Publishers) Pvt. Ltd., 2009.

Supplementary Readings

- 1) T.K. Manicavachagom Pillay, T.Natarajan and K.S.Ganapathy, Algebra, Volume I & II, S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai, 2004.
- 2) S. Arumugam, Algebra, New Gamma Publishing House, Palayamkottai, 2003.
- 3) A. Singaravelu, Algebra and Trigonometry, Vol.-I & II, Meenakshi Agency, Chennai, 2003.
- 4) S. Sudha, Algebra and Trigonometry, Emerald Publishes, Chennai. B.Sc. Mathematics: Syllabus (CBCS), 1998.

COURSE OUTCOMES

On successful completion of the course, the student will be able to:

- 1) Apply the fundamental concept of theory of equations and to find solutions.
- 2) Apply Descartes' rule, Horner's method, Newton Raphson methods for finding approximate solutions.

- 3) Apply summation of series using Binomial, Exponential and Logarithmic series for finding approximations.
- 4) Apply the elementary number theory for highest power of prime number.
- 5) Apply the elementary number theory for Fermat's and Wilson's theorem.

OUTCOME MAPPING

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	3	2

1-Low 2-Moderate 3- High

YEAR - I	DIFFERENTIAL CALCULUS AND TRIGONOMETRY	22UMATC14
SEMESTER - I		HRS/WK – 5
CORE- II		CREDIT – 4

COURSE OBJECTIVES

To inculcate the basics of differentiation and their applications, the notion of curvatures, radius of curvature in Cartesian and polar coordinates, Evolutes & Involutes, students can be trained to understand the basic concepts of Trigonometry.

UNIT I

Methods of Successive Differentiation – Leibnitz's Theorem and its applications
Increasing & Decreasing functions –Maxima and Minima of functions of two variables.

UNIT II

Curvature – Radius of curvature in Cartesian and in Polar Coordinates – Centre of curvature–Evolutes & Involutes

UNIT III

Expansions of $\sin(nx)$, $\cos(nx)$, $\tan(nx)$ – Expansions of $\sin nx$, $\cos nx$ –
Expansions of $\sin(x)$, $\cos(x)$, $\tan(x)$ in powers of x .

UNIT IV

Hyperbolic functions – Relation between hyperbolic & Circular functions- Inverse hyperbolic functions.

UNIT V

Logarithm of a complex number –Summation of Trigonometric series – Difference method- Angles in arithmetic progression method –Gregory's series

Text Books

- 1) S.Narayanan and T.K.Manicavachagom Pillai, Calculus Volume I, S.Viswanathan (Printers&Publishers) Pvt Limited, Chennai -2011.
- 2) S.Arumugam & others, Trigonometry and Fourier series, New Gamma Publications -1999

UNIT-I	Chapter III	Sections 1.1 to 2.2 & Chapter IV Section 2.1 2.2 and Chapter V 1.1 to 1.4 of [1]
UNIT-II	Chapter X	Sections 2.1 to 2.6 of [1]
UNIT-III	Chapter 1	Sections 1.2 to 1.4 of [2]
UNIT-IV	Chapter 2	Sections 2.1& 2.2 of [2]
UNIT V	Chapter 3 & 4	Sections 4.1,4.2 & 4.4 of [2]

Supplementary Readings

- 1) S.Arumugam and Isaac, Calculus, Volume1, New Gamma Publishing House, 1991.
- 2) S. Narayanan, T.K. Manichavasagam Pillai, Trigonometry, S. Viswanathan Pvt Limited, and Vijay Nicole Imprints Pvt Ltd, 2004.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

- 1) To know the basic concepts of Successive approximations and Leibnitz's theorem
- 2) Know the principles of Maxima and Minima for 2 variables.

- 3) Find the radius of curvature for Cartesian and Polar coordinates, Evolutes and Involutives.
- 4) Know the expansions of Trigonometric functions.
- 5) Understand the concepts of Hyperbolic and Inverse Hyperbolic functions, Logarithm of Complex numbers, summation of Trigonometry series, Gregory series.

OUTCOME MAPPING

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	2	3	2
CO5	3	3	2	3	2

1-Low 2-Moderate 3- High

YEAR - I	INTEGRAL CALCULUS	22UMATC23
SEMESTER -II		HRS/WK – 4
CORE- III		CREDIT – 4

COURSE OBJECTIVES

In this paper the student is exposed to the idea of integration and different methods of integration. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage. The application of integration to the evaluation of areas and volumes is also introduced.

Unit I :

Introduction, Definite integral-Methods of integration-Integrals of functions of the form

$$\int \frac{f'(x)}{f(x)} dx, \int [f(x)]^n f'(x) dx, \int F[f(x)]f'(x) dx, \int \frac{dx}{ax^2+bx+c}, \int \frac{lx+m}{ax^2+bx+c} dx$$

Unit II :

Reduction formulae-Bernoulli's formula

$$I_n = \int x^n e^{ax}$$

$$I_n = \int \cos^n x dx$$

$$I_n = \int \sin^n x dx$$

$$I_{m,n} = \int \sin^m x \cos^n x dx$$

Unit III :

Change of order of integration – Properties of definite integrals.

Unit IV:

Double integrals – Double integrals in Polar coordinates – Triple integrals.

Unit V:

Application of double and triple integrals – area- volume.

Text Books (In API Style)

1.S. Narayanan and T.K. Manicavachogam Pillay, Calculus Vol. II, Ananda Book Depot, 2021.

Unit-I Chapter 1: Sections 1 to 4

Unit-II Chapter 1: Sections 13 to 15.

Unit-III Chapter 1: Sections 11

Chapter 5: Section 2

Unit-IV Chapter 5: Section 3

Chapter 5: Sections 1 to 5.

Unit-V Chapter 5: Sections 4 to 6.

Supplementary Reading:

- 1) G.B.Thomas and R.L.Finney. (1998) Calculus and Analytic Geometry,
- 2) Addison Wesley (9th Edn),Mass. (Indian Print).
- 3) M.K.Venkataraman. (1992) Engineering Mathematics-Part B. National Publishing Company,Chennai.
- 4) T, Veerarajan, Engineering Mathematics [For Semester I and II], 3rd Edition, Tata McGraw Hill Education Private Limited, New Delhi.

Course Outcomes:

On successful completion of the course, the students will be able to

- 1) Solve problems using the different methods of integration.
- 2) Solve problems in techniques of Reduction formulae and Bernoulli's formula.
- 3) Solve problems in Change of order of integration and Properties of definite integrals.
- 4) Solve problems in double and triple integrals.
- 5) Apply double and triple integrals in finding area and volume.

OUTCOME MAPPING

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	2	2
CO5	3	3	3	3	2

1-Low 2-Moderate 3- High

YEAR - I	ANALYTICAL GEOMETRY 3D	22UMATC24
SEMESTER -II		HRS/WK – 3
CORE- IV		CREDIT – 3

COURSE OBJECTIVES

This paper aims to understand the fundamental concepts of Analytical Geometry in Three Dimension, such as Distance between points, Projections, Angle between planes, Line of intersection of two planes, Length of perpendicular, Symmetrical form of the equations of a line, Coplanar lines, Shortest distance between two given lines, Centre and radius of Sphere, Equation of a circle on a sphere, The equation of Right circular cone and cylinder, Central quadrics

Unit-1

Rectangular Cartesian Co-ordinates: Direction Cosines of a line.

Unit-2

The Plane.

Unit-3

The Straight Line.

Unit-4

The Sphere.

Unit-5

The Central Quadrics and Cone.

Text Book

T.K. Manickavachagom Pillay and T. Natarajan, Content and treatment as in the book Analytical Geometry, (Part-II – Three Dimensions), S.Viswanathan Printers & Publishers Pvt. Ltd., Chennai, Reprint 2011

Unit – I: Chapter 1 (Fully) (Pages 1-23)

Unit-II: Chapter 2 (Fully) (Pages 24-45)

Unit- III: Chapter 3 (Fully) (Pages 46-92)

Unit- IV: Chapter 4 (Fully) (Pages 93-114)

Unit- V: Chapter 5 (Fully) (Pages 115-190)

Supplementary Readings

- 1) P.Duraipandian and Laxmi Duraipandian, Analytical Geometry-3D, Emerald Publishers, Chennai, 1975.
- 2) G.B.Thomas and R.L.Finney, Calculus and Analytic Geometry, Addison Wesley (9th Edn.), Mass. (Indian Print), 1998.
- 3) P.R.Vittal, Coordinate Geometry, Margham Publishers, Chennai, 2003.

COURSE OUTCOMES

On successful completion of the course, the students will able to:

- 1) Explain fundamental concepts of analytical geometry in 3D, about direction cosines of a line and the plane, equation and plane.
- 2) Know the straight line, symmetric form of equation of a line, equation of a line passing through two given points, the plane and the straight line, intersection of three planes.

- 3) Understand the Length of perpendicular distance, Coplanar lines.
- 4) Solve problems on Symmetrical form of the equations of a line, Shortest distance between two given lines, Centre and radius of Sphere
- 5) Find the equation of Sphere, the length of the tangent from point to sphere, equation of a circle on a sphere, intersection of two spheres, cone, cylinder and central quadrics.

OUTCOME MAPPING

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	2	2
CO3	3	3	3	3	2
CO4	2	3	3	3	2
CO5	3	3	3	3	2

1-Low 2-Moderate 3- High

YEAR - I	FOURIER SERIES AND FOURIER TRANSFORM	22UMATE27-1
SEMESTER -II		HRS/WK – 3
ELECTIVE-I		CREDIT – 3

COURSE OBJECTIVES

Introduce the Fourier series and its application and the concepts of Half range Sine and Cosine series Dirichlet's conditions, Fourier Integrals, Fourier Sine and Cosine Integral, and different type Fourier transforms.

Fourier Series:

Unit-1:

Introduction, Dirichlet conditions, Euler's Formulae for Fourier Series, Theorem for the convergence of Fourier series, Fourier Series for functions of period 2π . Examples.

Unit-2:

Change of Interval - Fourier Series for functions of period 2Δ , Dirichlet's conditions, Examples. Fourier Series of a function with its periodic extension.

Unit-3:

Half Range Fourier Series: Construction of Half range Sine Series, Construction of Half range Cosine Series. Examples.

Unit-4:

Definition - Fourier Integrals - Fourier Sine and Cosine Integral - Complex Form of Fourier Integral - Fourier Transform: Fourier Sine and Cosine Transforms - Finite Fourier Sine and Cosine Transforms (without proof)

Unit-5:

Properties of Fourier Transforms - Convolution Theorem for Fourier Transforms - Parseval's Identity for Fourier Transforms - (without derivation), Inverse of Fourier Transform, Examples.

Text Books

- 1) Unit- I, II, III: Dr. M. K. Venkataraman and Mrs. Manorama Sridhar, Content and treatment of Chapter 1 Fourier series as in the book Calculus and Fourier Series, The National Publishing company, Chennai 2001.
- 2) B.S.Grewal. Higher Engineering Mathematics (2002), Khanna Publishers, New Delhi.

Supplementary Readings

- 1) S. Narayanan and T.K. Manicavachagom Pillay, Calculus Volume-III, S. Viswanathan (Printers & Publisher) Pvt. Ltd. Chennai, 2008.
- 2) M.K.Venkataraman, Engineering Mathematics-Part B. National Publishing Company, Chennai, 1992.
- 3) Dr. B. S. Grewal, Higher Engineering Mathematics Edition 43rd, Khanna Publishers, New Delhi, 2014.
- 4) K. Vairamanickam, Nirmala P. Ratchagar and S. Tamilselvan, Engineering Mathematics – II, Scitech Publications (India) Pvt. Ltd., Chennai, 2011.
- 5) K. Vairamanickam, Nirmala P. Ratchagar and S. Tamilselvan. Transforms and Partial Differential Equations, Scitech Publications (India) Pvt. Ltd., Chennai, 2012.

COURSE OUTCOMES

On successful completion of the course, the students will be able to:

- 1) Find the Fourier series representation of a function of one variable.
- 2) Find the solution of the wave, diffusion and Laplace equations using the Fourier series.
- 3) Demonstrate the use of Fourier Transform to connect the time domain and frequency domain.
- 4) Understand different types of Fourier Transform and its properties.
- 5) Solve problems on Fourier Transform and inverse Fourier Transform.

OUTCOME MAPPING

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	2
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	2	3	3	3	2
CO5	3	3	3	3	2

1-Low 2-Moderate 3- High

YEAR - I	MATRIX THEORY	22UMATE27-2
SEMESTER -II		HRS/WK – 3
ELECTIVE-II		CREDIT – 3

COURSE OBJECTIVES

In this course students are trained to develop skills in finding rank, inverse, Eigen values, Eigen vectors and quadratic forms.

Unit-1:

Rank of the Matrix – Inverse of the Matrix.

Unit-2:

Symmetric – Skew Symmetric – Hermitian – Skew Hermitian – Orthogonal and Unitary matrices.

Unit-3:

Eigen values – Eigen vectors – Cayley Hamilton theorem.

Unit-4:

Diagonalisation by similarity transformation.

Unit-5:

Quadratic Forms – Nature of Quadratic Forms.

Text Book

- 1) S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay and Dr. P. Kandaswamy, Ancillary Mathematics, Volume-I, S. Viswanathan (Printers & Publishers) Pvt. Ltd., 2009.

Supplementary Readings

- 1) K. Vairamanickam, Nirmala P. Ratchagar and S. Tamilselvan, Engineering Mathematics, Scitech Publications (India) Pvt. Ltd., Chennai, 2009.
- 2) Richard Bellman, Introduction to Matrix Analysis, Second Edition, T.M.G. Publishing Company Ltd., New Delhi, 1974.

COURSE OUTCOMES

On successful completion of the course, the students will be able to:

- 1) Find the rank and inverse of a matrix.
- 2) To understand the symmetric, skew symmetric, Hermitian, orthogonal and Unitary matrices
- 3) Find Eigen Values and Eigen Vectors.
- 4) Diagonalize the matrix using similarity transformation.
- 5) Find the nature of Quadratic forms.

OUTCOME MAPPING

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	3	2	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	3	2

1-Low 2-Moderate 3- High

YEAR - I	NUMBER THEORY	22UMATE27-3
SEMESTER -II		HRS/WK – 3
ELECTIVE-III		CREDIT – 3

COURSE OBJECTIVES

To highlight the niceties and nuances in the world of numbers, the students will be given training on divisibility of numbers and the fundamental theorem of arithmetic, prepare them for coding through congruences and make them understand the Applications of Fermat's theorem, Wilson's theorem and famous Chinese remainder theorem.

Unit I

Euclid's Division Lemma – Divisibility – The Linear Diophantine Equation – The Fundamental Theorem of Arithmetic

Unit II

Permutations and Combinations – Fermat's Little Theorem – Wilson's Theorem – Generating Functions

Unit III

Basic Properties of Congruences Residue Systems. Linear Congruences – The Theorems of Fermat and Wilson Revisited.

Unit IV

The Chinese Remainder Theorem – Polynomial Congruences – Combinational Study of $F(n)$.

Unit V

Formulae for $d(n)$ and $s(n)$ – Multiplicative Arithmetic Function – The Mobius Inversion Formula.

Books for Study

1. Number Theory by George E.Andrews, Hindustan Publishing Corporation – 1984, Edition.

Unit I : Chapter - 2 Sec. 2.1 – 2.4 pages 12-29

Unit II : Chapter – 3 Sec. 3.1, 3.4 pages 30-44

Unit III : Chapter – 4Sec. 4.1 – 4.2 Pages 49 – 55, Sec. 5.1- 5.2 Pages 58-65

Unit IV : Chapter – 4 Sec. 5.3 – 5.4 pages 66-74, Sec. 6.1 Pages 75-81

Unit V : Chapter – 5 Sec. 6.2 – 6.3 Pages 82-92

Text Books

- 1) Basic Number Theory by S.B.Malik, Vikas Publishing House Pvt. Ltd.,
- 2) A First Course Theory of Numbers by K.C.Chowdhury. Asian Books Pvt. Ltd., I Edition (2004)

COURSE OUTCOMES

On successful completion of the course, the students will be able to:

- 1) Know the divisibility of Numbers using Euclid's division Lemma.
- 2) Solve problems on Permutations and Combinations.
- 3) Understand the concepts of Chinese theorem and Multiplicative arithmetic functions.
- 4) Apply the Fermat's and Wilson's theorems for solving problems in Numbers.
- 5) Solve problems on Linear Congruence and Polynomial congruence.

OUTCOME MAPPING

CO / PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2
CO2	3	3	3	3	2
CO3	2	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	2	2

1-Low 2-Moderate 3- High

ANNAMALAI UNIVERSITY
BACHELOR OF SCIENCE
B.Sc. MATHEMATICS DEGREE COURSE

(With effect from 2021 - 2022)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
SEMESTER III									
17.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
18.	II	English	Paper-3	6	4	English	25	75	100
19.	III	Core Theory	Paper-5	6	5	Differential Equations	25	75	100
20.	III	Allied-2	Paper-3	4	3	(to choose any 1 out of 4) (For Practical Allied subjects)	25	75	100
	III	Allied Practical - 2	Practical-2	3	0		0	0	0
21.	IV	Skill Based Subject	Paper-1	3	2	Mathematics for competitive Examinations - I	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Basic Mathematics	25	75	100
		Sem. Total		30	20		150	450	600

23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
24.	II	English	Paper-4	4	4	English	25	75	100
25.	III	Core Theory	Paper-6	5	4	Vector Analysis and Fourier Series	25	75	100
26.	III	Core Theory	Paper-7	4	4	Mechanics	25	75	100
27.	III	Allied-2	Paper-4	4	3	(to choose any 1 out of 4) (For Practical Allied subjects)	25	75	100
28.	III	Allied Practical - 2	Practical-2	3	2		25	75	100
29.	IV	Skill Based Subject	Paper-2	2	2	Mathematics for Competitive Examinations - II	25	75	100
30.	IV	Non-Major Elective	Paper-2	2	2	Foundation Mathematics for Competitive Examinations - I	25	75	100
		Sem. Total		30	25		200	600	800

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	2	2		100	200
	Electives	3	3	9	100	300
	Core	14	(3-5)	52	100	1400
	Core practical	1	2	2	100	100
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	43		140		4500

ANNAMALAI UNIVERSITY

B.Sc. MATHEMATICS

SYLLABUS

CBCS PATTERN

(with effect from 2020 - 2021)

SEMESTER III

PAPER - 5

DIFFERENTIAL EQUATIONS

This course aims to provide logical skills in the formation of differential equations, to expose to different techniques of finding solutions to these equations and in addition stress is laid on the application of these equations in geometrical and physical problems.

UNIT - I

ORDINARY LINEAR DIFFERENTIAL EQUATIONS

Bernoulli Equation - Exact Differential Equations - Equations Reducible to Exact Equations - Equations of First order and Higher degree: Equations solvable for p, Equation solvable for x and Equations Solvable for y - Clairaut's Equation.

UNIT - II

ORDINARY LINEAR DIFFERENTIAL EQUATIONS [CONTD...]

Method of Variation of Parameters - 2nd order Differential Equations with Constant Coefficients for finding the P.I's of the form $e^{ax} V$, where V is $\sin(mx)$ or $\cos(mx)$ or x^n - Equations reducible to Linear equations with constant coefficients - Cauchy's homogeneous Linear Equations - Legendre's Linear Equations.

UNIT - III

DIFFERENTIAL EQUATIONS OF OTHER TYPES

Simultaneous Equations with Constant coefficients - Total Differential Equations
Simultaneous Total Differential Equations - Equations of the form $dx/P = dy/Q = dz/R$

UNIT - IV

LAPLACE TRANSFORM

Transform-Inverse Transform - Properties - Application of Laplace Transform to solution of first and second order Linear Differential equations [with constant coefficients].

UNIT - V

PARTIAL DIFFERENTIAL EQUATIONS

Formation of PDF - Complete Integral - Particular Integral - Singular Integral - Equations Solvable by direct Integration - Linear Equations of the first order - Non-linear Equations

of the first Order:

Types: $f(p, q) = 0$, $f(x, p, q) = 0$, $f(y, p, q) = 0$, $f(z, p, q) = 0$, $f(x, q) = f(y, p)$,
 $z = px + qy + f(p, q)$.

Recommended Text

S.Narayanan and T.K.Manicavachagom Pillay[2004] , Calculus, S.Viswanathan Printers and publishers Private Ltd., Chennai.

Reference Books

1. M.D. Raisinghania, [2001] Ordinary and Partial Differential Equations, S.Chand and Co., New Delhi.
2. M.R.Spiegel [2005] Advanced mathematics for Engineers and Scientists, Tata McGraw Hill Edition, New Delhi.
3. M.R.Spiegel [2005] Laplace Transforms, Tata McGraw Hill Edition, New Delhi.
4. S.Sudha [2003] Differential Equations and Integral Transforms, Emerald Publishers, Chennai.
5. M.K.Venkataraman [1998] Higher Engineering Mathematics, III-B, National Publishing Co., Chennai.
6. P.R.Vittal [2004] Differential Equations and Laplace Transform, Margham Publications, Chennai.
7. P.Kandasamy, K.Thilagarathy [2004] Mathematics for B.Sc. Vol. III S.Chand & Co., Ltd., New Delhi-55.
8. B.S.Grewal [2002] Higher Engineering Mathematics, Khanna Publishers, New Delhi.
9. Sheply. L.Ross [1984] Differential Equations, III Edition John Wiley and Sons, New York.

Course Outcomes

At the end of the course the student will be able to

- [1] solve the first order higher degree differential equations
- [2] solve the second order differential equations
- [3] know the concept of total differential equations
- [4] know the applications of Laplace transform
- [5] solve the partial differential equations.

SKILL BASED SUBJECT

PAPER - 1

MATHEMATICS FOR COMPETITIVE EXAMINATIONS - I

Objectives

To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

UNIT - I

Numbers, H.C.F. and L.C.M. of numbers, Decimal Fractions.

UNIT - II

Simplification, Square roots and Cube Roots, Average.

UNIT - III

Problems on numbers, problems on Ages.

UNIT - IV

Surds and Indices, Percentage, Profit and Loss.

UNIT -V

Ratio and Proportion, Partnership.

Text Books:-

1. R.S.Aggarwal, Quantitative Aptitude for competitive Examination, S.Chand and company, New Delhi.
2. Praveen R. V. Quantitative Aptitude and Reasoning, PHI Learning Pvt. Ltd, New Delhi.

Course Outcomes

At the end of the course the student should be able to

- [1] know the idea H.C.F. and L.C.M.
- [2] find the Average, square root and cubic root
- [3] solve the problems on ages and numbers
- [4] know the percentage, profit and loss
- [5] analyze the proportion and partnership problems

NON-MAJOR ELECTIVE

PAPER -1

BASIC MATHEMATICS

Objectives

To introduce a few basic and elementary concepts of mathematics for other major students.

UNIT - I

SETS

Definition - Subsets - Power sets - Equality of sets - Finite and Infinite sets - Set operations - De-Morgan's laws - Distributive tables - Cartesian products.

UNIT - II

NUMBER SYSTEM

Binary, octal, hexadecimal numbers - conversion from one system to another system - addition and subtraction - one's complement.

UNIT - III

SYMBOLIC LOGICS

Logical statements - connectives - truth tables - tautologies operations - groups - (problems and simple properties only).

UNIT - IV

DETERMINANTS

Definition - properties (without proof) - application of determinants - Cramer's rule for the solution of a system of equations

UNIT - V

MATRICES

Definition - types of matrices - operations on matrices - adjoint and inverse - applications - solving non-homogeneous equations.

Recommended Texts

1. Dr.M.K.Venkataraman & others, "Discrete mathematics and structures", The National Publishing Company, Madras.
2. Trembly J.P and Manohar.R "Discrete Mathematical Structures with applications to computer science" Tata McGraw - Hill Pub., Co., Ltd. New Delhi 2003.

Reference Books

1. P.R.Vittal “Algebra, Analytical Geometry and trigonometry” Margham Publications, Chennai.
2. Richard Johnsonbaugh, “Discrete Mathematics” fifth Edn., Pearson Education Asia, New Delhi 2002.

SEMESTER - IV

PAPER - 6

VECTOR ANALYSIS AND FOURIER SERIES

Course Objectives

The aim of this course is to cover the topics in vector and tensor calculus which are essential in modern applied mathematics. To develop the deep knowledge of the vector differentiation, vector integration and Fourier series concepts and its applications in the branch of applied mathematics for engineers and scientists.

UNIT - I

DIFFERENTIAL VECTOR CALCULUS

Differentiation of a Vector - Geometrical Interpretation of the Derivative - Differentiation Formulae - Velocity and Acceleration Vectors - Scalar and Vector Point functions - Level surface - Gradient - Equation of tangent plane - Unit normal to the given Surface - Differentiation of dot and Cross Products - Partial Derivatives of Vectors - Differentials of Vectors.

UNIT - II

GRADIENT, DIVERGENCE AND CURL

Vector Differential Operator Del - Directional Derivative - Geometric Interpretation - Gradient of the sum of Functions; of the product of functions and of a function of function - Operations involving Del - Divergence of a Vector and its Physical Interpretation - Curl of a Vector and its Physical Interpretation - Expansion Formulae for Operators involving Del - Solenoidal and Irrotational - Simple Problems.

UNIT - III

VECTOR INTEGRATION

The Line Integral - Surface Integral and its Physical Meaning - Volume integral - Simple Problems.

UNIT - IV

VECTOR INTEGRATION(CONTD.)

Statements of Stoke's Theorem, Gauss Divergence Theorem and Green's Theorem -

Simple Problems - Simple Problems Solved to Verify the Theorems.

UNIT - V

FOURIER SERIES

Euler's Formulae - Conditions for Fourier Expansion - Functions having Discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even periodic Functions - Half-range Series - Parseval's Formula.

Recommended Text

Erwin Kreyszig (2011), *Advanced Engineering Mathematics*, John Wiley & Sons, Inc. (10th edition), Printed in the United States of America

Reference Books

1. G.B.Thomas and R.L.Finney. (1998) *Calculus and Analytic Geometry*, Addison Wesley (9th edition), Mass. (Indian Print).
2. M.K.Venkataraman. (1992) *Engineering Mathematics-Part B*. National Publishing Company, Chennai.
3. P.R.Vittal. (2004) *Vector Calculus, Fourier series and Fourier Transform*. Margham Publications, Chennai.
4. B.S.Grewal (2012). *Higher Engineering Mathematics*, Khanna Publishers(42nd edition), Nai Sarak, New Delhi.

Course Outcomes

At the end of the course the student should be able to

- [1] know the physical and geometrical meaning of the derivative
- [2] know the physical and geometrical meaning of the divergence and curl
- [3] evaluating line, surface and volume integrals
- [4] know the applications of Stoke's Theorem, Gauss Divergence Theorem and Green's theorem
- [5] analyze the Fourier series in both theory and application level

PAPER - 7
MECHANICS

OBJECTIVES

This course aims to introduce the students the basic concepts of forces, moments, couple, friction and the centre of gravity..

UNIT - I

Forces, Type of forces- Resolution of forces - Resultant of two forces acting on a particle - triangle of forces, Lamis theorem - Resultant of several forces acting on a particle - Condition of equilibrium - Equilibrium of a particle under several forces - simple problems.

UNIT - II

Moment of a force - Parallel forces - Varignon's theorem - Forces along the sides of a triangle - Couples - Resultant of several coplanar forces - Equation of line of action of the resultant - Equilibrium of a rigid body under three coplanar forces - Reduction of coplanar forces into a force and a couple - simple problems.

UNIT - III

Center of mass - Center of mass of a triangular lamina - Three particles of same mass - Three particles of certain masses - uniform rods forming a triangle - lamina in the form of a trapezium and solid tetrahedron - Center of mass using integration - circular arc - circular lamina - elliptic lamina - solid and hollow hemisphere - solid and hollow right circular cone - simple problems.

UNIT - IV

Velocity, Relative Velocity, Angular Velocity, Acceleration, Rectilinear motion, Rectilinear motion with constant acceleration, Relative angular velocity. The Components of Velocity and Acceleration in

- a. Two Perpendicular directions
- b. Radial and Transverse directions
- c. Tangential and Normal directions.

UNIT - V

Motion of a projectile, Nature of a trajectory, Results pertaining to the motion of a projectile, Range on an inclined plane, Maximum range on the inclined plane - Impulsive force, Conservation of linear momentum, Impact of a sphere, Laws of impact, Impact of two smooth spheres, Direct impact of two smooth spheres - Oblique impact of two smooth spheres - Simple problems.

Recommended Text

P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasam, Mechanics, 6th edition, S. Chand and Company Ltd, 2005.

Reference Books

1. M.K.Venkataraman, Statics, Agasthiyar Publications, 17th edition, 2014.
2. S. Narayanan, R. HanumanthaRao, K. Sitaraman, P. Kandaswamy, *Statics*, S. Chand and Company Ltd, New Delhi.
3. S. L. Loney, *An Elementary Treatise on Statics*, Combridge University Press, 1951
4. A.V. Dharmapadam(1991) *Mechanics*. S. Viswanathan Printers & Publishers. Chennai
5. Joseph F. Shelley (2005) *Vector Mechanics for Engineers Vol-I: Statics*, Tata McGraw Hill Edition, New Delhi.

Course Outcomes

1. Provides basic knowledge of Resultant of forces and Equilibrium of a particle
2. Knowledge pertaining to Parallel forces and coplanar forces
3. To know about Center of mass
4. Gain the knowledge of projectile and its applications
5. Understand the concept of impact

SKILL BASED SUBJECT

PAPER - 2

MATHEMATICS FOR COMPETITIVE EXAMINATIONS - II

UNIT - I

Chain rule -Time and work.

UNIT - II

Time and Distance

UNIT - III

Problems on Trains.

UNIT - IV

Boats and Streams.

UNIT - V

Alligation or Mixture.

Text Book:-

Quantitative Aptitude for competitive Examination R.S. Aggarwal. S. Chand and company Ltd,152,Anna salai, Chennai. 2001

NON-MAJOR

ELECTIVE

PAPER - 2

**FOUNDATION MATHEMATICS FOR COMPETITIVE
EXAMINATIONS**

Objectives

To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

UNIT - I

Ratio and proportions

UNIT - II

Percentages

UNIT - III

Profit and loss, discounts.

UNIT - IV

Simple and

compound

interest.

UNIT - V

Time, Distance and Work

Recommended Text books:

7. R.S. Aggarwal, Quantitative Aptitude for competitive Examination, S. Chand and company, New Delhi.
8. Praveen R. V. Quantitative Aptitude and Reasoning, PHI Learning Pvt. Ltd, New Delhi.

Course Outcomes

At the end of the course the student should be able to

- [1] know the idea of ratio and proportions
- [2] find the percentages
- [3] profit and loss problems
- [4] know the simple and compound interest problems
- [5] analyze the time and distance problems

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS - 2022-2023 onwards

Programme Objectives:

1. Students should acquire the knowledge of basic mathematical concepts and the ability to communicate mathematical ideas with clarity and coherence.
2. Students should have the ability to solve problems in Mathematics independently by applying logical reasoning, abstraction, and critical analysis, and they have to know how to apply relevant mathematical techniques.
3. Competence in using computational tools and software such as Excel, Graphics, algorithms, and programs.
4. Students should possess a basic fundamental knowledge in Mathematics which is required for higher studies in pure, applied Mathematics and other professional courses.
5. To develop the attitude and ability to apply mathematical methods and ideas in other sciences and engineering programmes.

Programme Educational Objectives:

1. To acquire basic domain knowledge in mathematical concepts and their applications.
2. To develop analytical thinking, and logical reasoning skills to solve mathematical problems.
3. The ability to formulate real-life problems, applying appropriate mathematical models/tools to solve such problems.
4. Acquire the knowledge of applying mathematical techniques in other branches.
5. Students will develop the qualities such as working individually as well as the ability to work in teams.

Programme Specific Outcomes:

1. Represent the mathematical data in numerical, graphical, and visual form.
2. Develop the patience and persistence to solve a problem.
3. Students will have the knowledge to use ICT tools.
4. Motivation to the students to do research in the unexplored areas of Mathematics.
5. Ability to apply mathematical techniques in other fields of science and engineering.
6. Select appropriate algorithms and software programs to obtain accurate solutions to mathematical problems.
7. Students will be able to develop a solution oriented approach toward various social and environmental issues.
8. Gaining knowledge to pursue higher studies in pure and applied Mathematics.

9. Understand, formulate and apply quantitative models in management, economics, and business contexts.
10. Ignites their passion to do research in Mathematics.

Programme Outcomes:

1. Logical thinking, critical analysis, and reasoning skills will be highly improved.
2. Express mathematical ideas clearly and concisely to others.
3. Ability to apply suitable mathematical techniques to handle problems in physical and related sciences.
4. To demonstrate conceptual understanding of basic definitions, and theorems in Mathematics and should be able to describe elaborately with examples.
5. Ability to solve mathematical problems by applying the skills such as critical thinking, logical reasoning, and abstraction.
6. Select appropriate mathematical models and tools to solve the problems including those in real-life contexts.
7. Mathematics has its own universal language of symbols and notations. Students are expected to apply the Mathematics language appropriately while expressing mathematical ideas in both oral and written form.
8. Problem-solving techniques in mathematics will enhance the knowledge of students to formulate and solve any real-world problems independently.
9. Develop the knowledge of abstract mathematical concepts.
10. Enhance the employability skills in both public and private sector jobs

SEMESTER IV									
24.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
25.	II	English	Paper-4	4	4	English	25	75	100
25.	III	Core Theory	Paper-6	4	4	Vector Analysis and Fourier Series	25	75	100
26.	III	Core Theory	Paper-7	5	4	Statics	25	75	100
27.	III	Allied-2	Paper-4	4	3	(to choose any 1 out of 4) (For Practical Allied subjects)	25	75	100
28	III	Allied Practical – 2	Practical-2	3	2		25	75	100
29.	IV	NMSDC II : Digital Skills for Employability	Paper-2	2	2	Office Fundamentals	25	75	100
30.	IV	Non-Major Elective	Paper-2	2	2	Foundation Mathematics for Competitive Examinations – I	25	75	100
		Sem. Total		30	25		200	600	800
SEMESTER V									
31.	III	Core Theory	Paper-8	6	4	Abstract Algebra	25	75	100
32.	III	Core Theory	Paper-9	6	4	Real Analysis – I	25	75	100
33.	III	Core Theory	Paper-10	6	4	Dynamics	25	75	100
34.	IV	Elective	Paper-1	5	3	(to choose any 1 out of 2) 1. Linear Programming 2. Special Functions	25	75	100
35.	IV	Elective	Paper-2	4	3	(to choose any 1 out of 2) 1.Graph Theory 2. Discrete Mathematics	25	75	100
36.	IV	Skill Based Subject	Paper-3	3	2	Mathematics for Competitive Examinations – III	25	75	100
		Sem. Total		30	20		150	450	600
SEMESTER VI									
37.	III	Core Theory	Paper-11	5	4	Linear Algebra	25	75	100
38	III	Core Theory	Paper-12	5	4	Real Analysis II	25	75	100
39.	III	Core Theory	Paper-13	5	4	Complex Analysis	25	75	100
40.	III	Compulsory Project	Project-1	3	5	Group / Individual Project	25	75	100
41.	III	Core Theory	Paper-14	3	3	Programming in C Language	25	75	100
42.	III	Core Practical	Practical-1	3	2	C Language	25	75	100
43.	IV	Elective	Paper-3	3	3	(to choose any 1 out of 3) 1. Operations Research 2. Fuzzy Mathematics 3. R Programming (Practical Only)	25	75	100
44.	III	NMSDC III : Data Analytics with Advanced Tools for Employability	Paper – 3	2	2	Project based learning III	25	75	100
45.	V	Extension Activities		0	1		100	0	100
		Sem. Total		30	28		300	600	900
		Grand Total			142				4500

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: V

Paper type: Core

Paper code: C – 08 Name of the Paper: PAPER – 6 – ABSTRACT ALGEBRA Credit: 4

Total Hours per Week: 6 Lecture Hours: 6 Tutorial Hours: Practical Hours:

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Course Objectives

1. To state the group axioms and to verify whether a given set and a binary operation form a group.
2. To define a subgroup, order of an element, order of a group, cyclic group, abelian or commutative group.
3. To compute the order, powers, and inverse of an element with concrete examples.
4. To define and compute cyclic groups, the additive group mod n , the multiplicative group mod p , the symmetric group, and the dihedral group.
5. To state and prove Lagrange's Theorem.
6. To know the fundamental concepts of ring theory, ideals, quotient rings, integral domains, and fields.

Course Outcomes

1. After studied unit-1, the student will be able to determine whether a given set is a group under a binary operation and find its subgroup.
2. After studied unit-2, the student will be able to demonstrate knowledge of normal subgroup, homomorphism, and isomorphism.
3. After studied unit-3, the student will be able to carry out the problems based on permutation.
4. After studied unit-4, the student will be able to demonstrate knowledge of rings, ideals, and integral domain.
5. After studied unit-5, the student will be able to understand the concepts of ideals and Euclidean rings.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

UNIT - I GROUPS

Definition of a Group - Examples - Subgroups - simple problems.

UNIT - II GROUP [CONTD]

Counting Principle - Normal Subgroups - Homomorphism - simple problems.

UNIT – III GROUP [CONTD]

Automorphisms - Cayley's Theorem - Permutation Groups - simple problems.

UNIT - IV RINGS

Definition and Examples of Rings- Some special classes of Rings - Homomorphism of Rings - Ideals and Quotient Rings - simple problems.

UNIT - V RINGS [CONTD]

More Ideals and Quotient Rings - The field of quotients of an Integral domain - Euclidean rings - simple problems.

Text book:

I.N.Herstein.[1989], "Topics in Algebra", [2nd ed] Wiley Eastern Ltd. New Delhi.
Chapter:2 (Sec: 2.1 - 2.10 [Omit Applications 1 and 2 of 2.7]),
Chapter : 3 (Sec: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7)

Reference books:

1. S.Arumugam[2004], "Modern Algebra", SciTech Publications, Chennai.
2. J.B.Fraleigh [1987], "A First Course in Algebra", [3rd edition] Addison Wesley, Mass. [Indian Print]
3. Lloyd R.Jaisingh and Frank Ayres,Jr. [2005], "Abstract Algebra", [2nd edition], Tat McGraw Hill, New Delhi.
4. M.L.Santiago[2002], "Modern Algebra", Tat McGraw Hill, New Delhi
5. SurjeetSingh and Qazi Zameeruddin[1982], "Modern algebra", Vikas Publishing House Pvt.Ltd. New Delhi.

Course Material: website links, e-Books and e-journals

<https://tutorial.math.lamar.edu/Extras/AlgebraTrigReview/AlgebraTrig.aspx>
<https://ocw.mit.edu/courses/18-703-modern-algebra-spring-2013/>
<https://ocw.mit.edu/courses/18-701-algebra-i-fall-2010/>
<https://www.classcentral.com/course/swayam-introduction-to-abstract-and-linear-algebra-14142>
<https://www.classcentral.com/subject/algebra>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	M	S	S	M
CO2	S	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	M	S	M	M	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: V

Paper type: Core

Paper code: C – 09 Name of the Paper: PAPER – 9 – REAL ANALYSIS – I Credit: 4

Total Hours per Week: 6 Lecture Hours: 6 Tutorial Hours: Practical Hours:

Course Objectives

1. To explore the topics such as convergence and divergence of sequences and series, the limit of a function on the real line, metric spaces, continuous functions, open sets, and closed sets.
2. To identify the subsequence of a given sequence, test whether a given sequence is convergent or divergent.
3. To know about convergence and divergence of sequences and series, and test the convergence of sequences and series.
4. To acquire fundamental knowledge about metric spaces and limits on metric spaces.
5. To inculcate the knowledge about continuous functions on a metric space, open sets, and closed sets.

Course Outcomes

1. After studied unit -1, the student will be able to identify countable sets, the limit of a sequence, and its convergence.
2. After studied unit -2, the student will be able to demonstrate knowledge of divergent sequence, bounded sequence, monotone sequence, and Cauchy sequence.
3. After studied unit -3, the student will be able to carry out convergence and divergence of series and related problems.
4. After studied unit -4, the student will be able to express metric spaces and convergent and divergent sequences in a metric space.
5. After studied unit -5, the student will be able to demonstrate knowledge of open sets and closed sets with suitable examples.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	No

UNIT - I FUNCTIONS AND SEQUENCES

Functions - real valued functions - equivalence - countability and real numbers - least upper bound - definition of sequence and subsequence - limit of a sequence - convergent sequence - Simple problems.

Ch. 1.4 to 1.7, 2.1 to 2.3.

UNIT - II SEQUENCES [CONTD...]

Divergent sequences - Bounded sequences - Monotone sequence - Operations on convergent sequences - Operations on divergent sequences - Limit superior and Limit inferior - Cauchy sequences - Simple problems.

Ch. 2.4 to 2.10.

UNIT - III SERIES OF REAL NUMBERS

Convergence and Divergence - Series with non negative terms - Alternating series - conditional convergence and Absolute convergence - Test for Absolute convergence - Simple problems.

Ch. 3.1 to 3.4 and 3.6.

UNIT - IV SERIES OF REAL NUMBERS [CONTD...]

Test for Absolute convergence - The class ℓ^2 - Limit of a function on the real line - Metric spaces - Limits in Metric spaces - Simple problems.

Ch. 3.7, 3.10, 4.1 to 4.3.

UNIT - V CONTINUOUS FUNCTIONS ON METRIC SPACES

Functions Continuous at a point on the real line - Reformulation - Functions Continuous on a Metric Spaces - Open Sets - Closed Sets - simple problems.

Ch. 5.1 to 5.5.

Text book:

R.Goldberg [2000] Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi.

Reference books:

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York.
3. Malik, S.C. and SavitaArora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and Bansilal [1991], Introduction to Real Analysis, SatyaPrakashan, New Delhi.

Course Material: website links, e-Books and e-journals

<https://mathworld.wolfram.com/topics/CalculusandAnalysis.html>

<https://ocw.mit.edu/courses/18-100a-real-analysis-fall-2020/>

<https://ocw.mit.edu/courses/18-100b-analysis-i-fall-2010/>

<https://ocw.mit.edu/courses/18-s097-introduction-to-metric-spaces-iap-2022/>

<https://pkalika.in/2019/09/06/real-analysis/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	S	S	S	M	M	M	S
CO2	S	S	M	M	M	M	M	M	M	S
CO3	S	S	S	M	M	S	S	M	S	S
CO4	M	M	M	S	S	S	M	M	M	M
CO5	M	S	S	M	M	M	M	S	S	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: V

Paper type: Core

Paper code: C – 10

Name of the Paper: PAPER – 10 – DYNAMICS

Credit: 4

Total Hours per Week: 6

Lecture Hours: 6

Tutorial Hours: Practical Hours:

Course Objectives

1. To introduce the study of the motion of particles or bodies under the influence of forces and to provide a basic knowledge of the behavior of objects in motion.
2. Knowledge about Projectiles.
3. To acquire knowledge about simple harmonic motions.
4. Basic knowledge about different types of Impacts.
5. To understand the knowledge about various methods to find the central orbits.

Course Outcomes

1. After studied unit -1, the student will be able to demonstrate knowledge of velocity, acceleration, and coplanar motion.
2. After studied unit -2, the student will be able to gain knowledge of projectile and its applications.
3. After studied unit -3, the student will be able to know about simple harmonic motion and simple pendulum.
4. After studied unit -4, the student will be able to carry out problems related to impact and laws of impact.
5. After studied unit -5, the student will be able to demonstrate knowledge of the central orbits.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	No	Yes	Yes
3	Yes	Yes	Yes	No	Yes	No
4	Yes	Yes	Yes	No	Yes	Yes
5	No	Yes	Yes	Yes	Yes	Yes

Unit – I : Kinematics

Introduction – Velocity – Relative velocity – Angular velocity – Acceleration – Rectilinear motion – Rectilinear motion with a constant acceleration – Relative angular velocity – Coplanar motion (Chapter I : Sections 1.2 to 1.4)

Unit – II : Simple Harmonic Motion

Simple harmonic motion – Projection of a particle having a uniform circular motion – composition of two simple harmonic motions of same period – Simple harmonic motion along a horizontal line – Simple harmonic motion along a vertical line – Motion under gravity in a resisting medium (Chapter 12: Sections 12.1, 12.3, 12.4)

Unit – III : Projectiles

Forces on a projectile – Displacement as a combination of vertical and horizontal displacements – Nature of trajectory – Maximum horizontal range for a given velocity – Two trajectories with a given speed and range – Projectile projected horizontally – Projectile projected on an inclined plane – Maximum range on a inclined plane – Enveloping parabola (Chapter 13 : Sections 13.1 to 13.3)

Unit – IV : Impact

Impulsive force – Conservation of linear momentum – Impact of a sphere – Laws of impact – Impact of two smooth spheres – Direct impact of two smooth spheres – Direct impact of a smooth sphere on a plane – Oblique impact of a smooth sphere on a plane – Oblique impact of two smooth spheres. (Chapter 14 : Sections 14.1 to 14.5)

Unit – V : Central orbits

Differential equation of a central orbit – Laws of a central force – Methods to find the central orbits (Chapter 16: Sections 16.1, 16.2)

Text book:

P.Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, Mechanics, S.Chand and Company Ltd., 2010.

Reference books:

1. A.V.Dharmapadam, Dynamics, S.Viswanathan Pvt Ltd., 1981
2. S.J.Loney, Dynamics of a particle, Macmillan and Company Ltd., 1969
3. John L.Synage, Byron A.Griffth, Principles of Mechanics, McGraw Hill International Book Company, Singapore, 1970
4. M.K.Venkataraman, Text book of Dynamics, Sharma's Sanatorium press, Pudukottai, 1990

Course Material: website links, e-Books and e-journals

<http://mathworld.wolfram.com>

<https://www.classcentral.com/course/rigid-body-dynamics-20108>

<https://nptel.ac.in/courses/112106286>

<https://ocw.mit.edu/courses/8-223-classical-mechanics-ii-january-iap-2017/pages/lecture-notes/>

<https://www.edx.org/learn/mechanics>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	M	S	M	S	M
CO2	M	S	M	M	S	M	S	M	M	S
CO3	S	M	S	S	M	S	S	M	S	M
CO4	M	M	M	S	S	S	M	M	S	S
CO5	M	S	S	M	M	M	M	S	S	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

Paper code: E – 01 Name of the Paper: PAPER – 1A – LINEAR PROGRAMMING Credit:3

Total Hours per Week: 5 Lecture Hours: 5 Tutorial Hours: Practical Hours:

Course Objectives

1. To describe the role of mathematical models in operations research and decision making.
2. Formulate a real-life problem into a linear programming problem.
3. To solve an LPP by graphical and other methods.
4. To acquire knowledge of transportation and assignment problems.
5. To understand a knowledge of simulation and its applications

Course Outcomes

1. After studied unit-1, the student will be able to formulate a real-world problem into an LPP and carry out the calculations of the simplex method.
2. After studied unit-2, the student will be able to solve transportation problems.
3. After studied unit-3, the student will be able to understand analogies between transportation problems and assignment models.
4. After studied unit-4, the student will be able to demonstrate knowledge of game theory and its applications.
5. After studied unit-5, the student will be able to know the concept of simulation and solve the problems by applying the Monte Carlo simulation technique.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT - I

Linear programming problem - Mathematical formulation of the problem - Graphical solution method - Simplex method - The Big-M method -Duality - Dual simplex method (Simple Problems).

UNIT - II

Definitions of the transportation model - Formulation and solution of transportation models - Finding an initial basic feasible solution (NWCM - LCM -VAM) - Degeneracy in Transportation Problem - Transportation Algorithm (MODI Method)

UNIT - III

Definition of Assignment models - Mathematical representation of assignment models - Comparison with the transportation models - Solution of the assignment model - The Hungarian methods for solution of the assignment models - variation of the assignment

problem - Travelling salesman problem.

UNIT - IV

Games and Strategies - Two person zero sum - Some basic terms - the maximin-minimax principle - saddle points - Games without saddle points-Mixed strategies - graphic solution $2 \times n$ and $m \times 2$ games.

UNIT - V

Simulation - applications - advantages and disadvantages - Monte Carlo method - simple problems.

Text book:

Gupta P.K.and Hira D.S., (2000) Problems in Operations Research, S.Chand & Co. Delhi

Reference Books

1. J.K.Sharma, (2001) Operations Research: Theory and Applications, Macmillan, Delhi
2. KantiSwaroop, Gupta P.K. and Manmohan, (1999) *Problems in Operations Research*, Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research*, sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987) *Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research*, Macmillan Publishing Company, New York.
6. S.J.Venkatesan, *Operations Research*, J.S. Publishers, Cheyyar-604 407.

Course Material: website links, e-Books and e-journals

<https://ocw.mit.edu/courses/6-046j-design-and-analysis-of-algorithms-spring-2015/resources/lecture-15-linear-programming-lp-reductions-simplex/>

<https://www.mygreatlearning.com/academy/learn-for-free/courses/linear-programming-examples>

<https://www.studocu.com/en-us/document/university-at-buffalo/advanced-topics-in-computer-science/lecture-notes-introduction-to-linear-programming-1/647312>

<https://www.udemy.com/course/operation-research-a-course-on-linear-programming-problems/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	S	S	S	M
CO2	M	S	S	M	S	S	S	S	S	S
CO3	S	S	M	S	M	S	M	S	S	S
CO4	S	M	S	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	M

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: V

Paper type: Elective

Paper code: E – 01 Name of the Paper: PAPER – 1B – SPECIAL FUNCTIONS Credit:3

Total Hours per Week: 5 Lecture Hours: 5 Tutorial Hours: Practical Hours:

Course Objectives

1. To develop computational skills in certain special functions which are frequently occurring in higher mathematics and mathematical physics.
2. Learn the concepts of simultaneous linear differential equations and some solvable types of nonlinear equations.
3. Basic knowledge about numerical solutions using the Taylor series.
4. To understand the concepts of Bessel functions, Legendre functions, and their properties.
5. To give an insight about Fourier integral, term by term differentiation of Fourier series and Legendre series.

Course Outcomes

1. After studied unit -1, the student will be able to acquire the concept of linear operators, and solve simultaneous linear differential equations.
2. After studied unit -2, the student will be able to interpret Adams and Modified Adams method and extrapolation techniques.
3. After studied unit -3, the student will be able to understand the concept of power series solution.
4. After studied unit -4, the student will be able to explain the concepts of Bessel functions, Legendre functions, and their properties.
5. After studied unit -5, the student will be able to analyze term-by-term differentiation of the Fourier series and Legendre series.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	No

UNIT-I:

Properties of Linear Operators - Simultaneous Linear Differential Equations - Special Solvable Types of Nonlinear Equations.

UNIT-II:

Numerical Solutions Using Taylor Series - Adams and Modified Adams Method - Extrapolation with Differences

UNIT-III:

Properties of Power Series - Examples - Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT-IV:

Bessel Functions - Properties - Legendre Functions.

UNIT-V:

Term by Term Differentiation of Fourier Series, Legendre Series - Fourier Integral.

Recommended Text

1. F.B.Hildebrand. (1977) Advanced Calculus for Applications. Prentice Hall. New Jersey.

Reference Books

1. J.N.Sharma and R.K.Gupta (1998) Special Functions, Krishna Prakashan Mandir, Meerut.
2. Satya Prakash. (2004) Mathematical Physics. Sultan & Sons. New Delhi.
3. B.D.Gupta (1978) Mathematical Physics, Vikas Publishing House.

Course Material: website links, e-Books and e-journals

special-function-kalika124pages.pdf

<https://mathworld.wolfram.com/topics/CalculusandAnalysis.html>

<https://alison.com/topic/learn/127039/special-functions>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	S	S	M	S	M	S	M
CO2	S	M	S	S	M	S	S	S	M	S
CO3	M	M	S	S	S	S	M	S	S	M
CO4	S	S	M	S	S	M	S	M	S	S
CO5	M	S	S	M	S	S	S	S	M	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: V

Paper type: Elective

Paper code: E – 02

Name of the Paper: PAPER – 2A – GRAPH THEORY

Credit:3

Total Hours per Week: 4

Lecture Hours: 4

Tutorial Hours:

Practical Hours:

Course Objectives

1. To impart the knowledge of graph theory and study the basic concepts of graphs, and subgraphs.
2. To study operations on graphs and adjacency and incidence of matrices.
3. Knowledge about connectedness and components.
4. To acquire knowledge about connectivity theorems on graphs.
5. Knowledge about Eulerian and Hamiltonian graphs.

Course Outcomes

1. After studied unit -1, the student will be able to know various graph structures and isomorphism between graphs.
2. After studied unit -2, the student will be able to know the representation of the graphs in matrix form.
3. After studied unit -3, the student will be able to know the concepts of connected graph, component, cut point, and bridge of a graph.
4. After studied unit -4, the student will be able to know about trees and their applications.
5. After studied unit -5, the student will be able to demonstrate knowledge of Eulerian and Hamiltonian graphs.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	Yes	Yes	No	Yes	Yes
2	No	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	No	Yes	Yes
4	No	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	No	Yes	Yes

UNIT - I

Graphs - subgraphs - Degree of a vertex - Isomorphism of graphs -Ramsey numbers - independent sets and coverings.

UNIT - II

Intersection graphs - Adjacency and incidence of matrices - Operations on graphs - Simple problems.

UNIT - III

Walks, trails and paths - Connectedness and components - cut points - bridges - blocks.

UNIT - IV

Connectivity theorems and simple problems –Trees - Theorems and simple problems.

UNIT - V

Eulerian graphs and Hamiltonian graphs - Necessary and sufficient conditions - Theorems and simple problems.

Text book:

S.Arumugam and S.Ramachandran, “Invitation to Graph Theory”, SCITECH Publications India Pvt. Ltd., T.Nagar, Chennai - 17. 2001.

Unit 1 Chapter 2 Section 2.1 to 2.6

Unit 2 Chapter 2 Section 2.7 to 2.9

Unit 3 Chapter 4 Section 4.1 to 4.3

Unit 4 Chapter 4 Section 4.4

Chapter 6 Section 6.1, 6.2

Unit 5 Chapter 5 Section 5.1, 5.2

Reference Books

1. S.Kumaravelu, SusheelaKumaravelu, Graph Theory, Publishers, Nagercoil-629 002.
2. S.A.Choudham, A First Course in Graph Theory, Macmillan India Ltd.
3. Robin J.Wilson, Introduction to Graph Theory, Longman Group Ltd.

Course Material: website links, e-Books and e-journals

<http://www.stanford.edu/class/cs103x/>

<https://mathworld.wolfram.com/topics/GraphTheoryhtml>

<https://nptel.ac.in/courses/111/106/111106102/>

<https://ocw.mit.edu/courses/18-217-graph-theory-and-additive-combinatorics-fall-2019/>

<https://ocw.mit.edu/courses/18-304-undergraduate-seminar-in-discrete-mathematics-spring-2015/>

<https://ocw.mit.edu/courses/18-315-combinatorial-theory-introduction-to-graph-theory-extremal-and-enumerative-combinatorics-spring-2005/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	M	M	S	S	S	S
CO2	M	M	M	S	M	M	S	S	M	S
CO3	M	M	M	S	M	S	S	S	S	S
CO4	S	S	M	M	S	M	M	S	M	S
CO5	S	S	S	M	S	S	M	M	S	M

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: V

Paper type: Elective

Paper code: E – 02 Name of the Paper: PAPER – 2B – DISCRETE MATHEMATICS

Credit:3

Total Hours per Week: 4 Lecture Hours: 4 Tutorial Hours: Practical Hours:

Course Objectives

1. This course aims to develop mathematical maturity and the ability to deal with abstraction and to develop construction and verification of formal logical manipulation.
2. To expose to different techniques about recurrence relations and solutions of homogeneous and non-homogeneous relations.
3. To study mathematical logic and form a truth table of a formula.
4. To acquire knowledge about modular and distributive lattices and the properties of lattices.
5. Knowledge about Boolean polynomials.

Course Outcomes

1. After studied unit -1, the student will be able to demonstrate knowledge of recurrence relations and generating functions.
2. After studied unit -2, the student will be able to form a truth table and know the concepts of tautological implications and equivalence of formulae.
3. After studied unit -3, the student will be able to know the concepts of functionally complete sets of connectives and duality law.
4. After studied unit -4, the student will be able to demonstrate knowledge of modular and distributive lattices and the properties of lattices.
5. After studied unit -5, the student will be able to understand the concepts of Boolean Algebra, Boolean polynomials, and Karnaugh Maps.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	No

UNIT - I RECURRENCE RELATIONS AND GENERATING FUNCTIONS

Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite Order Homogeneous [linear] Relations - Solutions of Non-homogeneous Relations.

UNIT - II MATHEMATICAL LOGIC

TF Statements - Connectives - Atomic and Compound Statements - Well-formed [Statement Formulae] - Parsing - Truth Table of a Formula - Tautology - Tautological Implications and Equivalence of Formulae.

UNIT - III MATHEMATICAL LOGIC [CONTD..]

Replacement process - Functionally complete sets of connectives and Duality law - Normal Forms - Principal Normal Forms.

UNIT - IV LATTICES

Lattices [omit example 15 Pp No.10.6) - Some properties of Lattices - New Lattices (omit remark Pp 10.14) - Modular and Distributive Lattices (omit theorem 10 and 17, Example 4 - Pp 10.23, Example 11 - Pp 10.24)

UNIT - V BOOLEAN ALGEBRA

Boolean Algebra (omit theorem 25) - Boolean Polynomials - Karnaugh Maps (omit K-map for 5 and 6 variables)

Text book:

M.K.Venkataraman, N.Sridharan and N.Chandrasekaran, [2003] Discrete Mathematics, The National Publishing Company, Chennai.

Reference Books

1. R.Johnsonbaugh [2001] Discrete Mathematics [5th Edn.] Pearson Education, Asia.,
2. C.L.Liu, [1985] elements of Discrete Mathematics, McGraw Hill, New York,
3. J.Truss. [2000] Discrete Mathematics for Computer Scientists [2nd Edn.] Pearson Education, Asia.
4. M.K.Sen and B.C.Chakraborty [2002] Discrete Mathematics [2nd Edition,] Books and allied private Ltd., Kolkata.

Course Material: website links, e-Books and e-journals

<https://mathworld.wolfram.com/topics/DiscreteMathematics.html>

<https://ocw.mit.edu/courses/18-304-undergraduate-seminar-in-discrete-mathematics-spring-2015/>

<https://www.coursera.org/learn/discrete-mathematics>

<https://click.linksynergy.com/deeplink?id=nFJR8bwmzBk&mid=39197&murl=https%3A%2F%2Fwww.udemy.com%2Fcourse%2Fdiscrete-mathematics-open-doors-to-great-careers%2F>

https://onlinecourses.nptel.ac.in/noc20_cs82/preview

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	S	M	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	M	M	M	M	M	S	M	S	M	M
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	M	S	M	S	M	S	M	S	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: V

Paper type: Skill based subject

Paper code: S – 03

Name of the Paper: PAPER – 3 – MATHEMATICS FOR

COMPETITIVE EXAMINATIONS-III

Credit: 2

Total Hours per Week: 3

Lecture Hours: 3

Tutorial Hours:

Practical Hours:

Course Objectives

1. To introduce the concepts of mathematics with emphasis on analytical ability and computational skills required to write the competitive examinations.
2. Students will learn the relationship between time/speed/distance through a variety of activities.
3. Students should learn a few tricks which may help them to solve the boat and stream - related problems in the quantitative aptitude section faster and without errors.
4. Students learn the detailed concept of alligation along with some of the important formulae to solve the questions related to this topic.
5. To acquire the basic knowledge about simple, compound interest, and calculating areas of different shapes.

Course Outcomes

1. After studied unit -1, the student will be able to solve the problems related to time and distance.
2. After studied unit -2, the student will be able to carry out the boat and stream, train, and speed- based questions.
3. After studied unit -3, the student will answer the questions based on alligation or mixture. Aspirants preparing for the upcoming competitive examinations will be able to answer such questions in a faster way.
4. After studied unit -4, the student will be able to carry out problems related to compound interest.
5. After studied unit -5, the student will be able to demonstrate knowledge of area-related problems.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	No

UNIT - I

Time and Distance.

UNIT - II

Boats and Streams, Problems on Trains.

UNIT - III

Alligation or Mixture, Simple Interest.

UNIT - IV

Compound Interest.

UNIT - V

Area.

Text book:

1. R.S.Aggarwal, [2017] Quantitative Aptitude for Competitive Examinations, S Chand and Company, New Delhi.

Chapters 18 to 24.

Reference Book:

1.Praveen R. V. Quantitative Aptitude and Reasoning, PHI Learning Pvt. Ltd, New Delhi.

Course Material: website links, e-Books and e-journals

<https://study91.co.in/subject-category-list/math-classes>

<https://unacademy.com/class/mathematics-for-all-competitive-exams/KDPVC3M1>

https://artofproblemsolving.com/wiki/index.php/Resources_for_mathematics_competitions

<https://examsdaily.in/free-online-coaching-competitive-exams>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	S	S	S	M
CO2	M	S	S	M	S	M	S	M	M	S
CO3	S	M	M	S	M	S	M	S	S	M
CO4	M	S	M	M	S	M	S	S	M	S
CO5	S	S	S	M	S	S	M	M	S	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: VI

Paper type: Core

Paper code: C – 11 Name of the Paper: PAPER – 11 – LINEAR ALGEBRA Credit: 4

Total Hours per Week: 5 Lecture Hours: 5 Tutorial Hours: Practical Hours:

Course Objectives

1. To introduce the concepts of vector spaces.
2. To learn the concepts of dual spaces.
3. Knowledge about the algebra of linear transformations.
4. Basic knowledge about linear transformations and their properties related to a matrix.
5. To know about matrices, determinants, and their properties.

Course Outcomes

1. After studied unit -1, the student will be able to identify linear dependent and independent vectors.
2. After studied unit -2, the student will be able to classify orthogonal and orthonormal vectors.
3. After studied unit -3, the student will be able to know about the algebra of linear transformations.
4. After studied unit -4, the student will be able to know about the matrix of a linear transformation and its properties.
5. After studied unit -5, the student will be able to solve a system of linear equations.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	No	Yes	No
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	No	Yes	No

UNIT - I

VECTOR SPACES

Linear dependence and independence - Bases – Dimension – Basic concepts and examples.

UNIT - II

VECTOR SPACES [CONTD]

Dual spaces - Annihilator of a Subspace - inner product spaces.

UNIT - III

LINEAR TRANSFORMATIONS

Algebra of linear transformations - Sub Algebra - Minimal Polynomial - Invertible - Characteristics roots - Characteristic Vectors.

UNIT - IV

LINEAR TRANSFORMATIONS [CONTD]

Matrices - Matrix of a Linear Transformation and its Properties- Canonical forms - triangular forms - Invariant Transformation - Triangular Matrix of 'T'

UNIT - V

LINEAR TRANSFORMATIONS [CONTD]

Trace and Transpose: Definition and Properties-Jacobson Lemma- Symmetric, Skew Symmetric and Adjoint of a matrix - Determinants: Definition and Properties- Solving system of Linear Equations-Secular Equation.

Text book:

I.N.Herstein [1989], "Topics in Algebra", Wiley Eastern Ltd. New Delhi.
Chapters - 4 & 6(Sec: 4.1, 4.2, 4.3, 4.4 & 6.1, 6.2, 6.3, 6.4, 6.8, 6.9).

Reference books:

1. S.Arumugam.[2004], "Modern Algebra", Scitech Publications, Chennai.
- 2.J.B.Fraleigh [1987], "A First Course in Algebra", [3rd edition] Addison Wesley, Mass. [Indian Print]
3. Lloyd R.Jaisingh and Frank Ayres,Jr. [2005], "Abstract Algebra", [2nd edition], Tata McGraw Hill, New Delhi.
4. M.L.Santiago[2002], "Modern Algebra", Tata McGraw Hill, New Delhi
5. Surjeet Singh and Qazi Zameeruddin[1982], "Modern algebra", Vikas Publishing House Pvt.Ltd. New Delhi.

Course Material: website links, e-Books and e-journals

<https://www.classcentral.com/course/youtube-vector-spaces-80274>

<https://wolframalpha.com/examples/mathematics/linear-algebra>

<http://linear.ups.edu/index.html>

<https://open.umn.edu/opentextbooks/textbooks/5>

<https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/pages/syllabus/>

<https://ocw.mit.edu/courses/18-702-algebra-ii-spring-2011/>

<http://www.wolfram.com/wolfram-u/introduction-to-linear-algebra/>

<https://www.classcentral.com/course/edx-linear-algebra-ii-matrix-algebra-20932>

<https://www.classcentral.com/course/brilliant-linear-algebra-59261>

<https://www.classcentral.com/course/swayam-introduction-to-abstract-and-linear-algebra-14142>

<https://www.classcentral.com/subject/algebra>

<https://www.classcentral.com/course/edx-introduction-to-linear-models-and-matrix-algebra-2963>

<https://pkalika.in/2019/10/21/abstract-algebra-linear-algebra/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	M	S	S	S	M
CO2	S	S	S	S	M	S	S	M	M	S
CO3	M	S	S	S	M	S	M	S	S	M
CO4	S	S	M	S	S	M	S	M	M	S
CO5	S	M	S	M	S	M	M	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: VI

Paper type: Core

Paper code: C – 12 Name of the Paper: PAPER – 12 – REAL ANALYSIS II Credit: 4

Total Hours per Week: 5 Lecture Hours: 5 Tutorial Hours: Practical Hours:

Course Objectives

1. To attain a strong knowledge about the concepts of connected, complete, bounded, totally bounded, and compact spaces.
2. To acquire basic knowledge about continuous and uniformly continuous functions on compact metric spaces.
3. To understand the definition of Riemann integral and its properties.
4. To study the results of Rolle’s theorem, the law of mean, fundamental theorems of calculus, and Taylor’s theorem and carry out simple problems related to these concepts.
5. To know about pointwise convergence, uniform convergence of sequences of functions, convergence, and uniform convergence of series of functions.

Course Outcomes

1. After studied unit-1, the student will be able to demonstrate knowledge of connected sets and complete metric spaces with suitable examples.
2. After studied unit-2, the student will be able to identify the functions which are continuous and uniformly continuous.
3. After studied unit-3, the student will be able to express about Riemann integration and its properties.
4. After studied unit-4, the student will be able to carry out the problems related to Rolle’s theorem and the law of mean.
5. After studied unit-5, the student will be able to demonstrate knowledge of pointwise convergence, uniform convergence of sequences of functions, and of series of functions.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT - I CONNECTEDNESS, COMPLETENESS

Open Sets - Connected Sets - Bounded Sets and Totally Bounded Sets - Complete Metric Spaces - simple problems. Ch. 6.1 to 6.4 of Goldberg

UNIT - II COMPACTNESS

Compact Metric Space - Continuous Functions on Compact Metric Spaces - Continuity of Inverse Functions - Uniform Continuity - simple problems. Ch. 6.5 to 6.8 of Goldberg

UNIT - III RIEMANN INTEGRATION

Sets of measure zero - Definition Riemann Integral - Properties of Riemann Integral - Derivatives - simple problems.
Ch. 7.1, 7.2 7.4, 7.5 of Goldberg.

UNIT - IV RIEMANN INTEGRATION [CONTD...]

Rolle's Theorem - The law of mean - Fundamental theorems of calculus - Taylor's theorem - simple problems.
Ch. 7.6 to 7.8 and 8.5 of Goldberg.

UNIT - V SEQUENCES AND SERIES OF FUNCTIONS

Pointwise convergence of sequences of functions - Uniform convergence of sequences of functions - consequences of uniform convergence - Convergence and uniform convergence of series of functions - simple problems.
Ch. 9.1 to 9.4 of Goldberg.

Text book:

R.Goldberg, Methods of Real Analysis Oxford & IBH Publishing Co., New Delhi.

Reference Books:

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley Publishing Company Inc. New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York,
3. Malik, S.C. and Savita Arora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and Bansi Lal [1991] Introduction to Real Analysis, Satya Prakashan, New Delhi.

Course Material: website links, e-Books and e-journals

<https://ocw.mit.edu/courses/18-100b-analysis-i-fall-2010/>

<https://ocw.mit.edu/courses/18-s097-introduction-to-metric-spaces-iap-2022/>

<https://pkalika.in/2019/09/06/real-analysis/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	M	S
CO2	M	S	S	S	M	M	S	S	S	M
CO3	S	S	M	S	S	S	S	S	S	S
CO4	M	S	S	S	S	S	M	S	S	S
CO5	S	M	S	S	S	S	S	M	S	M

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: VI

Paper type: Core

Paper code: C – 13 Name of the Paper: PAPER – 13 – COMPLEX ANALYSIS Credit: 4

Total Hours per Week: 5 Lecture Hours: 5 Tutorial Hours: Practical Hours:

Course Objectives

1. To study the techniques of complex variables and functions together with their derivatives, and applications of analytic functions, harmonic functions, and their properties.
2. To understand the concepts of conformal mapping, bilinear transformations, and related problems.
3. To evaluate a complex integral using parameterization, and apply the results of Cauchy’s fundamental theorem and Cauchy’s integral formula.
4. A strong knowledge of Taylor’s and Laurent’s series, classifications of singularities, and evaluation of integrals using Cauchy’s residue theorem.
5. To evaluate contour integrals or integrals over the real line

Course Outcomes

1. After studied unit-1, the student will be able to gain knowledge about complex functions and their nature, continuous functions, necessary and sufficient conditions of an analytic function.
2. After studied unit-2, the student will be able to demonstrate knowledge of elementary transformations, conformal and bilinear transformations with examples.
3. After studied unit-3, the student will be able to evaluate contour integrals using Cauchy’s integral formula.
4. After studied unit-4, the student will be able to express a function as Taylor series or Laurent’s series at the given domain, and also determine the circle or annulus of convergence power series expansions of analytic functions.
5. After studied unit-5, the student will be able to carry out the problems related to the evaluation of improper integrals.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	NO	Yes	Yes	Yes	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	NO	Yes	NO	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	NO
5	Yes	Yes	Yes	Yes	Yes	NO

UNIT - I ANALYTIC FUNCTIONS

Complex valued functions-Mappings - Limits - Theorems on Limits(statement only)

Continuity - Derivatives and Differentiation formulas(without proof) - Cauchy-Riemann equations - Sufficient conditions - Cauchy - Riemann equations in polar form - properties of Analytic functions - Harmonic functions - Determination of Harmonic conjugate-problems.

UNIT – II CONFORMAL MAPPINGS & MAPPING BY ELEMENTARY FUNCTIONS

Conformal mapping - Isogonal mapping - Further properties - The transformations $w = z + d$, $w = \frac{1}{z}$, $w = z^2$, $w = z + d$, $w = e^z$, $w = \sin z$ - Bilinear Transformations – problems

UNIT – III INTEGRALS

Contours - Line Integrals - Cauchy-Goursat's Theorem (without proof) - Cauchy's Integral Formula - Derivatives of Analytic Functions - Morera's theorem - Maximum Moduli of functions - The fundamental theorem of Algebra - Liouville's theorem and the Fundamental Theorem on Algebra .

UNIT – IV POWER SERIES, SINGULARITIES AND RESIDUES

Taylor's and Laurent's theorem – Examples - Singularities and classifications - Isolated singularities- Removable singularity, Pole and essential singularity - Residues - Cauchy's Residue theorem - problems.

UNIT – V CONTOUR INTEGRATION

Evaluation of Improper Real Integrals - Improper integrals involving Trigonometric functions - simple problems.

Text book:

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Fourth Edition)

Reference Books

1. P. Duraipandian and Laxmi Duraipandian. Complex Analysis: Emerald Publishers, Chennai. 1976.
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi. 2000.
3. Tyagi B.S. Functions of Complex Variable, 17th Edition, Pragati Prakasham Publishing Company Ltd., Meerut, 1992 - 93.

Course Material: website links, e-Books and e-journals

<https://ocw.mit.edu/courses/18-04-complex-variables-with-applications-spring-2018/>
<https://ocw.mit.edu/courses/18-04-complex-variables-with-applications-fall-1999/pages/syllabus/>

<https://ocw.mit.edu/courses/18-112-functions-of-a-complex-variable-fall-2008/pages/syllabus/>
<https://pkalika.in/2019/07/01/complex-analysis/>
<https://mathworld.wolfram.com/topics/CalculusandAnalysis.html>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	M	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	M	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: VI

Paper type: Core

Paper code: C – 14 Name of the Paper: PAPER – 14 – PROGRAMMING IN C LANGUAGE

Credit: 3

Total Hours per Week: 3 Lecture Hours: 3 Tutorial Hours: Practical Hours:

Course Objectives

1. To make the students abreast with the programming concepts and master them in C Language.
2. To learn the basic structures of C programs and execute a ‘C’ Program.
3. Knowledge about data types, declaration of variables, storage class, and assigning values to variables.
4. To obtain basic knowledge about various operators, evaluation of expressions, and precedence of arithmetic operators.
5. Knowledge about formatted input and output, decision making with branching, looping, and arrays.

Course Outcomes

1. After studied unit -1, the student will be able to demonstrate ‘c’ tokens, keywords, the basic structure of C programs and the execution of a ‘C’ Program.
2. After studied unit -2, the student will be able to express the nature of constants, variables, data types, declaration of variables, and assigning values to variables.
3. After studied unit -3, the student will be able to describe valuation of expressions and usage of various operators.
4. After studied unit -4, the student will be able to express the logic using control statements.
5. After studied unit -5, the student will be able to demonstrate knowledge pertaining to arrays.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	No

UNIT –I: OVERVIEW OF C

Basic Structure of C Programs- Programming style- Executing a ‘C’ Programs –‘c’ Tokens- Keywords and Identifiers.

UNIT – II: CONSTANTS , VARIABLES & DATA TYPE

Constants-Variables-Data Types- Declaration of Variables- Declaration of Storage Class- Assigning values to variables.

UNIT – III: OPERATORS AND EXPRESSION

Arithmetic Operators-Relational operators- Logical operators-Assignment operators-Increment and decrement operators-Conditional operators-Evaluation of Expressions-Precedence of Arithmetic operators.

UNIT –IV: FORMATTED INPUT,OUTPUT & DECISION MAKING AND BRANCHING

Formatted input- Formatted output- Decision making with ‘IF’ statement- Simple IF statement- The IF...ELSE statement-Nesting of IF...ELSE statement-The ELSE IF ladder-The switch statement – The ?: Operators- The GOTO statement.

UNIT – V: DECISION MAKING AND LOOPING & ARRAYS

The WHILE statement-The DO statement-The FOR statement- Jumps in LOOPS-One dimensional array-Declaration of one dimensional arrays-Initialization of one dimensional arrays-Two dimensional arrays-Multi dimensional arrays.

TEXT BOOK:

1. E. Balagurusamy [1996], “Programming in ANSI C” .Tata McGraw Hill.
Unit:I Chap:1(1.8-1.10),Chap:2 (2.3,2.4)
Unit:II Chap:2 (2.5-2.10),
Unit:III Chap: 3 (3.2-3.12),
Unit-IV Chap:4 (4.4,4.5),Chap:5 (5.2-5.9),
Unit:V Chap:6 (6.2-6.5),Chap:7(7.2-7.7)

REFERENCE BOOKS:

1. V.Rajaraman [1995], “Computer Programming In C”, Prentice Hall. New Delhi.
2. H.Schildt, Osborne (1994), “Teach Yourself C”, McGraw Hill, New York ,Mullish Cooper.
3. “The Spirit of C – An Introduction to Modern Programming”,Jaico Publishing House. Delhi. 1998.
4. YashavantKanetkar, “Let Us C”, 6th edition BPB publication.

Course Material: website links, e-Books and e-journals

<https://lecturenotes.in/subject/1/programming-in-c-c>
<https://lecturenotes.in/subject/805/c-language>
<https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/pages/lecture-notes/>
<http://www.freebookcentre.net/programming-books-download/Lecture-Note-On-Programming-In-C.html>
https://www.technicalsymposium.com/Cprogramming_Contents.html

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	M	S	M	S	M	M
CO2	M	S	M	M	S	S	M	S	M	M
CO3	M	S	M	M	M	S	S	M	M	S
CO4	S	M	S	S	S	M	M	S	S	M
CO5	S	S	M	S	M	S	M	S	S	M

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: VI

Paper type: Core Practical

Paper code: CP – 1 Name of the Paper: PAPER – 1 – PRACTICAL IN C LANGUAGE

Credit: 2

Total Hours per Week: 3 Lecture Hours: 3 Tutorial Hours: Practical Hours:

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The following exercises shall be performed as minimum mandatory requirements [for eligibility to take the practical examination] and a RECORD of the code-listing and outputs shall be maintained by each student.

1. Assigning the ASCII value.
2. Square of numbers: Using For loop,
3. Square of numbers: While loop
4. Square of numbers: Do- while loop,
5. Square of numbers: Go to statement.
6. Printing Alphabets between two letters
7. Counting Vowels and consonants.
8. Printing Prime number between two numbers
9. Fibonacci series
10. Factorial numbers
11. Power of a value
12. Checking Palindrome in string
13. Sin(X) series
14. Cos(X) series
15. Pascal Triangle
16. Binary search
17. Matrix Transpose
18. Matrix Addition
19. Matrix Subtraction
20. Matrix Multiplication

REFERENCE BOOKS:

1. “The spirit if C”, Mulish Cooper, Indian edition by jaicopublishers, 1987.
2. “Teach yourself C”, Herbert Scheldt, McGraw-Hill, 2nd edition 1994 Programming in C-Schaum series.

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: VI

Paper type: Elective

Paper code: E – 03 Name of the Paper: PAPER – 3A – OPERATIONS RESEARCH Credit:3

Total Hours per Week: 3 Lecture Hours: 3 Tutorial Hours: Practical Hours:

Course Objectives

1. To develop computational skills and logical thinking in formulating industry - oriented problems as a mathematical problems and obtaining optimal solutions to the problems.
2. To learn about splitting and arranging the activities of a project as a network diagram and determine a critical path and its duration.
3. Knowledge about programme evaluation and review techniques (PERT).
4. Basic knowledge about inventory control models and determining EOQ levels.
5. To study steady-state analysis of various queuing models with finite and infinite capacities.

Course Outcomes

1. After studied unit -1, the student will be able to determine the critical activities of a repeated project and its completion time.
2. After studied unit -2, the student will be able to determine the duration of activities of a new project based on three-time estimates.
3. After studied unit -3, the student will be able to carry out the EOQ level of various inventory control models.
4. After studied unit -4, the student will be able to calculate processing times of sequencing of jobs through 2, 3, and m machines.
5. After studied unit -5, the student will be able to find out the length of the queue, and waiting time in the queue under single and multi-channel queuing models.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	No	Yes	No
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	No

UNIT - I

Network logic-Numbering the events-Construction of network diagram-Critical path method (CPM) - Three floats

UNIT - II

Three time estimates-Network scheduling by PERT Method

UNIT - III

Inventory models - EOQ model (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate infinite production rate with shortages allowed (c) Uniform demand rate finite production rate with no shortages (d) Uniform demand rate finite production rate with shortages allowed - Inventory control with Price Breaks.

UNIT - IV

Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines - n jobs through m machines.

UNIT - V

Queuing Theory - Basic concepts - Steady state analysis of M/M/1 and M/M/N systems with finite and infinite capacities - Multi-channel queuing model (M/M/C)/FCFS/ ∞/∞ .

Text book:

Gupta P.K. and Hira D.S. (2000) *Problems in Operations Research*, S.Chand & Co. Delhi

Reference Books

1. J.K.Sharma, (2001) *Operations Research: Theory and Applications*, Macmillan, Delhi
2. KantiSwaroop, Gupta P.K. and Manmohan, (1999) *Problems in Operations Research*, Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research*, sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987) *Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research*, Maocmillan Publishing Company, New York
6. S.J.Venkatesan, *Operations Research*, J.S. Publishers, Cheyyar-604 407.

Course Material: website links, e-Books and e-journals

<https://lecturenotes.in/subject/573/operations-research-or>

https://onlinecourses.nptel.ac.in/noc20_ma23/preview

<https://examupdates.in/operation-research-notes/>

<https://collegetutor.net/notes/Operation Research Notes>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	M	S
CO2	M	S	S	S	M	M	S	S	S	M
CO3	S	S	M	S	S	S	S	S	S	S
CO4	M	S	S	S	S	S	M	S	S	S
CO5	S	M	S	S	S	S	S	M	S	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: VI

Paper type: Elective

Paper code: E – 03 Name of the Paper: PAPER – 3B – FUZZY MATHEMATICS Credit:3

Total Hours per Week: 3 Lecture Hours: 3 Tutorial Hours: Practical Hours:

Course Objectives

1. To acquire background knowledge about the fundamentals of fuzzy Algebra.
2. To know the basic definitions and concepts of fuzzy theory.
3. To know the applications of fuzzy technology.
4. To study the Algebra of fuzzy relations and logic-connectives.
5. To learn the concepts of fuzzy invariant subgroups and fuzzy subrings

Course Outcomes

1. After studied unit -1, the student will be able to know fuzzy sets and their operations.
2. After studied unit -2, the student will be able to know the addition and product of two fuzzy sets.
3. After studied unit -3, the student will be able to demonstrate knowledge of fuzzy relations and logic-connectives.
4. After studied unit -4, the student will be able to express about fuzzy subgroup, homomorphic image, and pre-image of subgroupoid.
5. After studied unit -5, the student will be able to demonstrate knowledge of fuzzy invariant subgroups and subrings.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	No

UNIT - I

Introduction- Fuzzy subsets-Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy α level sets - properties of fuzzy subsets of a set.
Sections 1.1-1.10

UNIT - II

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-Cartesian product of fuzzy subsets.
Sections 1.11-1.13.

UNIT - III

Introduction- Algebra of fuzzy relations-logic-connectives.
Sections 2.1-2.4

UNIT - IV

Some more connectives-Introduction-fuzzy subgroup-homomorphic image and Pre-image of subgroupoid.

Sections 2.5,3.1-3.3

UNIT - V

Fuzzy invariant subgroups-fuzzy subrings.

Section 3.4 and 3.5.

Text book:

S.Nanda and N.R.Das “Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi.

Reference Books

1. Apostolos Syropoulos, A Modern Introduction to Fuzzy Mathematics, Wiley & Sons, Inc, 2020.

Course Material: website links, e-Books and e-journals

<https://www.classcentral.com/course/swayam-introduction-to-fuzzy-set-theory-arithmetic-and-logic-14149/>

<https://worldcat.org/oclc/1141919783>

https://onlinecourses.nptel.ac.in/noc21_ma55/preview

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	M	M	M	M	S	S	S	M
CO2	M	M	M	S	M	M	S	M	M	S
CO3	M	M	M	S	M	S	M	S	S	M
CO4	S	S	M	M	S	M	M	S	M	S
CO5	S	M	S	M	S	S	M	M	S	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

Paper code: E – 03 Name of the Paper: **PAPER – 3C – R Programming (Practical)** Credit:3

Total Hours per Week: 3 Lecture Hours: Tutorial Hours: Practical Hours: 3

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Using R Programming develop the programs in the following topics:

1. Arithmetic and matrix operations.
2. Simple functions
3. Plotting Bar chart and scatter plot
4. Plotting histogram and pie chart
5. Graphics for grouped data
6. Graphical display of distributions
7. Measures of central tendency -Mean, median, mode
8. Measures of Dispersion- std. deviation, mean deviation
9. Regression and correlation. Linear models.
10. Large sample tests
11. Small sample test t- tests
12. Small sample test F-tests
13. Small sample test Chi-square tests
14. ANOVA(one way)
15. ANOVA (Two way)

Reference Books:

1. Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters Beginner's Guide to R - Springer, 2009.
2. Allerhand M. Tiny Handbook of R - SpringerBriefs in Statistics, 2011
3. Baayen R. Analyzing Linguistic Data - A Practical Introduction to Statistics using R , 2008.
4. Gardener M. Beginning R - The Statistical Programming Language , 2012.
5. Jim Albert, Maria Rizzo R by Example, 2012.
6. Matloff N. Art of R Programming - A Tour of Statistical Software Design , 2011.

Course Material: website links, e-Books and e-journals

<https://www.classcentral.com/course/edx-statistics-and-r-2960>

<https://www.classcentral.com/course/probability-intro-6099>

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: I/III

Paper type: Allied

Paper code: A – 01 Name of the Paper: PAPER – 1 – MATHEMATICAL STATISTICS - I

Credit:3

Total Hours per Week: 4 Lecture Hours: 4 Tutorial Hours: Practical Hours:

Course Objectives

1. To know the fundamental concepts of Statistics.
2. Learn to apply Baye’s theorem to real-life problems.
3. To know the concepts such as expectation, moments, and distribution function.
4. To know the applications of correlation and rank correlation.
5. To learn some standard discrete and continuous distributions and their applications.

Course Outcomes

1. After studied unit -1, the student will be able to express the techniques of conditional probability and Baye’s theorem with examples.
2. After studied unit -2, the student will be able to calculate expectation, and distribution function.
3. After studied unit -3, the student will be able to express Chebychev’s inequality and its applications.
4. After studied unit -4, the student will be able to interpret the different types of correlation coefficient and lines of regression with examples.
5. After studied unit -5, the student will be able to apply domain knowledge for discrete and continuous distributions with examples.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No	Yes	No
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT-I: PROBABILITY THEORY

Axiomatic approach to probability - Some theorems on Probability - Conditional Probability - Multiplication theorem of probability - Independent events - Baye’s Theorem - Simple Problems.

[Chapter 3, sec 3.8 (3.8.1;3.8.2;3.8.5;3.8.6), sec 3.9 (3.9.1,3.9.2), sec 3.10 - 3.13; Chapter 4, sec 4.2]

UNIT –II: RANDOM VARIABLES, DISTRIBUTION FUNCTIONS AND

MATHEMATICAL EXPECTATION.

Random Variables (Discrete and Continuous) - Distribution Function – Mathematical Expectation – Expected value of function of a random variable – properties of expectation – properties of variance – covariance.

[Chapter 5, sec 5.2-5.4; Chapter 6, sec 6.2-6.6]

UNIT-III: GENERATING FUNCTIONS.

Moment generating function - Characteristic Function - Uniqueness and Inversion Theorem (Statement only) - Chebychev's Inequality - Simple Problems.

[Chapter 7, sec 7.1,7.3 - 7.5]

UNIT-IV CORRELATION AND REGRESSION.

Concept of Bivariate Distribution - Correlation - Karl Pearson's Coefficient of Correlation - Rank Correlation - Linear Regression.

[Chapter 10, sec 10.4-10.7, Chapter 11, sec 11.2]

UNIT-V

Standard distributions: Discrete distributions - Binomial, Poisson, Hyper Geometric and Negative Binomial Distributions - Continuous Distributions Normal, Uniform, Exponential.

[Chapter 8, sec 8.4(8.4.1-8.4.8), sec 8.5(8.5.1-8.5.6), sec (8.6.1; 8.6.3-8.6.5), sec 8.8; Chapter 9, sec 9.2 (9.2.1-9.2.5), sec 9.3, sec 9.8]

Text book: S.C. Gupta & V.K. Kapoor : Fundamentals of Mathematical Statistics, Sultan & sons , (11th edition, June 2002).

Reference Books

1. Hogg, R.V. & Craig.A.T.(1998) : Introduction to Mathematical Statistics, Macmillan
2. Mood. A.M. Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. & Cochran.W.G.(1967) : Statistical Methods, Oxford and IBH
4. Hoel, P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks S.S. Elementary Statistical Analysis, Oxford and IBH

Course Material: website links, e-Books and e-journals

<https://mathworld.wolfram.com/topics/ProbabilityandStatistics.html>

<https://ocw.mit.edu/courses/18-175-theory-of-probability-spring-2014/>
<https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2014/>
<https://ocw.mit.edu/courses/18-440-probability-and-random-variables-spring-2014/>
<https://ocw.mit.edu/courses/18-600-probability-and-random-variables-fall-2019/>
<https://ocw.mit.edu/courses/18-655-mathematical-statistics-spring-2016/>
<https://www.wolfram.com/broadcast/video.php?c=420&v=1630>
<https://www.classcentral.com/course/youtube-statistics-110-probability-91487/classroom>
<https://people.richland.edu/james/lecture/m170/>
<https://ocw.mit.edu/courses/18-650-statistics-for-applications-fall-2016/resources/lecture-1-introduction-to-statistics/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	S	S	S	S
CO2	S	S	S	S	M	S	S	S	M	S
CO3	M	S	S	S	S	S	M	S	S	M
CO4	S	S	M	S	S	M	S	S	S	S
CO5	S	M	S	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: II/IV

Paper type: Allied

Paper code: A – 02 Name of the Paper: PAPER – 2 – MATHEMATICAL STATISTICS -II
Credit:3

Total Hours per Week: 4 Lecture Hours: 4 Tutorial Hours: Practical Hours:

Course Objectives

1. To know the Statistical investigations and the applications of sampling techniques in our day-to-day life.
2. Learn the applications of Chi-square distribution.
3. To understand the concepts such as Students t, F, and Z distributions and their properties.
4. To know the various methods of estimation and testing of hypothesis techniques.
5. To apply ANOVA technique to verify whether all samples are drawn from the same population.

Course Outcomes

1. After studied unit -1, the student will be able to demonstrate sampling, parameter, and significance with examples.
2. After studied unit -2, the student will be able to know about Chi-square distribution and its applications.
3. After studied unit -3, the student will be able to illustrate Students t-distribution and the applications of F-distribution.
4. After studied unit -4, the student will be able to state null and alternate hypotheses to the given problem and test the hypothesis.
5. After studied unit -5, the student will be able to apply ANOVA techniques.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No	Yes	No
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	No	Yes	No

UNIT - I

Statistical Population Census and Sampling Survey - Parameter and Statistics - Sampling and Sampling Distribution and Standard Error. Sampling distributions - students 't', chi - square and F distributions.

Sampling and large sample test

Chapter: 12 Page 307- 333

UNIT - II

Test of significance - Large sample test for proportion, mean and standard deviation - Exact test based on 't', Chi - square and F distribution with respect to population mean, variance and correlation coefficient - Tests of independence of attributes - goodness of fit tests.

Exact sampling distribution (Chi-square distribution)

Chapter:13 Page 334 - 351

UNIT - III

Point estimation - Concept of unbiasedness, consistency, efficiency and sufficiency - Cramer- Rao Inequality - Methods of Estimation - Maximum Likelihood Estimation - Method of Moments.

Exact sampling distribution- t, F and Z distribution

Chapter:14 Page 352-370

UNIT - IV

Test of Hypothesis: Null and Alternate Hypothesis - Type I and Type II error - Power of the test - Neymann Pearson lemma - Likelihood Ratio Test - Concept of Most Powerful test (Statement and Results only) - Simple Problems

Theory of estimation, testing of hypothesis

Ch:15 and 16 Pages: S.1-S.15 and S.18-S.30

UNIT - V

Analysis of Variance - One - way and Two-way Classification - Basic Principles of Design of Experiments - Randomization, Replication, Local Control, Completely Randomized Design, Randomized Block Design and Latin Square Design.

Analysis of variance, Design of experiments

Chapter: 17 and 18 Page: S.31-S.46 and S.47-S.75

Text book: S.C. Gupta & V.K. Kapoor: Elements of Mathematical Statistics, Third extensively revised and greatly improved edition, Sultan Chand & sons.

Books for Reference

1. Hogg, R.V. & Craig. A. T. (1998): Introduction to Mathematical Statistics, Macmillan
2. Mood.A.M., Graybill. F.A.&Boes. D.G.(1974): Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks . S. S.Elementary Statistical Analysis, Oxford and IBH
6. O. Kempthorne - Design of Experiments

7. Das and Giri : Design of Experiments Wiley Eastern

Course Material: website links, e-Books and e-journals

<https://mathworld.wolfram.com/topics/ProbabilityandStatistics.html>

<https://ocw.mit.edu/courses/18-175-theory-of-probability-spring-2014/>

<https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2014/>

<https://ocw.mit.edu/courses/18-655-mathematical-statistics-spring-2016/>

<https://www.wolfram.com/broadcast/video.php?c=420&v=1630>

<https://www.classcentral.com/course/youtube-statistics-110-probability-91487/classroom>

<https://people.richland.edu/james/lecture/m170/>

<https://ocw.mit.edu/courses/18-650-statistics-for-applications-fall-2016/resources/lecture-1-introduction-to-statistics/>

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	S	S	M	S	S	S	M
CO2	S	S	S	S	M	S	S	M	M	S
CO3	M	S	S	S	S	S	M	S	S	M
CO4	S	S	M	S	S	M	S	S	S	S
CO5	S	M	S	M	S	M	S	S	M	M

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semesters: I, II (or) III, IV

Paper type: Practical(Allied)

Paper code: A – 03 Name of the Paper: MATHEMATICAL STATISTICS Credit: 2

Total Hours per Week: 2 Lecture Hours: Tutorial Hours: Practical Hours: 2

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LIST OF PROBLEMS

1. Measures of location and Dispersion (absolute and relative)
2. Computation of Correlation Coefficient for raw and Grouped data, Rank Correlation Coefficient
3. Computation of Regression Equations for Raw and Grouped Data
4. Curve Fitting by the Method of Least Squares
 - a. $y=ax+b$
 - b. $y=ax^2+bx+c$
 - c. $y=ae^{bx}$
 - d. $y=ax^b$
5. Fitting of Binomial, Poisson, Normal distributions and tests of goodness of fit.
6. Large sample tests with regard to population mean, proportion, standard deviation
7. Exact tests with respect to Mean, Variance and Coefficient of Correlation
8. Test for Independence of Attributes based on Chi-Square Distribution
9. Calculation of Confidence Intervals based on Normal, t and Chi-square and F Distributions
10. Problems based on ANOVA-one way and two way Classification
11. Completely Randomized Design
12. Randomized Block Design
13. Latin Square Design

Note

Use of scientific calculator shall be permitted for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

- Mathematics faculty alone should be appointed as examiners.

Books for Reference

1. Hogg, R.V. & Craig, A.T. (1998): Introduction to Mathematical Statistics, Macmillan.
2. Mood, A.M., Graybill, F.A. & Boes, D.G. (1974) : Introduction to theory of Statistics, McGraw Hill.
1. Snedecor, G.W. & Cochran, W.G. (1967): Statistical Methods, Oxford and IBH

2. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
3. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan &sons
4. S.C. Gupta & V.K. Kapoor: Fundamentals of Applied Statistics, Sultan & sons
5. Wilks . S. S. Elementary Statistical Analysis, Oxford and IBH
6. O. Kempthorne - Design of Experiments.

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: I/III

Paper type: Allied

Paper code: A – 02 Name of the Paper: PAPER – 1 – NUMERICAL METHODS – I Credit:3

Total Hours per Week: 4 Lecture Hours: 4 Tutorial Hours: Practical Hours:

Course Objective

1. To know the methods of solving simultaneous linear equations.
2. To acquire knowledge about forward differences and Backward differences and their relationship.
3. Knowledge about central difference operators and problems based on various central differences formulae.
4. To study Newton's divided difference formula and problems based on Lagrange's interpolation formula.
5. Knowledge about Summation of series up to n terms.

Course Outcomes

1. After studied unit -1, the student will be able to solve simultaneous linear equations by Gauss elimination method, Gauss-Jordan Method, and Gauss-Seidel method.
2. After studied unit -2, the student will be able to calculate interpolation values by applying Gregory-Newton's forward and backward formulae.
3. After studied unit -3, the student will be able to calculate the central interpolation values by applying central differences formulae.
4. After studied unit -4, the student will be able to estimate one or more missing terms of the given set of data.
5. After studied unit -5, the student will be able to estimate the interpolation value for unequal intervals based on Lagrange's formula of inverse interpolation.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	No	Yes	Yes

UNIT - I SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

Gauss elimination method - matrix inversion method - Gauss-Jordan Method, Gauss-Seidel method (Three unknowns only).

UNIT - II FINITE DIFFERENCES

First and higher order differences - forward differences and Backward differences - Properties of operators - Differences of a Polynomial - Factorial Polynomials - Operator E, Relation between Δ , ∇ and E – Interpolation: Gregory-Newton - forward & backward formulae for interpolation.

UNIT - III CENTRAL DIFFERENCES

Central difference Operators - Central differences formulae: Gauss Forward and Backward formulae - Stirling's formula - Bessel's formula.

UNIT - IV INTERPOLATION FOR UNEQUAL INTERVALS

Divided differences - Newton's divided difference formula - Lagrange's interpolation formula- Estimating the Missing terms (With one or more missing values).

UNIT - V INVERSE INTERPOLATION

Lagrange's formula of inverse interpolation and Reversion of series method (Using Newton's forward formula only).

Summation of series: Sum to n term of the series whose general term is the first difference of a function-summation by parts.

Text book: 1. B.D. Gupta.(2001) *Numerical Analysis*.Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Books for Reference

1. S. Arumugam. (2003) *Numerical Methods*, New Gamma Publishing, Palayamkottai.
2. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co., Delhi
3. A.Singaravelu (2004). *Numerical Methods*Meenakshi Agency, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) *Calculus of Finite differences & Numerical Analysis*, S. Chand & Company Ltd., New Delhi-55.

Course Material: website links, e-Books and e-journals

<https://ocw.mit.edu/courses/22-15-essential-numerical-methods-fall-2014/pages/syllabus/>

<https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004/>

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	M	S	S	S	S
CO2	S	S	S	S	M	S	S	S	M	S
CO3	M	S	S	S	S	S	M	S	M	M
CO4	S	S	M	S	S	M	S	S	S	S
CO5	S	M	S	M	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semester: II/IV

Paper type: Allied

Paper code: A – 02 Name of the Paper: PAPER – 2 – NUMERICAL METHODS – IICredit:3

Total Hours per Week: 4

Lecture Hours: 4

Tutorial Hours: Practical Hours:

Course Objective

1. To evaluate derivatives using Newton’s forward and backward differences formulae.
2. To acquire the knowledge about evaluation of numerical integration.
3. To evaluate the solution of linear homogeneous difference equations with constant coefficients.
4. To obtain numerical solutions to the algebraic and transcendental equations.
5. To obtain numerical solutions to the ordinary differential equations.

Course Outcomes

1. After studied unit -1, the student will be able to evaluate derivatives by applying Newton’s forward and backward differences formulae.
2. After studied unit -2, the student will be able to evaluate integrations by applying the trapezoidal rule, Simpson’s rules, and Weddle’s rule.
3. After studied unit -3, the student will be able to find a complete solution to linear difference equations.
4. After studied unit -4, the student will be able to estimate approximate numerical solutions of algebraic and transcendental equations.
5. After studied unit -5, the student will be able to estimate approximate numerical solutions of ordinary differential equations by Euler, Picard, Taylor, and Runge-Kutta methods.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	No	Yes	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

UNIT - I NUMERICAL DIFFERENTIATION

Newton’s forward and backward differences to compute derivatives-derivative using divided differences formula - maxima and minima using the above formulae.

UNIT - II NUMERICAL INTEGRATION

General Quadrature formula-Trapezoidal rule-Simpson’s one third rule- Simpson’s three-eight rule, Weddle’s rule- Euler-Maclaurin Summation Formula

UNIT - III DIFFERENCE EQUATIONS

Linear differences equations-Linear homogeneous difference equations with constant coefficients-Particular integrals for a^x , x^m , $\sin ax$, $\cos ax$ and $a^x f(x)$.

UNIT - IV SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection method - Iteration method - Regula-falsi method (False Position Method) - Newton-Raphson Method.

UNIT - V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (FIRST ORDER ONLY)

Euler's method- Euler's modified method-Picard's method - Taylor's methods-Runge-Kutta method (Fourth order only).

Text book: 1. B.D. Gupta.(2001) *Numerical Analysis*, Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering*, National Publishing Company, Chennai.

Books for Reference

1. Gupta, Malik, Calculus of finite differences and Numerical Analysis, Krishna Prakashan Media, Meerut Seventh Edition.
2. S.C.Saxena, Calculus of finite differences and Numerical Analysis, S.Chand & Co., New Delhi. IX Edition.
3. A.Singaravelu, Numerical methods, Meenakshi Publications-First Edition 1992.
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite Differences & Numerical Analysis, S.Chand & Company Ltd., New Delhi-55.

Course Material: website links, e-Books and e-journals

<https://ocw.mit.edu/courses/22-15-essential-numerical-methods-fall-2014/pages/syllabus/>

<https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	S	M	S	S
CO2	M	S	S	S	M	M	S	S	M	S
CO3	M	S	S	S	S	S	M	S	S	M
CO4	S	S	M	S	S	S	S	S	S	S
CO5	M	M	S	M	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

B.Sc. MATHEMATICS – 2022-2023 onwards

Semesters: I, II (or) III, IV

Paper type: Practical(Allied)

Paper code: A – 03 Name of the Paper: NUMERICAL METHODS

Credit:2

Total Hours per Week: 2

Lecture Hours:

Tutorial Hours: Practical Hours: 2

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LIST OF PROBLEMS

1. Derivatives by Newton's method
2. Gauss elimination method.
3. Gauss-Jacobi method.
4. Gauss-Seidel method.
5. Newton's forward and backward interpolation.
6. Lagrange interpolation.
7. Trapezoidal and Simpson one-third rules.
8. Euler's method.
9. Picard's method
10. Runge-Kutta's method.

401 - M.Sc. MATHEMATICS

(Applicable to the candidates admitted from the academic year 2022-2023 onwards)

COURSE CODE	STUDY COMPONENTS AND COURSE TITLE	HOURS /WEEK	CREDIT	MAXIMUM MARKS		
				CIA	ESE	TOTAL
SEMESTER - I						
22PMATC11	Core Theory-I: Advanced Abstract Algebra	6	4	25	75	100
22PMATC12	Core Theory-II: Advanced Real Analysis	6	4	25	75	100
22PMATC13	Core Theory-III: Ordinary Differential Equation	6	4	25	75	100
22PMATC14	Core Theory-IV: Optimization Technique	5	4	25	75	100
22PMATE15	Core Elective I	4	4	25	75	100
22PMATO16	Open Elective I	3	3	25	75	100
TOTAL		30	23			600
SEMESTER - II						
22PMATC21	Core Theory-V: Advanced Linear Algebra	6	4	25	75	100
22PMATC22	Core Theory-VI: Measure Theory and Integration	6	4	25	75	100
22PMATC23	Core Theory-VII: Partial Differential Equation	6	4	25	75	100
22PMATC24	Core Theory-VIII: Classical Dynamics	6	4	25	75	100
22PMATE25	Core Elective II	4	4	25	75	100
22PHUMR27	Compulsory Course: Human Rights	2	2	25	75	100
TOTAL		30	22			600

List of Core Electives (Choose any one out of three given in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	TOTAL
I	22PMATE15-1	Fuzzy Sets and Applications	4	4	25	75	100
	22PMATE15-2	Mathematical Statistics	4	4	25	75	100
	22PMATE15-3	Wavelets	4	4	25	75	100
II	22PMATE25-1	Number Theory and Cryptography	4	4	25	75	100
	22PMATE25-2	Formal Languages and Automata Theory	4	4	25	75	100
	22PMATE25-3	Differential Geometry	4	4	25	75	100

List of Open Electives (Choose 1 out of 3 in each semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	TOTAL
I	22PMATO16-1	Basic Mathematics	3	3	25	75	100
	22PMATO16-2	Mathematical Foundations	3	3	25	75	100
	22PMATO16-3	Latex	3	3	25	75	100

SEMESTER: I PART: COREI	COURSE CODE: 22PMATC11 COURSE TITLE:ADVANCED ABSTRACT ALGEBRA	CREDITS: 4 HOURS: 6
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COURSE OBJECTIVE

- 1) To learn the importance of Sylow's Theorems
- 2) To learn the basic concepts of Direct Products and ideas of polynomials
- 3) To attain depth knowledge about the algebraic structure of extension fields
- 4) To provide the use of Galois theory in discussing the existence of roots of the polynomials
- 5) To learn about finite fields and important theorem related to division rings.

UNIT – I (Group Theory)

Hours: 18

Another Counting Principle – 1st, 2nd and 3rd parts of Sylow's Theorem – Double coset – the normalizer of a group.

UNIT – II (Group theory and Ring Theory)

Hours: 18

Direct Products – Finite Abelian groups –Polynomial Rings.

UNIT – III (Ring Theory and Fields)

Hours: 18

Polynomial Rings Over the Rational field – Extension Fields – Roots of Polynomial.

UNIT – IV (Fields)

Hours: 18

More About Roots – The Elements of Galois Theory.

UNIT – V (Finite fields)

Hours: 18

Solvability by Radicals – Finite Fields.

TEXT BOOK:

I.N. Herstein, Topics in Algebra, 2nd Edition. John Wiley and Sons, New Delhi, 1999.

UNIT – I– Chapter II (Sections: 2.11 and 2.12)

UNIT – II – Chapter II(Sections: 2.13 and 2.14)

Chapter III (Section: 3.9)

UNIT – III– Chapter III (Section: 3.10)

Chapter V (Sections: 5.1 and 5.3)

UNIT – IV– Chapter V (Sections: 5.5 and 5.6)

UNIT – V– Chapter V (Section: 5.7)

Chapter VII (Section: 7.1)

Text Books

- 1) D.S.Dummit and R.M. Foote, Abstract Algebra. Wiley 2003.
- 2) M.Artin, Algebra, Prentice Hall of India, New Delhi, 1991.
- 3) I.S. Luther and I.B.S. Passi,Algebra, Vol. 1 – Groups (1996), Vol. 2 Rings,Narosa Publishing House, New Delhi 1999.
- 4) V.K. Khanna and S.K. Bhambri, A First Course in Abstract Algebra, Vikas Publishing House Pvt Limited, 1993.

COURSE OUTCOMES:

At the end of the course, the student will be able

- 1) To find the number of Sylow sub groups.
- 2) To find the number of non-Isomorphic Abelian groups.
- 3) To understand fields and roots of polynomials.
- 4) To find the splitting field, Galois group of the given polynomial.
- 5) To check whether the given polynomial is solvable by radicals or not.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	3	2
CO3	2	3	3	3	3
CO4	3	2	3	3	3
CO5	2	3	3	3	2

SEMESTER: I PART: CORE II	COURSE CODE: 22PMATC12 COURSE TITLE: ADVANCED REAL ANALYSIS	CREDIT:4 HOURS: 6
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COURSE OBJECTIVES

- 1) To give the students a thorough knowledge of real valued functions and their properties.
- 2) To discuss the concepts of Riemann –stieltjes integral and its properties.
- 3) To develop the concept of analysis in abstract situations.

Unit – I

Hours: 18

Functions of bounded variation – properties of monotonic functions, functions of bounded variation, total variation, additive property of total variation, total variation on (a,x) as a function of x , functions of bounded variation expressed as the difference of increasing functions, continuous functions of bounded variation, Riemann – stieltjes integral, the definition of the Riemann-stieltjes integral, linear properties, integration by parts.

Unit – II

Hours: 18

Riemann stieltjes integral – change of variable in a Riemann-stieltjes integral, reduction to a Riemann integral, step functions as a integrators, reduction of a Riemann stieltjes integral to a finite sum, Euler’s summation formula, monotonically increasing integrators, upper and lower integrals, additive and linearity properties of upper and lower integrals, Riemann’s condition, comparison theorems, integrators of bounded variation- sufficient and necessary conditions for existence of Riemann-stieltjes integral-, mean value theorems for Riemann-stieltjes integrals.

Unit - III

Hours: 18

Sequence of functions- definition of uniform convergence- uniform convergence and continuity- the Cauchy condition for uniform convergence- uniform convergence of infinite series of functions- a space filling curve- uniform convergence and Riemann – stieltjes integration- nonuniformly convergent sequences that can be integrated term by term- uniform convergence and differentiation- sufficient conditions for uniform convergence of a series – uniform convergence and double sequences- mean convergence – power series- multiplication of power series.

Unit - IV

Hours: 18

Multivariable differential calculus- the directional derivative- directionanal derivatives and continuity- the total derivative- the total derivative expressed in terms of partial derivatives- an application to complex-valued functions- the matrix of a linear function- the jacobian matrix- the chain rule- matrix form of the chain rule- the mean value theorem for differentiable functions- a sufficient condition for differentiability.

Unit - V**Hours: 18**

Implicit functions and extremum problems- functions with nonzero jacobian determinant- the inverse function theorem- the implicit function theorem- extrema of real-valued functions of one variable- extrema of real-valued functions of severable variables.

Text Books

Tom.M.Apostol,, Mathematical Analysis, Narosa publishing house, 1974.

- Unit - I** - Chapter 6, Sections 6.1 to 6.8
 Sections 7.1 to 7.5
- Unit - II** - Chapter 7 Sections 7.6 to 7.18
- Unit - III** - Chapter 9 Sections 9.3 to 9.15
- Unit - IV** - Chapter 12 Sections 12.1 to 12.12
- Unit - V** - Chapter 13 Sections 13.1 to 13.6

Supplementary Reading:

- 1) Royden, Real Analysis, MacMillan Publishing Company, New York, 1968.
- 2) Walter Rudin, Principles of mathematical analysis, McGraw-Hill international book Company, New Delhi, 2013.

COURSE OUTCOMES

Our successful completion of this course, students will be able to

- 1) Demonstrate an understanding the theory of function of bounded variations, sequence Of functions, Riemann-stieltjes integrals.
- 2) To apply the theory in the course to solve a variety of problems at an appropriate Level of difficulty.
- 3) Demonstrate skills in constructing rigorous mathematical analysis.
- 4) The student will gain confidence in proving theorems and solving problems.
- 5) Student will understand the generalized concept of Differential Calculus.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	3	2	3	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3

SEMESTER: I PART: CORE III	COURSE CODE: 22PMATC13 COURSE TITLE: ORDINARY DIFFERENTIAL EQUATIONS	CREDIT:4 HOURS:6
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COURSE OBJECTIVES

1.To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also singular points.

2.To study existence and uniqueness of the solutions of first order differential equations.

UNIT-I : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Second order homogeneous equations, Initial value problems, Linear dependence and independence, Wronskian and a formula for Wronskian Non-homogeneous equation of order two. (18 Hours)

UNIT-II : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Homogeneous and non-homogeneous equation of order n, Initial value problem, Annihilator method to solve non-homogeneous equation, Algebra of constant coefficient operators. (18 Hours)

UNIT-III : LINEAR EQUATIONS WITH VARIABLE COEFFICIENTS

Initial value problems, Existence and uniqueness theorems, solutions to solve a homogeneous equation, Wronskian and linear dependence, reduction of the order of a non- homogeneous equation, homogeneous equation with analytic coefficients, The Legendre equation. (18 Hours)

UNIT-IV : LINEAR EQUATIONS WITH REGULAR SINGULAR POINTS

Euler equation, Second order equations with regular singular points, Bessel Function. (18 Hours)

UNIT-V : EXISTENCE AND UNIQUENESS OF SOLUTIONS TO FIRST ORDER EQUATIONS

Equation with variable separated, Exact equation , method of successive approximations, the Lipschitz condition , convergence of the successive approximations and the existence theorem. (18 Hours)

COURSE OUTCOMES

After successful completion of the course the student will be able to:

- 1) Understand the concept of Wronskian formula;
- 2) Understand the concept of initial value problems;
- 3) Understand the concept of Existence and uniqueness theorems;
- 4) Understand the Bessel Function;
- 5) Understand the Lipschitz condition;

Text book

- 1) E.A.Coddigton, An introduction to ordinary differential equations (3rd reprint) Prentice-Hall of India Ltd., New Delhi, 1987.

Supplementary Readings

- 1) George F Simmons, Differential Equations with applications and historical notes, Tata McGraw Hill, New Delhi, 1974.

- 2) N.N.Lebedev, Special functions and their applications, Prentice-Hall of India Ltd., New Delhi, 1965.
- 3) W.T.Reid, Ordinary Differential Equations , John Wiley and sons, New York, 1971.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	2	2	3	3	3
CO4	3	3	3	2	3
CO5	2	3	3	3	2

SEMESTER: I PART: CORE IV	COURSE CODE: 22PMATC14 COURSE TITLE: OPTIMIZATION TECHNIQUES	CREDIT: 4 HOURS: 5
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COURSE OBJECTIVES

- 1) To enlighten the students in the field of operations research.
- 2) To help the students to apply OR techniques in business and management problems.
- 3) To provide a mathematical programming for finding applications in diverse fields Including engineering, computer science and economics.

Unit – I

Hours:15

Integer programming algorithms –Branch and bound algorithm-cutting plane algorithm-computational considerations in ILP – travelling salesman problem – heuristic algorithms – B & B solution algorithm – cutting plane algorithm.

Unit – II

Hours:15

Dynamic programming – Recursive nature of computations in DP – forward and backward recursion – knapsack/fly away/cargo – loading model – work force size model – equipment replacement model – investment model – inventory model.

Unit – III

Hours:15

Decision analysis and Games – Decision making under certainty – analytic hierarchy process – decision making under risk – decision tree – based expected value criterion – variations of the expected value criterion – decision under uncertainty – game theory – optimal solution of two person zero sum games – solutions of mixed strategy games.

Unit – IV

Hours:15

Classical optimization theory – unconstrained problems – necessary and sufficient conditions – the newton raphson method – constrained problems – equality constraints – inequality constraints – karush Kuhn tucker conditions

Unit – V

Hours:15

Non-Linear Programming algorithms – unconstrained algorithms – direct search method – gradient method – constrained algorithms – seperable programming – quadratic programming.

Text Books

Hamdy A. Taha, Operations Research (8th Edn.), McGraw Hill Publications, New Delhi, 2006.

- Unit - I** - Chapter 9, Sections 9.2.1 to 9.2.3, 9.3.1 to 9.3.3
- Unit - II** - Chapter 10, Sections 10.1 to 10.3, 10.3.1 to 10.3.5
- Unit - III** - Chapter 13, Sections 13.1, 13.2, 13.2.1, 13.2.2, 13.3, 13.4, 13.4.1, 13.4.2.
- Unit - IV** - Chapter 18, Sections 18.1, 18.1.1, 18.1.2, 18.2, 18.2.1, 18.2.2.
- Unit - V** - Chapter 19, Sections 19.1, 19.1.1, 19.1.2, 19.2, 19.2.1, 19.2.2

Supplementary Readings

- 1) O.L. Mangasarian, Non Linear Programming, McGraw Hill, New York.
- 2) Mokther S. Bazaraa and C.M. Shetty, Non Linear Programming, Theory and Algorithms, Willy, New York.
- 3) Prem Kumar Gupta and D.S. Hira, Operations Research : An Introduction, S. Chand and Co., Ltd. New Delhi.
- 4) S.S. Rao, Optimization Theory and Applications, Wiley Eastern Limited, New Delhi.

COURSE OUTCOMES

On successful completion of the course, the student will be able to,

- 1) Ability to apply the theory of optimization methods and algorithms to develop and For solving various types of optimization problems.
- 2) Ability to go in research by applying optimization techniques in real value problems
- 3) Analyze decision making under certainty and uncertainty by game theory.
- 4) Understand unconstrained and constrained optimization problems.
- 5) Understand Non-Linear programming problems.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	3	2
CO3	2	3	3	3	3
CO4	3	2	3	3	3
CO5	2	3	3	3	2

	CORE CODE:22PMATE15-1 COURSE TITLE: FUZZY SUBSETS AND APPLICATIONS	
SEMESTER – I		HRS/WK – 4
PART: CORE ELECTIVE– 1		CREDITS – 4

COURSE OBJECTIVES

Familiarize the students with the fundamentals of fuzzy sets, operations on these sets and concept of membership function. Familiar with fuzzy relations and the properties of these relations .To know the concept of a fuzzy number and how it is defined. Become aware of the use of fuzzy inference systems in the design of intelligent systems

Unit I: Fuzzy Sets (12 Hours)

Fuzzy sets – Basic types – basic concepts – Characteristics – Significance of the paradigm shift – Additional properties of α -cuts.

Chapter 1: 1.3 - 1.5 and Chapter 2: 2.1

Unit II: Fuzzy sets versus CRISP sets (12 Hours)

Representation of fuzzy sets – Extension principle of fuzzy sets – Operation on fuzzy sets – Types of operation – Fuzzy Complements.

Chapter 2: 2.2 - 2.3 and **Chapter 3:** 3.1 - 3.2

Unit III: Operations on Fuzzy sets (12 Hours)

Fuzzy intersection – t-norms, fuzzy unions – t-conorms – Combinations of operations – Aggregation operations.

Chapter 3: 3.3 - 3.6

Unit IV: Fuzzy Arithmetic (12 Hours)

Fuzzy numbers – Linguistic variables – Arithmetic operation on intervals – Lattice of fuzzy numbers.

Chapter 4: 4.1 - 4.4

Unit V: Constructing Fuzzy Sets (12 Hours)

Methods of construction on overview – direct methods with one expert – direct method with multiple experts – indirect method with multiple experts and one expert – Construction from sample data.

Chapter 10: 10.1 - 10.7.

COURSE OUTCOME

At the completion of the Course, the Students will able to

- 1) Understand the concepts of Fuzzy sets and its types – Characteristics – Significance of the paradigm shift.
- 2) Be able to distinguish between the crisp set and fuzzy set concepts through the learned differences between the crisp set characteristic function and the fuzzy set membership function.

- 3) To know Fuzzy intersection – t-norms, fuzzy unions – t-conorms. Combinations of operations – Aggregation operations.
- 4) Apply the concept of a fuzzy number and apply in real world problems.
- 5) Student practice to construct various methods of fuzzy sets using sample data.

Text Book:

- 1) G.J Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic: Theory and Applications, Prentice Hall of India Ltd, New Delhi, 2005.

Supplementary Readings

- 1) H.J Zimmernann, Fuzzy Set Theory and its Applications, Allied Publishers, Chennai, 1996.
- 2) A.Kaufman, Introduction to the Theory of fuzzy subsets, Academic press, New York, 1975.
- 3) V.Novak, Fuzzy Sets and Their Applications, Adam Hilger, Bristol, 1969.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	3	2	3	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3

SEMESTER: I	COURSE CODE: 22PMATE15 – 2	CREDIT: 4
PART: CORE ELECTIVE -2	COURSE TITLE: MATHEMATICAL STATISTICS	HOURS: 4

COURSE OBJECTIVES

- 1) To study random variables and its applications.
- 2) To explore probability distributions.
- 3) To understand moments and their functions.
- 4) To introduce significance tests.
- 5) Concepts of ANOVA

Unit I: Random Variables

Hours: 12

The concepts of random variables – The distribution function – Random variable of the discrete type and the continuous type – Functions of random variables – Marginal distributions – Conditional distributions – Independent random variables.

Unit II: Some Probability Distributions

Hours: 12

The Binomial Distribution – The Poisson Distribution – The Uniform Distribution – The Normal Distribution – The Gamma Distribution – The Beta Distribution.

Unit III: Sample Moments and Their Functions

Hours: 12

Notion of a sample and a statistic - Distribution of the arithmetic mean of independent normally distributed random variables – The χ^2 -distribution – The distribution of the statistics (\bar{X}, S) – Student's t - distribution - Fisher's Z - distribution.

Unit IV: Significance tests

Hours: 12

Concept of a statistical test – Parametric tests for small samples and large samples - χ^2 test - Tests of Kolmogorov and Smirnov type – Independence Tests by contingency tables.

Unit V: Analysis of Variance

Hours: 12

One-way Classification and two-way Classification. **Hypotheses Testing:** The Power functions and OC function – Most Powerful test – Uniformly most powerful test – unbiased tests.

COURSE OUTCOMES

After completion of this course the student will be able to

- 1) Apply the concepts of random variables in real life situations.
- 2) Identify the type of statistical situation to which different distributions can be applied.
- 3) Calculate moments and their functions.
- 4) Explore knowledge in the various significance tests for statistical data.
- 5) Analyze statistical data using ANOVA.

Text Book (In API Style)

- 1) M. Fisz , Probability Theory and Mathematical Statistics, John Wiley and sons, New Your, 1967.

Supplementary Readings

- 1) E.J. Dudewicz and S.N. Mishra , Modern Mathematical Statistics, John Wiley and Sons, New York, 1988.
- 2) V.K.Rohatgi An Introduction to Probability Theory and Mathematical Statistics,
3) Wiley Eastern New Delhi, 1988(3rd Edn).
- 4) B.L.Vander Waerden, Mathematical Statistics, G.Allen & Unwin Ltd., London, 1968.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	3
CO3	2	2	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	2

SEMESTER: I PART: CORE ELECTIVE- 3	CORE CODE: 22PMATE15-3 COURSE TITLE: WAVELETS	CREDIT: 4 HOURS: 4
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COURSE OBJECTIVES

- 1) To introduce the basic notions and techniques of Wavelets Theory.
- 2) To establish the Concepts to understand and use wavelets from Fourier to wavelet analysis.

Unit I : AN OVERVIEW Hours: 12

Fourier analysis to wavelet analysis - Integral Wavelet Transform and Time-frequency analysis - Inversion formulas and duals - Classification of Wavelets – Multiresolution analysis - Splines and Wavelets – Wavelet decompositions and reconstructions.

Chapter 1: Sections 1.1 to 1.6

Unit II : FOURIER ANALYSIS Hours: 12

Fourier and Inverse Fourier Transforms – Continuous-time convolution and the delta function - Fourier Transform of square-integrable functions- Fourier Series - Basic Convergence Theory - Poisson Summation Formula.

Chapter 2: 2.1 and 2.5

Unit III : WAVELET TRANSFORMS AND TIME FREQUENCY ANALYSIS Hours: 12

The Gabor Transform – Short-time Fourier Transforms and the uncertainty principle - The integral Wavelet Transform - Dyadic Wavelets and Inversions - Frames - Wavelet Series.

Chapter 3: Section 3.1 to 3.6

Unit IV : CARDINAL SPLINE ANALYSIS Hours: 12

Cardinal Spline spaces. – B-Splines and their basic properties - The two-scale relation and an interpolatory graphical display algorithm - B-Net representations and computation of cardinal splines - Construction of cardinal splines - construction of spline application formulas - Construction of Spline interpolation formulas.

Chapter 4: Sections 4.1 to 4.6

Unit V: SCALING FUNCTIONS AND WAVELETS Hours: 12

Multiresolution analysis - Scaling functions with finite two scale relations – Direction sum Decompositions of $L^2(\mathbb{R})$ - Wavelets and their duals.

Chapter 5: Sections 5.1 to 5.4

COURSE OUTCOMES

On successful completion of the course, the students will be able to

- 1) Understand the terminologies that are used in the wavelets, from Fourier analysis to wavelet analysis.
- 2) Determine the concepts of the Fourier and Inverse Fourier Transforms.
- 3) know the Wavelet Transforms and Time Frequency Analysis.
- 4) Learn the concepts on Cardinal Spline Analysis.
- 5) Study the Scaling Functions and Wavelets theory.

Text Books

- 1) Charles K.Chui , An Introduction to Wavelets, Academic Press, New York, 1992.

Supplementary Readings

- 1) Chui. C.K. (ed) Approximation theory and Fourier Analysis, Academic Press Boston, 1991.
- 2) Daribeckies,I. Wavelets, CBMS-NSF Series in Appl.. math. SIAM. Philadelphia, 1992.
- 3) Schumaker,L.L. Spline Functions: Basic Theory , Wiley, New York 1981.
- 4) Nurnberger, G. Applications to Spline Functions, Springer Verlag, New York. 1989.5. Walnut,D.F. Introduction to Wavelet Analysis, Birhauser, 2004.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	2	2	3	3	3
CO4	3	3	3	2	3
CO5	2	3	3	3	2

SEMESTER: II PART: CORE V	COURSE CODE: 22PMATC21 COURSE TITLE: ADVANCED LINEAR ALGEBRA	CREDITS: 4 HOURS: 6
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COURSE OBJECTIVES

- 1) To aim learning the students to solve systems of linear equations using multiple methods, matrix operations including inverses
- 2) To establish basic properties of algebra of polynomials over a field
- 3) To apply principles of matrix algebra
- 4) To investigate determinant of matrices and its properties
- 5) To understand the canonical forms of matrices and its properties.

UNIT – I (Linear Equations and Vector Spaces) Hours: 18

Systems of Linear Equations – Matrices and Elementary Row Operations – Row-Reduced echelon Matrices – Matrix Multiplication - Invertible Matrices – Bases and Dimension of vector spaces.

UNIT – II (Linear Transformations) Hours: 18

The algebra of linear transformations – Isomorphism – Representation of Transformations by Matrices – Linear Functionals – The Double Dual – The Transpose of Linear Transformation.

UNIT – III (Polynomials) Hours: 18

The algebra of polynomials – Lagrange interpolation – Polynomials ideals – The prime factorization of a polynomial.

Determinants – Commutative rings – Determinant functions.

UNIT – IV (Determinants – Continued) Hours: 18

Permutations and the Uniqueness of determinants – Additional properties of determinants **Canonical forms** – Characteristic values – Annihilating polynomials.

UNIT – V (Canonical Forms – Continued) Hours: 18

Invariant subspaces – Simultaneous triangulation: Simultaneous Diagonalization – Direct sum Decompositions – Invariant Direct sums – The Primary Decomposition Theorem.

TEXT BOOK:

Kenneth M Hoffman and Ray Kunze, Linear Algebra, 2nd Edition, Prentice – Hall of India Private Limited, New Delhi, 1971.

UNIT – I – Chapter I (Sections: 1.2 to 1.6)

Chapter II (Section: 2.3)

UNIT – II – Chapter III (Sections: 3.2 to 3.7)

UNIT – III – Chapter IV (Sections: 4.1 to 4.5)

Chapter V (Sections: 5.1 and 5.2)

UNIT – IV – Chapter V (Sections: 5.3 and 5.4)

Chapter VI (Sections: 6.1 to 6.3)

UNIT – V – Chapter VI (Sections: 6.4 to 6.8)

Text Books:

- 1) I.N. Herstein, Topics in Algebra, John Wiley & Sons 2nd Edition New Delhi, Third Reprint, 2007.
- 2) Rao, A.R. and Bhimasankaram, P, Linear Algebra, 2nd Edition, TRIM series 19, Hindustan Book Agency, 2000.
- 3) Charles W. Curtis, Linear Algebra, – An Introductory Approach by Springer, 1984.
- 4) W. Keith Nicholson, Linear Algebra with Applications, 5th Edition, Mc Graw Hill, 2006.

COURSE OUTCOMES:

Students will be introduced to and have the knowledge of many mathematical concepts, Examples and Counter Examples, Proof Techniques and Problem Solving studied in Linear Algebra such as

- 1) Systems of linear equations
- 2) The algebra of linear Equations
- 3) The algebra of Polynomials
- 4) Determinant functions
- 5) Diagonalization, Decompositions.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	3	2	3	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3

SEMESTER: II PART: CORE VI	COURSE CODE: 22PMATC22 COURSE TITLE: MEASURE THEORY and INTEGRATION	CREDIT: 4 HOURS: 6
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Learning Objectives(LO):

- 1) To generalize the concept of integration using measures.
- 2) To develop the concept of analysis in abstract situations.
- 3) To discuss convergence in measure and properties of L^p Space.

Unit – I

Hours: 18

Measure on Real line – Lebesgue outer measure – Measurable sets – Regularity – Measurable function – Borel and Lebesgue measurability.

Unit – II

Hours: 18

Integration of non-negative functions – The General integral – Integration of series – Riemann and Lebesgue integrals.

Unit - III

Hours: 18

Abstract measure spaces – Measures and outer measures – Extension of a measure – Uniqueness of the extension – Completion of a measure – Measure spaces – Integration with respect to a measure.

Unit - IV

Hours: 18

Convergence in measure – Almost uniform convergence – Signed measures and Halin decomposition – The Jordan decomposition.

Unit - V

Hours: 18

Measurability in a product space – The product measure and Fubini's Theorem.

Text Book:

G.De Barra, Measure Theory and Integration, New age international (P) Limited, 2005.

- Unit - I** - Chapter II: Sections 2.1 to 2.5
- Unit - II** - Chapter III: Sections 3.1 to 3.4
- Unit - III** - Chapter V: Sections 5.1 to 5.6
- Unit - IV** - Chapter VII: Sections 7.1 and 7.2,
Chapter VIII: Sections 8.1 and 8.2
- Unit - V** - Chapter X: Sections 10.1 and 10.2

Supplementary Reading:

- 1) Royden, Real Analysis, MacMillan Publishing Company, New York, 1968.
- 2) V. Ganapathy Iyer, Mathematical Analysis, Tata McGraw Hill Publication Co. Ltd., New Delhi, 1977.
- 3) P.R. Halmos, Measure Theory, Van Nostrand Princeton, New Jersey, 1950.
- 4) Michael E. Taylor, Measure Theory and Integration by Graduate Studies in Mathematics, Volume 76, American Mathematical Society, Indian Edition, 2006.

Course Outcomes(CO):

Students will be able to get knowledge of many mathematical concepts

- 1) Examples and counter examples
- 2) Problem solving techniques
- 3) Understand the fundamental studies in measurable sets, measurable functions and convergence in measure.
- 4) Student will understand the generalized concept of convergence in measure.
- 5) Student will understand the measurability in a product space.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	2	2	3	3	3
CO4	3	3	3	2	3
CO5	2	3	3	3	3

SEMESTER: II PART: CORE VII	COURSE CODE: 22PMATC23 COURSE TITLE: PARTIAL DIFFERENTIAL EQUATIONS	CREDIT:4 HOURS:6
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COURSE OBJECTIVES

- 1) To introduce to the students the various types of partial differential equations.
- 2) How to solve the partial differential equations.

UNIT – I : PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER

Formation and solution of PDE, Integral surfaces, Cauchy problem order equation, orthogonal surfaces, First order non-linear, characteristics, compatible system, Charpits method. (18 Hours)

UNIT – II : FUNDAMENTALS

Introduction, Classification of second order PDE, Canonical forms, Adjoint operators, Riemann's method. (18 Hours)

UNIT – III : ELLIPTIC DIFFERENTIAL EQUATIONS

Derivation of Laplace and Poisson equation, BVP, Separation of variables, Dirichlet's problem and Neumann problem for a rectangle, solution of Laplace equation in Cylindrical and Spherical coordinates, Examples. (18 Hours)

UNIT – IV : PARABOLIC DIFFERENTIAL EQUATIONS

Formation and solution of Diffusion equation, Dirac- Delta function, Separation of variables method, solution of Diffusion equation in Cylindrical and Spherical coordinates, Examples. (18 Hours)

UNIT – V : HYPERBOLIC DIFFERENTIAL EQUATIONS

Formation and solution of one-dimensional wave equation, canonical reduction, IVP, D'Alembert's solution, IVP and BVP for two-dimensional wave equation, Periodic solution of one-dimensional wave equation in Cylindrical and Spherical coordinate systems, Uniqueness of the solution for the wave equation, Duhamel's Principle, Examples. (18 Hours)

COURSE OUTCOMES

On successful completion of the course, the student will be able to:

- 1) Solve various types of first order PDE.
- 2) Solve various types of second order PDE.
- 3) Solve Elliptic differential equation.
- 4) Solve Parabolic differential equation.
- 5) Solve Hyperbolic differential equation

Text book

- 1) K.Sankar Rao, Introduction to Partial Differential Equations, 2nd Edition, Prentice Hall of India, New Delhi, 2005.

Supplementary Readings

- 1) R.C.McOwen, Partial Differential Equations, 2nd Edition Pearson Education, New Delhi, 2005.
- 2) I.N.Sneddon, Elements of Partial Differential Equations, McGraw Hill, New Delhi, 1983.
- 3) R.Dennemeyer, Introduction to Partial Differential Equations and Bounded Value Problems, McGraw Hill, New York, 1968.
- 4) M.D.Raisinghania, Advanced Differential Equations, S.Chand & Company Ltd, New Delhi, 2001.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	3	2
CO3	2	3	3	3	3
CO4	3	2	3	3	3
CO5	2	3	3	3	2

SEMESTER: III PART: CORE VIII	COURSE CODE: 22PMATC34 COURSE TITLE:CLASSICAL DYNAMICS	CREDIT:4 HOURS: 6
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COURSE OBJECTIVES

- 1) Classical mechanics afford the student an opportunity to master many of mathematics techniques.
- 2) It is certainly true that classical mechanics today is far from being a closed subject.
- 3) Alternate means exist in the curriculum for acquiring the mathematics needed in other branches
- 4) To give a details knowledge about the mechanical system of particles, applications of Lagrange's equations and Hamilton's equations as well as the theory of Hamilton Jacobi Theory.

Unit I : INTRODUCTORY CONCEPTS

Hours: 18 Hrs

The mechanical systems - Generalized Coordinates-Constraints -Virtual work - Principle of virtual work - D'Alemberts principle - Examples - Generalized force - Example.

Unit II: LAGRANGE'S EQUATIONS

Hours: 18 Hrs

Derivation of Lagrange's Equations - Examples -Integral of the motion - Ignorable coordinates - the Routhian function - example - Liouville's system - examples.

Unit III: SPECIAL APPLICATIONS OF LAGRANGE'S EQUATIONS

Hours: 18 Hrs

Rayleigh's Dissipation Function - impulsive motion - Gyroscopic systems - small motions - Gyroscopic stability - examples.

Unit IV: HAMILTON'S EQUATIONS

Hours: 18 Hrs

Hamilton's principle - Hamilton's equations - other variational principles - Principle of least action - example.

Unit V: Hamilton-Jacobi Theory

Hours: 18 Hrs

Hamilton's Principal function - the canonical integral - Pfaffian forms - The Hamilton-Jacobi Equation - Jacobi's theorem - example.

COURSE OUTCOMES

- 1) Be able to solve the Lagrange's equations for simple configurations using various methods
- 2) Be able to understand the concept of Hamilton Jacobi Theory.
- 3) Be able to understand the concept canonical Transformations
- 4) To develop skills in formulating and solving physics problems
- 5) Able to get idea of dynamical systems are of relatively recent origin, the concept of motion in phase- space and its geometrical depiction is simple

Text Books

Donald T. Greenwood, Classical Dynamics, PHI Pvt. Ltd., New Delhi, 1985.

Unit I - Chapter I: Sections 1.1 to 1.5

Unit II - Chapter II: Sections : 2.1-2.4

Unit III - Chapter III: Sections: 3.1,3.2 and 3.4 (3.3 Omitted)

Unit IV - Chapter IV: Sections: 4.1-4.4

Unit V - Chapter V: Sections: 5.1-5.3

Supplementary Readings(Reference Books)

- 1) John L. Synge, Byron A. Griffith, Principles of Mechanics, Third Edition, McGraw-Hill Book, New York, 1959.
- 2) Herbert Goldstein, Charles P. Poole, John L. Safko, Classical Mechanics, Addison-Wesley Press Inc., 2002.
- 3) Narayan Chandra Rana & Promod Sharad Chandra Joag, Classical Mechanics, Tata McGrawHill, 1991.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	3	2	3	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3

SEMESTER – II CORE ELECTIVE –1	CORE CODE: 22PMATE25-1 COURSE TITLE: NUMBER THEORY AND CRYPTOGRAPHY	HRS/WK – 4 CREDIT – 4
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COURSE OBJECTIVES

The course aim is to introduce the concept divisibility and Euclidean algorithm, quadratics residues and reciprocity, encryption and decryption, primality test.

UNIT-1: INTRODUCTION TO NUMBER THEORY (12 HOURS)

The estimates for doing arithmetic-Divisibility and the Euclidean algorithm-Congruences-Model exponentiation-Some applications to factoring.

Chapter 1,Sections: 1.1,1.2,1.3,1.4

UNIT-2: QUADRATIC RESIDUES AND RECIPROCITY (12 HOURS)

Finite Fields-Multiplication generators-Uniqueness of fields with prime power elements-Quadratic residues and reciprocity.

Chapter 2, Sections: 2.1,2.2

UNIT-III : CRYPTOSYSTEMS (12 HOURS)

Some simple crypto systems- Digraph transformation-Enciphering Matrices-Affine enciphering transformation RSA- Discrete log- Diffie-Hellman Key exchange-The massey-Omura cryptosystem-Digital signature standard-Computation of discrete log.

Chapter 3,Sections: 3.1,3.2

UNIT-IV : PRIMALITY AND FACTORING-I (12 HOURS)

Pseudoprimes- Strong pseudo primes- Solovay- Strassen primality test- Miller- Rabin test- Rho method-Fermat factoring and factor bases- Quadratic sieve method.

Chapter 5,Sections:5.1,5.2,5.3

UNIT-V: PRIMALITY AND FACTORING-II (12 HOURS)

Elliptic curves-Elliptic curve primality test – Elliptic curve factoring –pollard’s p-1 method – Elliptic curve reduction modulo n – Lenstras method.

Chapter 6,Sections: 6.1,6.3,6.4

COURSE OUTCOMES

- 1) Students able to understand the divisibility and Euclidean algorithm.
- 2) Students able to understand quadratics residues and reciprocity.
- 3) Students able to analyse encryption and decryption.
- 4) Students able to do the primality test.
- 5) Students able to the determine the elliptic curve primality test.

Text books

- 1) Neal Koblitz, "A course in number theory and cryptography", 2nd Edition, Springer-Verlag, 1994.

Supplementary Readings

- 1) Menezes A, " Van Oorschot and Vanstone S.A, Hand book of applied cryptography", CRC press, 1996.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	2	2	3	3	3
CO4	3	3	3	2	3
CO5	2	3	3	3	2

SEMESTER: II PART: CORE ELECTIVE-2	COURSE CODE: 22PMATE25-2 COURSE TITLE: FORMAL LANGUAGES and AUTOMATA THEORY	CREDIT: 4 HOURS: 4
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COURSE OBJECTIVES

- 1) Identify the role of switch as simple nontrivial finite automaton
- 2) Describe states, deterministic and nondeterministic nature of transition
- 3) Differentiate various languages and the corresponding Machines which accepts them
- 4) Ascertain the limitations of automaton

Unit I: Introduction to the theory of computation: Three basic concepts. Hours: 12

Finite automata: Deterministic Finite Accepters – Nondeterministic Finite Accepters – Equivalence of deterministic and nondeterministic finite accepters – Reduction of the number of states in finite automata.

Chapter 1 (1.2)

Chapter 2 (2.1 – 2.4)

Unit II: Regular Languages and Regular Grammars:

Hours: 12

Regular Expressions-Connection between Regular Expressions and Regular Languages – Regular Grammars.

Chapter 3 (3.1 – 3.3)

Unit III: Properties of Regular Languages:

Hours: 12

Closure properties of Regular Languages – Elementary questions about regular languages – identifying non-regular languages.

Chapter 4 (4.1 – 4.3)

Unit IV:

Hours: 12

Context Free Languages: Context Free Grammars (CFG).

Simplification of CFG and Normal Forms: Methods for transforming Grammars-Two important

Normal Forms.

Chapter 5 (5.1)

Chapter 6 (6.1, 6.2)

Unit V:

Hours: 12

Pushdown Automata: Nondeterministic pushdown automata – Pushdown Automata and CFL

Deterministic Pushdown Automata and Deterministic CFL.

Properties of CFL: Two Pumping Lemmas. **Turing Machines:** The Standard Turing Machines.

Chapter 7 (7.1 –7.3)

Chapter 8 (8.1)

Chapter

COURSE OUTCOMES

- 1) Formulate grammar which produces a language
- 2) Identify an automaton which accepts a given language
- 3) Formulate automaton from grammar
- 4) Critically analyze the relationship between grammar, language and automaton
- 5) Student understand the pushdown Automata and CFL.

Text Books

Contents and treatment as in

An introduction to Formal Languages and Automata by Peter Linz, 4th edition (2006), Narosa.

Supplementary Readings (Reference Books)

- 1) Introduction to Automata Theory, Languages, and Computation by John E.Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, 3rd edition, Prentice Hall.
- 2) A Course in Formal Languages , Automata and Groups by Ian M.Chiswell,1st Edition,(2009), Springer
- 3) Introduction to Languages and the Theory of Computation by John C Martin, 4th edition(2010), McGraw-Hill.
- 4) Introduction to Formal Languages, Automata Theory and Computation by Kamala Krithivasan and Rama R, (2009),Pearson.
- 5) Formal Languages and Automata by Rani Siromoney(1979), The Christian Literature Society.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	2	2	3	3	3
CO4	3	3	3	2	3
CO5	2	3	3	3	2

SEMESTER: II PART: CORE ELECTIVE -3	COURSE CODE:22PMATE25-3 COURSE TITLE: DIFFERENTIAL GEOMETRY	CREDIT: 4 HOURS: 4
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COURSE OBJECTIVES

- 1) To introduce space curves , surfaces ,curves on surfaces ,and study some of their properties.
- 2) To study the notion of geodesics and its properties.
- 3) To understand some type of special surfaces such as developables and minimal surfaces.

UNIT-I : Space curves

Space curves, Arc length, Tangent, normal and binormal, curvature torsion of a curve given as the intersection of two surfaces, Contact between curves and surfaces. (12 Hours)

UNIT-II: Space curves (continued)

Tangent surface, involutes and evolutes, Intrinsic equations, Fundamental existence theorem for space curves, Helices, Definition of a surface, Curves on a surface, Surface of revolution. (12 Hours)

UNIT-III : Metric

Metric, Direction coefficients, Geodesics, Canonical geodesic equations, Normal property of geodesics, Geodesic curvature, Gauss-Bonnet Theorem. (12 Hours)

UNIT-IV : Metric (continued)

Gaussian curvature, Surface of constant curvature, Principal curvature, Lines of curvature, Conformal mapping, Dini's theorem, Tissot's theorem. (12 Hours)

UNIT-V : Second Fundamental form

Second fundamental form, Developables, Developables associated with space curves and with curves on surfaces, Minimal surfaces, Ruled surfaces, Compact surfaces whose points are umbilics, Hilbert's lemma, Compact surface of constant curvature. (12 Hours)

COURSE OUTCOMES

- 1) Understand the concept of a space curve in 3D and compute the curvature and torsion of space curves.
- 2) Understand the fundamental existence theorem.
- 3) Find geodesics equation on a surface.
- 4) Understand surfaces of constant curvature , Dini's and Tissot' theorems
- 5) Determine the second fundamental form, compact surface, Hilbert's lemma.

Text Books

- 1) Willmore.T.J. (1959). An Introduction to Differential Geometry, Oxford Univesity Press, New Delhi.

Supplementary Readings

- 1) Struik.D.T., (1950), Lectures on Classical Differential Geometry, Addison-Wesley Press.
- 2) Andrew Pressley, (2001), Elementary Differential Geometry, Springer.
- 3) Heinrich.W.Guggenheimer,(1977), Differential Geometry, Dover Publications, Inc., New York.

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	3	2
CO3	2	2	3	3	3
CO4	3	3	2	2	3
CO5	2	3	3	3	2

12.	Compulsory Paper		2	2	Human Rights & Duties	25	75	100
			30	24		250	450	700
SEMESTER III						CIA	Uni. Exam	Total
13.	Core	Paper-7	6	6	Complex Analysis –I	25	75	100
14.		Paper-8	6	5	Topology	25	75	100
15.		Paper-9	6	5	Differential Geometry	25	75	100
Internal Elective for same major students								
16.	Core Elective	Paper-3	6	3	(to choose one out of 3) A. LaTeX B. Discrete Mathematics C. Operations Research	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
17.	Open Elective	Paper-3	6	3	(to choose one out of 3) A. Mathematical Biology B. Quantitative Techniques C. SCILAB	25	75	100
18.	**MOOC Courses		-	-				100
			30	22		125	375	600
SEMESTER IV						CIA	Uni. Exam	Total
19.	Core	Paper-10	5	4	Complex Analysis –II	25	75	100
20.		Paper-11	5	4	Fluid Dynamics	25	75	100
21.		Paper-12	5	5	Functional Analysis	25	75	100
22.	Core	Project	5	5	Project with <i>viva voce</i>	100 (75 Project +25 viva)		100
Internal Elective for same major students								
23.	Core Elective	Paper-4	5	3	(to choose one out of 3) A. Number Theory and Cryptography B. Advanced Numerical Analysis C. Calculus of Variations and Integral Equations	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
24.	Open Elective (Non-Major)	Paper-4	5	3	(to choose one out of 3) A. Mathematical Economics B. Entrepreneurial Development C. Programming in C++	25	75	100
			30	24		125	375	600
			120	90				2400

*** Field Study**

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

- (i). Head of the respective department
- (ii). Mentor
- (iii). One faculty from other department

****Mooc Courses**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

SEMESTER IV

PAPER - 10

COMPLEX ANALYSIS - II

Course Objectives:

The objectives of the course is to

- introduce the concept of residues.
- evaluate contour integrals.
- educate the analytic continuation and poisson integral formula.
- inculcate the concepts of meromorphic and entire functions.
- indoctrinate the applications of open mapping, Hurwitz and Riemann mapping theorems.

Unit – 1: Calculus of Residues

15 hours

Residue at a Finite Point – Residue at the Point at Infinity – Residue Theorem – Number of Zeros and Poles – Rouché's Theorem. (Chapter 7, Sections: 7.1 to 7.6 and Chapter 8, Sections: 8.1 to 8.5)

Unit – 2: Evaluation of Certain Integrals

15 hours

Integrals of three types - Singularities on the Real Axis - Integrals Involving Branch Points - Estimation of Sums (Chapter 9, Sections: 9.1 to 9.6)

Unit – 3: Analytic Continuation

15 hours

Direct Analytic Continuation - Monodromy Theorem - Poisson Integral Formula - Analytic Continuation via Reflection (Chapter 10, Sections: 10.1 to 10.4)

Unit – 4: Representation of Meromorphic and Entire Functions

15 hours

Infinite Sums and Meromorphic Functions - Infinite Product of Complex Numbers - Infinite Products of Analytic Functions - Factorization of Entire Functions - The Gamma Function - The Zeta Function - Jensen's Formula - The Order and the Genus of Entire Functions (Chapter 11, Sections: 11.1 to 11.8)

Unit – 5: Mapping Theorems

15 hours

Open Mapping Theorem and Hurwitz' Theorem - Basic Results on Univalent Functions - Normal Families - The Riemann Mapping Theorem - Bieberbach Conjecture - The Bloch-Landau Theorems - Picard's Theorem (Chapter 12, Sections: 12.1 to 12.7)

Prescribed Book

S. Ponnusamy, *Foundations of Complex Analysis*, Second Edition, Narosa Publishing House, New Delhi, 2015.

Reference Books:

1. Lars V. Ahlfors, *Complex Analysis*, 3rd Edition, McGraw-Hill Inc., New York, 1979.
2. J.W. Brown and R.V. Churchill, *Complex Variables and Applications*, 8th Edition, McGraw-Hill Higher Education, New York, 2009.
3. J.B. Conway, *Functions of One Complex Variable*, 2nd Edition, Narosa Publishing House, New Delhi, 1996.
4. V. Karunakaran, *Complex Analysis*, 2nd Edition, Narosa Publishing House, New Delhi, 2005.

5. H.A. Priestley, *Introduction to Complex Analysis*, 2nd Edition, Oxford University Press Inc., New York, 2005.

E-Materials:

1. <https://ocw.mit.edu/courses/mathematics/18-112-functions-of-a-complex-variable-fall-2008/>
2. <https://ocw.mit.edu/courses/mathematics/18-04-complex-variables-with-applications-spring-2018/>
3. <https://www.coursera.org/learn/complex-analysis>

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- Understand the concepts of residues
- Evaluate the integrals using Cauchy residue theorem.
- comprehend the harmonic functions and its consequences.
- understand the conformal mappings, normal families and Riemann mapping theorem.
- acquire the concepts of entire and meromorphic functions.
- procure the applications of analyticity and special functions.

PAPER - 11

FLUID DYNAMICS

Course Objectives:

The objectives of the course is to

- discuss kinematics of fluids in motion
- derive the equations of motion of a fluid
- study the three dimensional flows, two dimensional flows and viscous flows.

Unit-1: Kinematics of Fluids In Motion 15 hours

Real fluids and ideal fluids – Velocity of a fluid at a point, Stream lines, path lines, steady and unsteady flows – Velocity potential – The vorticity vector – Local and particle rates of changes – Equations of continuity – Worked examples – Acceleration of a fluid – Conditions at a rigid boundary. (Chapter 2: Sections 2.1 to 2.10)

Unit-2: Equations of Motion of Fluid 15 hours

Pressure at a point in a fluid at rest – Pressure at a point in a moving fluid – Conditions at a boundary of two inviscid immiscible fluids – Euler's equation of motion – Discussion of the case of steady motion under conservative body forces. (Chapter 3: Sections 3.1 to 3.7)

Unit-3: Some Three Dimensional Flows 15 hours

Introduction – Sources, sinks and doublets – Images in a rigid infinite plane – Axis symmetric flows – Stokes stream function. (Chapter 4 : Sections 4.1, 4.2, 4.3, 4.5.)

Unit-4: Some Two Dimensional Flows 15 hours

Meaning of two dimensional flow – Use of Cylindrical polar coordinate – The stream function – The complex potential for two dimensional, irrotational incompressible flow – Complex velocity potentials for standard two dimensional flows – Some worked examples – Two dimensional image systems – The Milne Thompson circle Theorem.

(Chapter 5 : Sections 5.1 to 5.8)

Unit-5: Viscous Flows 15 hours

Stress components in a real fluid – Relations between Cartesian components of stress – Translational motion of fluid elements – The rate of strain quadric and principal stresses – Some further properties of the rate of strain quadric – Stress analysis in fluid motion – Relation between stress and rate of strain – The co-efficient of viscosity and Laminar flow – The Navier – Stokes equations of motion of a Viscous fluid. (Chapter 8: Sections 8.1 to 8.9)

Prescribed Book

F. Chorlton, Text Book of Fluid Dynamics ,CBS Publications. Delhi ,1985.

Reference Books:

1. R.W.Fox and A.T.McDonald. Introduction to Fluid Mechanics, Wiley, 1985.
2. E.Krause, Fluid Mechanics with Problems and Solutions, Springer, 2005.
3. B.S.Massey, J.W.Smith and A.J.W.Smith, Mechanics of Fluids, Taylor and Francis, New York, 2005
4. P.Orlandi, Fluid Flow Phenomena, Kluwer, New Yor, 2002.
4. T.Petrila, Basics of Fluid Mechanics and Introduction to Computational Fluid Dynamics, Springer, berlin, 2004.

E-Materials:

<http://web.mit.edu/1.63/www/lecnote.html>

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- understand the concepts of kinematics of fluids in motions.
- analyse the examples related to the equation of continuity and acceleration of a fluid
- discuss two-dimensional flows, the stream function and the Milne Thompson Circle theorem.
- acquire the concept of three-dimensional flows and derive Stoke's stream function
- discuss the viscous flows and Navier – Stokes equations of motion of a Viscous fluid.

PAPER - 12
FUNCTIONAL ANALYSIS

Course Objectives:

The objectives of the course is to

- study the details of Banach algebra and Hilbert Spaces
- provide the concept of conjugate space H^* , adjoint, self-adjoint, normal and unitary operators.
- study the regular, singular elements, radical and semi-simplicity.
- study the details of structure of commutative Banach algebras
- know about the relationship between algebraic structure of linear space and distance structure of a metric space.

UNIT-I : Banach Spaces

15 hours

Definition - Some examples - Continuous Linear Transformations - The Hahn - Banach Theorem (Chapter 9: Sections 46 to 48)

UNIT-II : Banach Spaces And Hilbert Spaces

15 hours

Open mapping theorem - conjugate of an operator - Definition and some simple properties - Orthogonal complements - Orthonormal (Chapter 9: Sections 50 and 51 ; Chapter 10 : Sections 52, 53 and 54)

UNIT-III : Hilbert Space

15 hours

Conjugate space H^* - Adjoint of an operator - Self-adjoint operator - Normal and Unitary Operators – Projections (Chapter 10: Sections 55, 56, 57, 58 and 59)

UNIT-IV : Preliminaries on Banach Algebras

15 hours

Definition and some examples - Regular and single elements - Topological divisors of zero - spectrum - the formula for the spectral radius - the radical and semi-simplicity. (Chapter 12 : Sections 64 to 69)

UNIT-V: Structure of Commutative Banach Algebras

15 hours

Gelfand mapping – Applications of the formula $r(x) = \lim \|x^n\|^{1/n}$ - Involutions in Banach Algebras - Gelfand-Neumark Theorem. (Chapter 13 : Sections 70 to 73)

Prescribed Book

G.F. Simmons, *Introduction to topology and Modern Analysis*, McGraw Hill International Book Company, New York, 1963.

Reference Books:

1. W. Rudin *Functional Analysis*, Tata McGraw-Hill Publishing Company, New Delhi, 1973
2. G. Bachman & L. Narici, *Functional Analysis* Academic Press, New York, 1966.
3. H.C. Goffman and G. Fedrick, *First course in Functional Analysis*, Prentice Hall of India, New Delhi, 1987
4. E. Kreyszig *Introductory Functional Analysis with Applications*, John Wiley & Sons, New York, 1978.
5. Balmohan V. Limaye, *Linear Functional Analysis for Scientists and Engineers*, Springer.

E-Materials

<http://www.math.ucdavis.edu/~hunter/book/ch5.pdf>

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- analyse the Banach space with examples
- understand the natural embedding N in N^{**}
- discuss Banach spaces with the Hilbert spaces
- acquire the open mapping theorem, orthonormal complements and orthonormal sets
- derive Gelgand-Neumark theorem
- prove the structure theorems

CORE ELECTIVE

PAPER - 4

(to choose one out of 3)

A. NUMBER THEORY AND CRYPTOGRAPHY

Course Objectives:

The objectives of the course is to

- give elementary ideas from number theory which will have applications in cryptography.
- study the quadratic residues and reciprocity
- understand about public key and primality

UNIT–I Some Topics in Elementary Number Theory 15 hours

Time Estimates for doing arithmetic – Divisibility and Euclidean Algorithm – Congruence's – Some applications to Factoring. (Chapter I)

UNIT–II Cryptography 15 hours

Some simple cryptosystems – Enciphering matrices. (Chapter III)

UNIT–III Quadratic Residues 15 hours

Quadratics – Residues and reciprocity. (Chapter II)

UNIT–IV Public Key 15 hours

The idea of Public key Cryptography – RSA – Discrete Law – Knapsack – Zero–Knowledge.(Chapter IV : Sections 1 to 5)

UNIT–V Primalityand Factoring 15 hours

Pseudo–primes – The rho method – Fermat factorization and factor bases – The continued fraction method – The quadratic sieve method. (Chapter V: Sections 1 to 5)

Prescribed Book

Neal Koblitz, A Course in Number Theory And Cryptography, Springer–Verlag, New York,1987.

Reference Books:

1. Niven and Zuckerman, An Introduction to Theory of Numbers, Third Edition, Wiley Eastern Ltd, New Delhi,1976.
2. David M. Burton,Elementary Number Theory, Wm. C. Brown Publishers, Dubuque, Iowa, 1989.

3. K. Ireland and M. Rosen, A Classical Introduction to Modern Number Theory, Springer–Verlag, 1972.

E-Materials

<http://mathworld.wolfram.com>

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- discuss the elementary number theory
- understand the the quadratic, residues and reciprocity
- develop the idea of Public key cryptography, RSA and discrete law
- solve problems using the continued fraction method and the quadratic Sieve method
- analyse Knapsack, zero knowledge
- discuss Fermat factorization and factor bases.

CORE ELECTIVE

PAPER - 4

B. ADVANCED NUMERICAL ANALYSIS

Course Objectives:

The objectives of the course is to

- introduce the derivation of numerical methods with error analysis
- study the transcendental and polynomial equations
- study the system of linear algebraic equations
- understand the differentiation and integration
- solve problems on interpolation and ordinary differential equations

UNIT-I Transcendental and Polynomial Equations 15 hours

Iteration methods based on second degree equation –Rate of convergence – Iteration methods – Methods for complex roots – Polynomial equations.

(Chapter 2: Sections 2.4 to 2.8)

UNIT-II System of Linear Algebraic Equations and Eigen Value Problems 15 hours

Direct methods –Triangularisation, Cholesky and Partition methods – Error analysis– Iteration methods – Eigen values and Eigenvectors – Jacobi’s method, Given’s method, Rutishaugher method and Power method. (Chapter 3: Sections 3.2 to 3.5)

UNIT-III Interpolation and Approximation 15 hours

Hermite Interpolations – Piecewise and Spline Interpolation – Bivariate interpolation – Approximation – Least Square approximation – Uniform approximation.

(Chapter 4: Sections 4.5 to 4.10)

UNIT-IV Differentiation and Integration 15 hours

Numerical Differentiation – Partial Differentiation – Numerical Integration methods based on undetermined coefficients– Double integration.

(Chapter 5: Sections 5.2, 5.5, 5.6, 5.8, 5.11)

UNIT–V ORDINARY DIFFERENTIAL EQUATIONS

15 hours

Numerical methods – Single step methods –Multistep methods –Predictor–Corrector methods.(**Chapter 6:**Sections6.2 to 6.5)

Prescribed Book

M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods For Scientific And Engineering Computation, 3rd Edition, New Age International, 1993.

Reference Books:

1. S. D. Corte and de Boor, Elementary Numerical Analysis – An Algorithmic approach, 3rd Edition, McGraw Hill International Book Company, 1980.
2. James B. Scarborough, Numerical Mathematical Analysis, Oxford& IBH Publishing Company, New Delhi.
3. F.B. Hildebrand, Introduction To Numerical Analysis, McGrawHill, New York, 1956.

E-Materials

1. <https://www.math.upenn.edu/~wilf/DeturckWilf.pdf>
2. <https://web.archive.org/web/20120225082123/http://kr.cs.ait.ac.th/~radok/math/mat7/steptsa.htm>
3. <https://ocw.mit.edu/courses/mechanical-engineering/2-993j-introduction-to-numerical-analysis-for-engineering-13-002j-spring-2005/>

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- compute the solutions of transcendental and polynomial equations
- understand the system of linear algebraic equations
- analyse interpolation and extrapolation
- derive numerical differentiation and integrations
- evaluate double integrals
- solve differential equations by single and multi step methods

CORE ELECTIVE

PAPER - 4

C. CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS

Course Objectives:

The aim of the course is to introduce to

- the concept of calculus of variation and its applications and to introduce various types of integral equations
- study the methods of successive approximations and fredholm theory
- acquire knowledge on applications to Ordinary Differential Equations.

Unit– I: Variational Problems with Fixed Boundaries **15 hours**

The concept of Variation and its properties – Euler’s equation – Variational problems for functionals of the form –Functionals dependent on higher order derivatives – Functionals dependent on Functions of several independent variables– Variational problem in parametric form – Some applications to problems of mechanics.

(Book – 1, Chapter 1, Sections: 1.1 to 1.7)

Unit–II: Variational Problems with Moving Boundaries **15 hours**

Variational problem with a Movable boundary for a functional dependent on two functions – One sided variations – Reflection and Refraction of extremals – Diffraction of light rays.

(Book–1, Chapter 2, Sections: 2.2 to 2.5)

Unit– III: Integral Equations **15 hours**

Introduction– Definition– Regularity conditions– Special kinds of Kernels– Eigen values and Eigen functions – Convolution integral – Reduction to a system of algebraic equations – Examples –Fredholm alternative – Examples – An approximation method. (Book–2, Chapter 1, Sections: 1.1 to 1.5; Chapter 2, Sections: 2.1 to 2.5)

Unit–IV: Method of Successive Approximations and Fredholm Theory **15 hours**

Method of successive approximations – Iterative scheme – Examples – Volterra integral equations –Examples – Some results about the resolvent kernel – The method of solution of Fredholmequation –Fredholm first theorem – Examples. (Book–2, Chapter 3, Sections:3.1 to 3.5; Chapter 4, Sections: 4.1 to 4.3)

Unit–V: Applications to Ordinary Differential Equations **15 hours**

Initial value problems – Boundary value problems – Examples – Singular integral equations – The Abel integral equations - Examples.

(Book–2, Chapter 5, Sections: 5.1 to 5.3; Chapter8, Sections: 8.1 to 8.2)

Prescribed Book

1. A. S. Gupta, *Calculus of Variations with Applications*, PHI, New Delhi, 2005.
2. Ram P.Kanwal, *Linear Integral Equations*, Theory and Techniques, Academic Press, NewYork, 1971.

Reference Books:

1. M. D. Raisinghania, *Integral Equations and Boundary Value Problems*, S. Chand & Co., New Delhi, 2007.
2. Sudir K. Pundir and RimplePundir, *Integral Equations and Boundary Value Problems*, PragatiPrakasam, Meerut. 2005.

E –Materials

<http://www.maths.ed.ac.uk/~jmf/Teaching/Lectures/CoV.pdf>

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- understand the concept of calculus of variation and its applications
- discuss the various types of integral equations
- analyse the methods of successive approximations and Fredholm theory
- acquire knowledge on applications to Ordinary Differential Equations.

OPEN ELECTIVE

PAPER - 4

(to choose one out of 3)

A. MATHEMATICAL ECONOMICS

Course Objectives:

The aim of the course is to introduce to

- study the theory of FIRM and perfect competition
- understand about market equilibrium and welfare economics

Unit-1: The Theory of FIRM **15 hours**

Basic Concepts - Optimizing Behavior - Input Demands - Cost Functions – Joint Products - Generalization to m variables - (Chapter 4: Sections 4.1 to 4.6)

Unit-2: CES Production **15 hours**

Homogeneous Production functions – CES Production Function.
(Chapter 5: Sections 5.1 and 5.2)

Unit-3: Perfect Competition **15 hours**

Assumptions of Perfect Competition - Demand Functions - Supply Functions – Commodity - Market Equilibrium - An application to Taxation.
(Chapter 6: Sections 6.1 to 6.5)

Unit-4: Market Equilibrium **15 hours**

Factor-Market Equilibrium - Existence and Uniqueness of Equilibrium - Stability of Equilibrium - Dynamic Equilibrium with Lagged Adjustment.
(Chapter 6: Sections 6.6 to 6.9)

Unit-5: Welfare Economics **15 hours**

Pareto Optimality - the efficiency of Perfect competition - The efficiency of Imperfect competition - External Effects in consumption and Production - Taxes and Subsidies – Social Welfare functions - The theory of Second Best.
(Chapter 11 : Sections 11.1 to 11.7)

Prescribed Book

James M. Henderson and Richard E. Quandt, Micro Economic Theory
A Mathematical Approach, (3rd Edn.) Tata McGraw Hill, New Delhi, 2003.

Reference Books

1. William J. Baumol. Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi, 1978
2. A.C. Chiang, Fundamental Methods of Mathematical Economics, McGraw Hill, New York, 1984
3. Michael D. Intriligator, Mathematical Optimization and Economic Theory, Prentice Hall, New York, 1971.

4. A. Kautsoyiannis, Modern Microeconomics (2nd edn) MacMillan, New York, 1979

E –Materials

1. [https://curlie.org/Science/Math/Applications/Mathematical Economics and Financial Mathematics/](https://curlie.org/Science/Math/Applications/Mathematical_Economics_and_Financial_Mathematics/)
2. http://master-economics-qem.univ-paris1.fr/about/?no_cache=1

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- understand the knowledge of FIRM theory and perfect competition
- analyse the CES production
- acquire the knowledge of market equilibrium
- control the stability of equilibrium
- discuss the welfare economics, taxes and subsidies

OPEN ELECTIVE

PAPER - 4

B. ENTREPRENEURIAL DEVELOPMENT

Course Objectives:

The aim of the course is to

- provide an understanding of basic concept in the area of entrepreneurship
- expose students to the idea generation, creating awareness of business opportunities, and familiarizing them with formal practices in effective project formation.
- provide insights to students on entrepreneurial finance and role of various government agencies in assisting entrepreneurship.

Unit-1: Introduction

15 hours

Entrepreneur and Entrepreneurship – Concept – Definition - Classification of Entrepreneur – Women Entrepreneur - Functions of an Entrepreneur - Traits of successful Entrepreneur - Entrepreneurs Vs Professional Managers – Role of an Entrepreneur in Economic Development - Future challenges.

Unit-2: Entrepreneurial Development

15 hours

Entrepreneurial Development Programmes – Meaning - Evolution and Objectives of EDP - Institutional efforts to develop Entrepreneurship - National Skill Development Corporation (NSDC) - Role of Government in Organising EDPs - Operational Problem of EDPs.

Unit-3: Project Management and Idea Generation

15 hours

Project Management - Project Identification - Project Formulation - Project Design and Network Analysis – Overview of Project Appraisal - Project Report - Identification and Selection of Business Opportunity – Idea Generation – Overview of Techniques used for Idea Generation. - Individual creativity.

Unit-4: Entrepreneurial Finance and Development Agencies

15 hours

Sources of Finance – Commercial Banks and Development Banks - Role of Agencies in assisting Entrepreneurship - District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

Unit-5: Government Policies and Benefits**15 hours**

Tax Benefits – Tax Holidays – Allowance for deducting Depreciation – Rehabilitation Allowance – Benefits available for MSMEs: PMEGP – NEEDS – UYEGP.

Prescribed Books

1. Dr. S.S. Khanka, Entrepreneurship Development - S. Chand & Co., New Delhi.
2. Jayashree Suresh, Entrepreneurial Development –Margham Publication, Chennai.
3. VasantDesa, Dynamics of Entrepreneurial Development –Himalaya Publication.
4. Robert D. Hisrich, Michael P. Peters & Dean A. Shepherd, Entrepreneurship - Tata McGraw Hill Publishing Company Limited, New Delhi.
5. Ravindranath V. Badi&Narayana, Entrepreneurship, Vrinda Publication (P) Ltd, New Delhi.

References Books:

1. Rabindra N. Kanungo, Entrepreneurship and Innovation, Sage Publications, New Delhi.
2. Holt D. H., Entrepreneurship New Venture Creation. New Delhi: Prentice Hall of India.
3. Hisrich R, and Peters, M., Entrepreneurship. New Delhi: Tata McGraw Hill.
4. Rajkonwar A.B., Entrepreneurship, Kalyani Publisher, Ludhiana.
5. Charantimath, Poornima, Entrepreneurship Development and Small Business Enterprises, Pearson Education, New Delhi.

E-Materials:

1. <http://www.indcom.tn.gov.in/pmegp.html>
2. <http://www.indcom.tn.gov.in/needs.html>
3. <http://www.indcom.tn.gov.in/uyegp.html>

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- understand the knowledge of entrepreneurship
- analyse the entrepreneurial finance and role of various government agencies
- develop the idea generation, creating awareness of business opportunities, and familiarizing them with formal practices
- discuss the Government policies and benefits.

OPEN ELECTIVE
PAPER – 4
C. PROGRAMMING IN C++

Course Objectives:

- This course introduces a higher level language C++ for hands on experience on computers.

Unit –1: Tokens Expressions and control Structures **15 hours**

Tokens – Keywords – Identifiers and constants – Basic data types – Uses defined data types – Derived data types – Symbolic – Operators in C++ – Scope resolution operator – Manipulators – Operator overloading – Control structures. (Chapter 3: Sections: 3.1 to 3.24)

Unit –2: Functions **15 hours**

Characteristic of OOP – Function prototype – Default arguments – Inline functions – Function overloading – Template functions (Chapter 4: Sections: 4.2, 4.3, 4.6, 4.7, 4.9)

Unit-3: Classes in C++ **15 hours**

Classes –Constructors and destructors – Friend functions – Template classes – New and delete operators – Operator overloading. (Chapter 5: Sections: 5.1 to 5.15; Chapter 6: Sections: 6.1 to 6.9, Chapter 7: Sections: 7.1 to 7.5)

Unit –4: Inheritance **15 hours**

Single inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance – Virtual functions (Chapter 8: Sections: 8.1 to 8.8)

Unit-5: Polymorphism in C++ **15 hours**

Polymorphism. (Chapter 9: Sections: 9.6,9.7)

Prescribed Book

E.Balagurusamy, Object Oriented Programming with C++, 4-e, Tata McGraw Hill
Pub.Co,New Delhi,2001

Reference Books

1. E.Balagurusamy, Numerical Methods, Tata McGraw Hill Publishing Company Ltd , New Delhi,1999.
2. John.H.Mathews, Numerical Methods for Mathematics, Science and Engineering, 2-e Prentice Hall India Pvt.,Ltd, 2003.
3. S.S.Sastry , Introductory to Numerical Methods , Prentice Hall India Pvt., Ltd, 2000
4. H.C.Saxena,Finite Differences and Numerical Analysis, S.Chand& Company Ltd, New Delhi, 2005.

E-Materials:

[http:// en.wikipedia.org/wiki//c++/programme](http://en.wikipedia.org/wiki/c++/programme).

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- understand the concept of Tokens Expressions and control Structures
- analyse the types of functions and classes used in C++
- discuss the inheritance and various types of inheritance
- acquire the knowledge of Polymorphism in C++

203 - B. Sc. PHYSICS

Programme Structure and Scheme of Examination (under CBCS)
 (Applicable to the candidates admitted in Affiliated Colleges from
 the academic year 2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours /Week	Credit	Maximum Marks		
					CIA	ESE	Total
SEMESTER – I							
22UTAML11	I	Language Course - I : Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I : Communicative English I	5	3	25	75	100
22UPHYC13	III	Core Course – I: Properties of Matter and Sound	5	4	25	75	100
22UPHYC14		Core Course – II : Heat and Thermodynamics	5	4	25	75	100
		Core Practical – I	3	-	-	-	-
22UMATA01		Allied Course - I : Paper -1: Mathematics-I	5	4	25	75	100
22UENVS18	IV	Environmental Studies	2	2	25	75	100
Total			30	20			600
SEMESTER – II							
22UTAML21	I	Language Course - II : Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course - II : Communicative English II	5	3	25	75	100
22UPHYC23	III	Core Course – III : Mechanics	5	4	25	75	100
22UPHYP24		Core Practical – I	3	4	40	60	100
22UMATA02		Allied Course - I : Paper -2: Mathematics-II	5	4	25	75	100
22UPHYE26		Internal Elective – I	3	3	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28		Soft Skill	2	1	25	75	100
Total			30	23			800

Internal Elective Courses

22UPHYE26	Internal Elective - I	Renewable Energy Sources
		Fundamentals of Physics
		Data Communication and programming in C

Allied Courses offered by the Department of Physics

22UPHYA01	Theory	Physics - I
22UPHYA02	Theory	Physics – II
22UPHYP02	Practical	Physics Practical – I

SEMESTER: I CORE COURSE: I PART: III	22UPHYC13: PROPERTIES OF MATTER AND SOUND	CREDITS: 4 HOURS: 60
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COURSE OBJECTIVES

1. To expound the fundamentals of elastic properties of solids.
2. To understand the surface properties of liquids and the experimental methods.
3. To explain the viscous properties of liquids and gases, Poiseuille's formula.
4. To elaborate the SHM, resonance phenomena, determination of frequency and loudness.
5. To get an idea of the ultrasonics generation method, reverberation, acoustics of buildings and use in oil and gas industry.

Unit I: Elasticity:**14 Hours**

Elasticity -- Hooke's law – Elastic moduli – Poisson's ratio – Beams – bending of beams – Expression for bending moment – Cantilever - Theory of uniform and non – uniform bending - Determination of Young's modulus - Koenig's method – Torsion of a body – Expression for couple per unit twist – Work done in twisting a wire – Torsional oscillations of a body - Rigidity modulus by dynamic torsion method (Torsional pendulum) and static torsion method.

Unit II: Surface Tension:**14 Hours**

Surface tension – definition – Molecular forces – Explanation of surface tension on kinetic theory – Surface energy – work done in increasing the area of a surface – Excess pressure inside a curved liquid surface – Excess pressure inside a spherical and cylindrical drops and bubbles - drop weight method - angle of contact - Quincke's method.

Unit III: Viscosity:**10 Hours**

Viscosity – Coefficient of viscosity – Streamlined and turbulent motion – critical velocity – Rate of flow of liquid in a capillary tube – Poiseuille's formula – viscosity of highly viscous liquid - terminal velocity - Stoke's method - Ostwald Viscometer - viscosity of gas - Mayer's formula.

Unit IV: Sound:**12 Hours**

Simple Harmonic Motion – Composition of two S.H.M in a straight line - at right angles -Lissajous's figures - Free, Damped, Forced vibrations - Resonance - Laws of transverse vibration of strings – Sonometer - Determination of AC frequency using sonometer - Decibels – Loudness and Intensity levels.

Unit V: Ultrasonics and Acoustics:**10 Hours**

Ultrasonics – Production – Piezoelectric crystal method – Magnetostriction method – Properties and Applications - Acoustics of building – Reverberation - Sabine's Reverberation formula (No derivation) - Factors affecting acoustics of building - Sound distribution in an auditorium - Requisites for good acoustics - application of sound in oil industry: seismic survey and sonic Log

COURSE OUTCOMES

On completion of the course, the student would have learnt the following:

1. Theory of Elasticity and bending of beams, Couple per unit twist of a wire, Torsional pendulum ideas.
2. have knowledge on surface properties of liquids and its determination methods.
3. Understood the viscous behaviour of liquids and gasses.
4. understood the Physics of sound and its applications
5. Learned the method of producing ultrasonic waves and its applications. The concepts of acoustic comfort and the theories used in building acoustics, use of sound in oil industry

Text Books

1. Mathur D.S, (2004) *Elements of properties of matter*, S. Chand & Co.,
2. Murugesan R. (2004) *Properties of matter* S. Chand & Co.,
3. Brijlal and Subramanian (2006) *Properties of matter* S. Chand & Co.,
4. Khanna D.R. and Bedi. R.S (1969) *Textbook of Sound*, Atmaram and sons
5. Subrahmanyam N and Brijlal (1995) *A Textbook of Sound*, Vikas Publishing House Second revised edition

Supplementary Readings

1. Gulati, H.R. (1982) *Fundamentals of General Properties of Matter*, S. Chand & Co., New Delhi.
2. Halliday D, Resnick and Walker J (2001), *Fundamentals of Physics*, 6th Edition, Wiley, New York.
3. Schlumberger (1991), *Basic Principles of logging*, Schlumberger Wireline & Testing, Texas

Web Resources

1. <https://www.pdfdrive.com/schlumberger-log-interpretation-principles-applicationspdf-e20509665.html>

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	2	2
CO3	3	2	3	3	2
CO4	2	3	2	2	3
CO5	3	2	3	3	3

1- LOW, 2- MODERATE, 3- HIGH

SEMESTER: I CORE PAPER - II PART: III	22UPHYC14 HEAT AND THERMODYNAMICS	CREDIT:4 HOURS: 60
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COURSE OBJECTIVES

1. To get an idea about the specific heat capacity and its determination.
2. To understand the kinetic theory of gases and gas laws.
3. To get acquainted with transmission of heat and radiation laws.
4. To understand the low temperature Physics and Superconductivity.
5. To learn the thermodynamic system and its laws.

Unit-I: Specific Heat**12 Hours**

Specific heat capacity - Principle of method of mixtures - Specific heat capacity of liquid by method of mixtures - Newton's law of cooling - Specific heat capacity of a liquid by the method of cooling - Specific heat capacity of a liquid by Callender and Barne's method - Specific heat capacity of gases - Meyer's relation between C_p and C_v .

Unit -II: Kinetic theory of gases**12 Hours**

Kinetic theory of gases - Expression of pressure of gas - Boyle's law - Charle's law - Perfect gas equation - Mean free path - Expression for mean free path - Maxwell's velocity distribution law - Transport phenomena - Diffusion - Law of equipartition energy - Application to specific heat of gases.

Unit - III: Transmission of Heat**12 Hours**

Conduction - Coefficient of thermal conductivity - thermal conductivity of a good conductor - Forbe's method-thermal conductivity of a poor conductor - Lee's disc method - Convection and examples - Black body radiation - Wien's distribution law - Rayleigh - Jeans Law - Plank's Law - Stefan - Boltzmann law - determination of Stefan's constant - laboratory method

Unit - IV: Low Temperature Physics**12 Hours**

Joule-Kelvin effect - Porous plug experiment - liquefaction of hydrogen - liquefaction of helium - Kammerling - Onne's method - Helium I and II - Lambda point - Superconductivity - Type I and II superconductors - Meissner effect - applications of superconductors.

UNIT - V: Thermodynamics**12 Hours**

Thermodynamic system - Zeroth law, First and Second law of thermodynamics - Carnot engine - working and efficiency - Carnot's theorem - Thermodynamic scale of temperature - Thermodynamic and perfect gas scale - Third law of thermodynamics - Entropy - Change in entropy in a reversible/ irreversible process - Temperature entropy diagram - Entropy of perfect gas

COURSE OUTCOMES

1. After the completion this Course, the student would acquire the following:
2. get an idea about the specific heat capacity and its determination methods.
3. understood the kinetic theory of gases and gas laws.
4. get acquainted with transmission of heat process and radiation laws.
5. understood the method of generating low temperature and Superconductivity.

6. learnt the thermodynamic system and its associated laws.

Text Books:

1. Brij Lal and N Subrahmanyam (2016), *Heat Thermodynamics* S Chand & Company Pvt Ltd, New Delhi.
2. Murugesan R and KiruthigaSivaprasad (2002), *Thermal Physics*, S Chand & Co., New Delhi.

Supplementary Readings:

1. Mathur D S (2008), *Heat and Thermodynamics*, S Chand & Company Pvt Ltd.
2. Rajam J B (1990), *Heat and thermodynamics*, S Chand & Co., New Delhi.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	2	3	3	2	2
CO3	3	2	3	3	2
CO4	2	3	2	2	3
CO5	3	2	3	3	3

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH

SEMESTER:II CORE COURSE – III PART:III	22UPHYC23 MECHANICS	CREDIT: 4 HOURS: 60
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COURSE OBJECTIVES:

1. To learn the laws of conservation and collision of bodies
2. To understand and calculate the moment of inertia of different bodies
3. To know the laws of gravitation, variation of 'g' and gravitational field
4. To learn the central force motion, centre of mass, variable mass systems
5. To understand the friction, centre of gravity and flow of fluids

Unit I: Laws of Motion**14 Hours**

Laws of conservation of energy, linear momentum and angular momentum - work energy theorem - work done by gravitational force - work done by spring force - potential energy - conservative and non-conservative forces - potential energy curve- Collision - Elastic and inelastic collision - (Fundamental laws of impact) - Newton's law of impact - coefficient of restitution - Impact of a smooth sphere on a fixed plane - Direct impact between two smooth spheres - Oblique impact between two smooth spheres - Calculation of final velocities of the spheres - Loss of K.E due to impact.

Unit II: Dynamics of Rigid body**10 Hours**

Moment of inertia - Theorems of perpendicular and parallel axes - M.I of a circular ring, disc, solid sphere, hollow sphere and cylinder about all axes - Compound pendulum - theory - equivalent simple pendulum - reversibility of centers of oscillation and suspension - determination of g and k

Unit III: Gravitation**12 Hours**

Newton's law of gravitation - Kepler's laws of gravitation - Determination of G - Boy's method - Mass and density of earth - Acceleration due to gravity - Variation of g with altitude, depth and rotation of earth - Value of g at poles and equator. Gravitational field - Gravitational potential - Gravitational potential due to spherical shell - Gravitational potential due to a solid sphere (inside and outside)

Unit IV: Central Force Motion**12 Hours**

Angular velocity, angular momentum and K.E of rotation - Torque and angular acceleration - Relation between them - Expression for acceleration of a body rolling down an inclined plane without slipping. Center of mass -velocity and acceleration of centre of mass - determination of motion of individual particle-- system of variable mass. Rocket motion- Satellite

Unit V: Statics and Hydrodynamics**12 Hours**

Friction-laws of friction-angle of friction-cone of friction-Centre of gravity-solid and hollow tetrahedron-solid and hollow hemisphere -Centre of pressure - vertical rectangular lamina - vertical triangular lamina. Hydrodynamics - Equation of continuity- Pitot's tube and Venturimeter - Euler's equation of unidirectional flow - Torricelli's theorem - Bernoulli's theorem and its applications.

COURSE OUTCOME

After the completion of the Course the student would understand the following:

1. The laws of conservation and collision of bodies
2. Calculate the moment of inertia of rigid body systems
3. Laws of gravitation, variation of 'g' and gravitational field and potential
4. The central force motion, centre of mass and variable mass systems
5. The friction, centre of gravity and flow of fluids

Text Books:

1. Narayanamoorthy *Mechanics – Part I and II*, National Publishing Company.
2. Mathur D.S. (2001) *Mechanics*, S. Chand & Co., 2nd Edition.
3. Duraipandian P, Laxmi Duraipandian, Muthamizh, Jayapragasam, (1988),
4. *Mechanics*, S. Chand & Co., New Delhi.
5. Murugesan R (2001), *Properties of Matter*, S. Chand & Co., New Delhi.

Supplementary Readings

1. Halliday, Resnick, and Walker (2001) *Fundamentals of Physics*, 6th edition, Wiley, NY.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	3	2	3	2	3
CO4	2	3	2	3	3
CO5	3	2	3	3	3

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH

SEMESTER: I & II CORE PRACTICAL – I PART: III	22UPHYP24 PRACTICAL - I	CREDIT: 4 HOURS: 60
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COURSE OBJECTIVES:**To understand and learn the measurement of**

1. Elastic properties of solids.
2. Physical properties of liquids
3. Thermal properties of matter
4. Optical and electrical properties of materials and semiconductors
5. Frequency of vibration, relative density, and acceleration due to gravity

List of Experiments (Any 15 Experiments only)

1. Compound Pendulum - Determination of 'g' and 'k'.
2. Young's modulus - non uniform bending -Pin and microscope.
3. Young's modulus - uniform bending – Pin and microscope.
4. Young's modulus cantilever – depression - dynamic method-Mirror, Scale and Telescope.
5. Rigidity modulus -Torsional Pendulum -without masses.
6. Rigidity modulus and moment of inertia -Torsional Pendulum - with identical masses.
7. Rigidity modulus -Static torsion -Mirror, Scale and telescope.
8. Surface tension and Interfacial surface tension - drop weight method.
9. Coefficient of viscosity of liquid - Graduated burette - Radius of capillary tube by using microscope.
10. Specific heat capacity of liquid -Newton's law of cooling.
11. Sonometer - Frequency of Tuning fork.
12. Sonometer - Relative density of a solid and liquid.
13. Focal length - R and μ of a convex lens [focal length i) u-v and ii) conjugate foci method; Radius of curvature by telescope method].
14. Focal length - R and μ of a concave lens [focal length i) in contact and ii) auxiliary lens method; Radius of curvature by Boy's method].
15. Spectrometer - Solid prism- Refractive index of material of a prism.
16. Spectrometer - Hollow prism – Refractive index of a liquid.
17. Potentiometer - Calibration of low range voltmeter.
18. Potentiometer - Internal resistance of a Cell.
19. Study of Characteristics of the Junction diode – Determination of knee voltage
20. Study of Characteristics of the Zener diode – Determination of reverse breakdown voltage

COURSE OUTCOMES

The student will be learnt to determine the following physical properties:

1. Elastic properties of solids.
2. Physical properties of liquids
3. Thermal properties of matter
4. Optical and electrical properties of materials and semiconductors
5. Frequency of vibration, relative density, and acceleration due to gravity

Text Books:

1. Ouseph, C.C. Rao, U.J. Vijayendran,V. (2018), *Practical Physics and Electronics*, S. Viswanathan, Printers & Publishers Private Ltd, Chennai
2. Srinivasan, M.N, Balasubramanian,V, Ranganathan, R. (2015) *A Text Book of Practical Physics*, Sultan Chand & Sons, New Delhi

Supplementary Readings:

1. Samir Kumar Ghosh (2000) *A Textbook of Advanced Practical Physics*, NCBA Kolkatta
2. Chattopadyay, D. Rakshit, P.C. (2011), *An Advanced Course in Practical Physics*, NCBA, Kolkatta,
3. Arora, C.L, *B.Sc. Practical Physics*,S. Chand and Company, New Delhi.
4. Khandelwal,V, *A Laboratory Manual of Physics for Undergraduate Classes*, Vani Publications.
5. Saraf. B. et al, *Physics through Experiments*, Vikas Publications.
6. Harnaam Singh., *B.Sc., Practical Physics*, S. Chand and Company, New Delhi.
7. Tayal, D C, *University Practical Physics*, Himalaya Publishing House.
8. Gupta & Kumar, *Practical Physics*, Pragati Prakashan, Meerut

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	2	3	2	3	2
CO3	3	2	3	2	2
CO4	3	3	2	2	3
CO5	2	2	3	2	3

Correlation Level: 1-Low, 2-Moderate, 3-High

SEMESTER: II PART: III	22UPHYE26 - 1 Internal Elective – I - (1) RENEWABLE ENERGY SOURCES	CREDIT: 3 HOURS: 45
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COURSE OBJECTIVES

1. To provide an understanding of the present energy crisis and various available energy sources.
2. To understand the harvesting of solar energy.
3. To know the basics of photovoltaic system and its applications.
4. To learn about the biogas and biomass energy.
5. To understand the alternative energy sources and their details.

UNIT I: Introduction to Energy Sources**Hours: 9**

World's reserve of Commercial energy sources and their availability - India's production and reserves - Conventional and non - conventional sources of energy, comparison – Coal- Oil and natural gas –applications - merits and demerits.

UNIT II: Solar Thermal Energy**Hours: 9**

Solar constant -Solar spectrum - Solar radiations outside earth's atmosphere –at the earth surface - on tilted surfaces - Solar Radiation geometry - Basic Principles of Liquid flat plate collector –Materials for flat plate collector - Construction and working - Solar distillation–Solar disinfection - Solar drying - Solar cooker(box type) - Solar water heating systems – Swimming pool heating.

UNIT III: Photovoltaic Systems**Hours: 9**

Introduction - Photovoltaic principle - Basic Silicon Solar cell - Power output and conversion efficiency - Limitation to photovoltaic efficiency - Basic photovoltaic system for power generation - Advantages and disadvantages - Types of solar cells - Application of solar photovoltaic systems- PV Powered fan – PV powered area - lighting system – A Hybrid System.

UNIT IV: Biomass Energy**Hours: 9**

Introduction - Biomass classification - Biomass conversion technologies - Bio - gas generation - Factors affecting bio - digestion - Working of biogas plant - floating and fixed dome type plant- advantages and disadvantage of -Bio - gas from plant wastes - Methods for obtaining energy from biomass - Thermal gasification of biomass - Working of downdraft gasifier - Advantages and disadvantages of biological conversion of solar energy.

UNIT V: Wind Energy and Other Energy Sources**Hours: 9**

Wind Energy Conversion - Classification and description of wind machines, wind energy collectors - Energy storage - Energy from Oceans and Chemical energy resources - Ocean thermal energy conversion - tidal power, advantages and limitations of tidal power generation - Energy and power from waves- wave energy conversion devices - Fuel cells - and application of fuel cells - batteries advantages of battery for bulk energy storage - Hydrogen as alternative fuel for motor vehicles.

COURSE OUTCOMES

After Completion of the course, the student would have learnt the ideas listed below

1. Knowledge of Conventional and non-conventional energy sources.
2. Understand the solar energy and the harvesting methods.
3. Gain knowledge about power generation and solar cells.
4. Acquainted with the conversion of biogas and its application.
5. Familiar with the alternative types of energy and their advantages.

Text Books:

1. Kothari D.P, Singal K.C. and Rakesh Ranjan, 2008, *Renewable energy sources and emerging Technologies*, Prentice Hall of India,
2. Sukhame, S.P. *Solar Energy - principles of thermal collection and storage*, Tata McGraw Hill Publishing Company Ltd.

Supplementary Readings:

1. Chetan Singh Solanki, 2011, *Solar Photovoltaics Fundamentals, Technologies and Applications*, 2nd Edition, PHI Learning Private Limited.
2. Rai G. D, 2010, *Non-conventional Energy sources*, 4th Edition, Khanna Publishers.
3. Jeffrey M. Gordon 2013, *Solar Energy: The State of the Art*, Earthscan.
4. Kalogirou S.A., 2013, *Solar Energy Engineering: Processes and Systems*, 2nd Edition, Academic Press.
5. Zobia A. F and Ramesh Bansal, 2011, *Handbook of Renewable Energy Technology*, World Scientific.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	2	2	2	3	2
CO4	2	3	3	2	3
CO5	3	2	2	3	3

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH

SEMESTER: II PART: III	22UPHYE26 - 2 Internal Elective – I (2) FUNDAMENTALS OF PHYSICS	CREDIT: 3 HOURS: 45
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COURSE OBJECTIVES

1. To know the units, dimensions and measurement of various physical quantities.
2. To acquire knowledge on different states of matter and conversion between them.
3. To know different types of energy.
4. To know about pressure, temperature and their simple measuring devices.
5. To understand principles of mirrors and lenses

Unit I: Units and Measurements**9 Hours**

S.I. Units – measurement of length, mass, time and other physical quantities
 - Dimensional formula for area, volume, density, velocity, acceleration, momentum and force – Impulse – Torque – couple – angular momentum – Uses of dimension.

Unit II : States of matter**9 Hours**

Matter – Solid, Liquid, Gas and Plasma – Application of Plasma – change of state – specific heat capacity – specific heat capacity of gas - latent heat of fusion and vaporisation - specific latent heat of ice and steam.

Unit III :Energy**9 Hours**

Kinds of energy – Mechanical energy, Thermal energy, Optical energy, Sound energy, Electrical energy, atomic and nuclear energy, (Examples) – Conservation of energy – work energy theorem.

Unit IV: Pressure and Temperature**9 Hours**

Pressure – atmospheric pressure – Fortin barometer – Aneroid barometer - Concept of heat and temperature – Centigrade, Fahrenheit and Rankine scale – relation between temperature scales - Mercury thermometer – Error and corrections in mercury thermometers – Platinum wire resistance thermometer

Unit V : Mirror and lens**9 Hours**

Mirror – Laws of reflection – total internal reflection – Image formation (Concave and Convex mirror) - Lens – Laws of refraction – Image formation (Concave and Convex lens) – Defects of eye and rectification – Rayleigh, Mie, Tyndall and Raman scattering of light

COURSE OUTCOMES

Students studying Fundamentals of Physics course would have learnt the following:

1. units and dimensions of various fundamental physical quantities
2. different states of matter and conversion between them.
3. types of energy and its conservation.
4. pressure and temperature and their measurement using simple devices.
5. principle and use of mirrors, lenses and scattering of light.

Text Books:

1. Narayan Rao, (1998), B V, *First Year B. Sc. Physics*, New Age International (P) Lt.

Supplementary Readings:

1. Halliday, D, Resnick R and Walker J, (2011), *Fundamentals of Physics*, Wiley India, Pvt Ltd.
2. Mathur, D S (2002), *Mechanics*, S. Chand & Co. Mathur, D S (2002), *Properties of matter*, S. Chand & Co., Brijlal and Subramanian, (2006), *Properties of matter*, S. Chand & Co., Rai, G D, *Solar energy utilization*, Khanna Publishers. Subramanyam and Brijlal (2004), *A text book of Optics*, S. Chand and co., 22nd Edition.
3. Murugesan, R (2008), *Optics and Spectroscopy*, S. Chand and co., 6th Edition.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	2	2
CO3	2	3	2	3	2
CO4	3	2	3	3	3
CO5	2	3	2	2	3

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH

SEMESTER: II PART: III	22UPHYE26-3 Internal Elective – I (3) DATA COMMUNICATION AND PROGRAMMING IN C	CREDIT: 3 HOURS: 45
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COURSE OBJECTIVES

1. To learn the different aspects of digital data communication and networks
2. To understand the art of multiplexing signals and its advantages and applications.
3. To get to know the ideas about broadband, layers, repeaters, bridges and gateway
4. To get acquainted with the keywords, operators, expressions and functions in C program.
5. To study the input and output, branching, loop, arrays etc., in C program.

Unit I:Data Communication**Hours: 9**

Introduction to Data Communication - Network, protocols and standards standard organizations - line configuration - topology- transmission mode - classification of network.

Unit II: Transmission**Hours: 9**

Parallel and serial transmission - Interface standards - modems-guided media types of error - Multiplexing - Types of Multiplexing - Multiplexing application Telephone system – ether net.

Unit III: Network Access**Hours: 9**

Analog and digital network: Access to ISDN-broadband ISDN-X.25 Layers- Atm – Repeater – Bridges – Routers – Gateway - TCP/IP Network - World Wide Web.

Unit IV:Introduction to Programming in C**Hours: 9**

Basic structure of C Program – character set – identifiers and keywords constants and variables - data types – operators and expressions – Relational, Logical and Assignment operators – increment and decrement operators – Arithmetic expressions – Mathematical functions.

Unit V: Preliminaries And Functions**Hours: 9**

Data input and output – getchar, putchar, scan f, print f, gets, puts functions – Decision making – branching and looping – if, if-else, else if ladder, switch, break, continue, goto – while, do while – for, nested loops – Arrays (one dimensional and two dimensional) – declaration – initialization – simple programs.

COURSE OUTCOMES**After finishing this course, the student will be knowing:**

1. the different aspects of digital data communication and networks
2. the art of multiplexing signals and its advantages and applications.
3. The ideas about broadband, layers, repeaters, bridges and gateway
4. the keywords, operators, expressions and functions in C program.
5. the input and output, branching, loop, arrays etc., in C program.

Text books:

1. Balagurusamy.E, (2008), *Programming in ANSI C*, Second Edition, Tata McGraw Hill.
2. Brijendra Singh, *Data, Communications, and Computer Networks*, second edition, PHI

Supplementary Readings:

1. KamthaneAshok.N, (2013), *Programming in C*, 2nd Edition, Pearson Education.
2. Yashvant P. Kanetkar, (2008), *Let us C*, 8th Edition, Infinity science press.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	2	3	2	3	3
CO4	3	3	3	3	2
CO5	3	2	3	2	3

CORRELATION LEVELS: 1- LOW, 2- MODERATE, 3- HIGH

ANNAMALAI UNIVERSITY
BACHELOR OF SCIENCE
B.Sc. PHYSICS DEGREE COURSE
(With effect from 2021 - 2022)

The Course of Study and the Scheme of Examinations

SEMESTER III							CIA	Uni. Exam	Total
16.	I	Language	Paper-3	6	4	Tamil/Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	5	4	Electricity, Magnetism and Electromagnetism	25	75	100
	III	Core Practical	Paper-2	3	0		0	0	0
19.	III	Allied-2	Paper-3	6	3	Mathematics I	25	75	100
20.	IV	Skill Based Subject	Paper-1	2	2	Basic Electrical Technology	25	75	100

21.	IV	Non-Major Elective	Paper-1	2	2	Environmental Physics	25	75	100
		Sem. Total		30	19		150	450	600
SEMESTER IV									
22.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23.	II	English	Paper-4	6	4	English	25	75	100
24.	III	Core Theory	Paper-4	5	5	Waves and Optics	25	75	100
25.	III	Core Practical	Practical-2	3	3	Any 15 Experiments given in the syllabus	25	75	100
26.	III	Allied-2	Paper-4	6	5	Mathematics II	25	75	100
27.	IV	Skill Based Subject	Paper-2	2	2	Physics Workshop Skills	25	75	100
28.	IV	Non-Major Elective	Paper-2	2	2	Everyday Physics	25	75	100
		Sem. Total		30	25		175	525	700

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200

	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	1	2		100	100
	Electives	3	3	9	100	300
	Core	9	(3-5)	43	100	900
	Core practical	4	(2-3)	11	100	400
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	43		140		4200

Note: Compulsory Project

The faculty/Guides are advised to give projects and suggest project titles focusing more on the current field of research/social relevance and ensure the level of innovation. Staff member cannot guide more than five students for a group project.

A student may be permitted to work on projects in an Industrial/Research Organization, on the recommendations of the Head of his/her Department. In such cases, the Project work shall be jointly guided by a guide of the department and an expert from the organization. The student shall be instructed to meet the respective guide periodically for evaluating the progress.

ELECTIVE SUBJECTS

Students can choose any one of the groups (Elective I, II & III)

GROUP A

Elective 1: Digital Electronics

Elective 2: Fundamentals of Microprocessor-8085

Elective 3: Nanophysics

GROUP B

Elective 1: Digital Electronics

Elective 2: Materials Science

Elective 3: Medical Physics

GROUP C

Elective 1: Digital Electronics

Elective 2: Radiation Safety

Elective 3: Astrophysics

ANNAMALAI UNIVERSITY

B.Sc. PHYSICS

SYLLABUS

CBCS PATTERN

(With effect from 2020 - 2021)

SEMESTER III

CORE PAPER-3

Electricity, Magnetism & Electromagnetism

Course Objectives

1. Familiarize with the concept of electric flux, electric potential and capacitors.
2. To know the principles current and thermo electricity.
3. Understand the magnetic effects of electric current.
4. Study the unification of electric and magnetic phenomena.
5. To gain knowledge about Maxwell's equations.

UNIT- I

ELECTROSTATICS

Coulomb's Law- Gauss's Law and its applications (Electric Field due to a uniformly charged sphere, hollow cylinder & solid cylinder)-Electric Potential - Potential at a point due to a uniformly charged conducting sphere-Principle of a capacitor-Capacity of a spherical and cylindrical capacitors- Capacitance of a parallel plate capacitor-Partially filled with dielectric-Energy stored in a charged capacitor-Loss of energy on sharing of charges between two capacitors-Problems solving.

UNIT - II

CURRENT ELECTRICITY AND THERMO ELECTRICITY

Carey Foster's Bridge-Determination of temperature coefficient of resistance of a coil-Potentiometer-Calibration of Ammeter and Voltmeter (Low range and High range) -Comparison of Resistances- Seebeck, Peltier and Thomson effects -Peltier coefficient - Thomson coefficient - application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients - thermo electric power and thermo electric diagrams-Problems solving.

UNIT- III

ELECTROMAGNETIC INDUCTION

Laws of electromagnetic induction- Self and mutual induction- Self-inductance of a solenoid-Mutual inductance of a pair of solenoids-Coefficient of coupling-Experimental determination of self (Rayleigh's method) and mutual inductance-Growth and decay of current in a circuit containing L and R-Growth and decay of charge in a circuit containing C and R-Measurement of High resistance by leakage-Problems solving.

UNIT- IV

MAGNETISM

Intensity of Magnetization-Magnetic Susceptibility- Magnetic Permeability-Types of magnetic materials- Properties of para, dia and ferromagnetic materials-Langevin's theory of dia and para magnetism-Weiss's theory of ferromagnetism - B-H curve-Energy loss due to magnetic hysteresis- Ballistic Galvanometer method for plotting B-H curve - Magnetic properties of iron and steel-Problems solving.

UNIT- V

MAXWELL'S EQUATIONS & EMT

Introduction-Displacement Current-Maxwell's equations in material media-Plane electromagnetic waves in free space-velocity of light-Electromagnetic waves in isotropic non-conducting media-Index or refraction-Poynting vector-Problems solving

Text Books

Unit 1 to Unit 4

1. R Murugesan- Electricity and magnetism, S Chand & Co., New Delhi, 2006.

Unit 4 and Unit 5

1. R Murugesan- Electricity and magnetism, S Chand & Co., New Delhi, 2006
2. K KTewari, Electricity & Magnetism by, S Chand & Co.,2001.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.
2. D.C. Tayal, Electricity and Magnetism, Himalay Publishing House,Bombay, 1992.
3. M Narayanamurthy& N Nagarathnam, Electricity & Magnetism, National Publishing Co., Meerut.
4. David J Griffiths, Introduction to Electrodynamics, Prentice Hall of India, Pvt. Ltd., New Delhi, 1997.

E-Materials

1. https://en.wikipedia.org/wiki/Coulomb%27s_law
2. <https://www.toppr.com/guides/physics/electric-charges-and-fields/coulombs-law/>
3. https://www.youtube.com/watch?v=rkntp3_cZl4
4. <https://ask.learnrbse.in/t/derive-an-expression-for-the-capacitance-of-a-parallel-plate-capacitor/66928>
5. <http://egyankosh.ac.in/bitstream/123456789/18820/1/Experiment-6.pdf>
6. <https://www.youtube.com/watch?v=vGpXTq-ITCE>

7. https://en.wikipedia.org/wiki/Thermoelectric_effect
8. <https://ww.topperlearning.com/answer/derive-the-formula-for-self-inductance-of-a-solenoid/8k8rlhzff>
9. https://www.brainkart.com/article/Self-inductance-of-a-long-solenoid_12109/
10. <https://byjus.com/physics/diamagnetic-paramagnetic-ferromagnetic/>
11. https://www.youtube.com/watch?v=yWa_2P6CDpw
12. <https://nptel.ac.in/courses/115/101/115101005/>
13. <https://www.youtube.com/watch?v=4vEeG-YmCJQ> (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to know fundamentals coulomb's law and Gauss's law and also able to derive the expression for electric potential, capacitance of a parallel plate capacitor.
2. After studied unit-2, the student will be able to derive the expression for temperature coefficient resistance of a coil using Carey Foster's Bridge and able to know how to calibrate the ammeter and voltmeter. Also able to learn the thermo electricity concept.
3. After studied unit-3, the student will be able to explain the concepts of self and mutual inductance using electromagnetic induction phenomenon.
4. After studied unit-4, the student will be able to distinguish the dia, para and ferro magnetic materials based on different theories.
5. After studied unit-5, the student will be able formulate the expression for displacement current and Maxwell's equations.

ALLIED - 2
Paper -3
MATHEMATICS - I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots-Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ .

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai

4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

**SKILL BASED SUBJECT
PAPER-1
Basic Electrical Technology**

Course Objectives

1. Students can know the basic principles of electricity.
2. To expose the knowledge on different kinds of cells and batteries.
3. To state the different theorems for DC circuits and know the function of DC generator/motor.
4. To acquire the basic ideas of alternating voltage and current.
5. To know the principle of transformers and motors.

UNIT- I

BASIC ELECTRICITY PRINCIPLES

Voltage, Current, Resistance, and Power-Ohm's law- Resistors Series, parallel - combinations - Series-Parallel combinations - Charge-Coulomb's law-Capacitors-Capacitance of capacitor-AC Electricity-LT/HT Line-Concept of neutral and earth-Application of fuse- MCB, ELCB- relays -Electrical Safety- Safety Precautions of Electricity -Electric Shock-Preventive measures of Electrical Shock.

UNIT- II

CELL AND BATTERIES

Dry Cell -Voltaic Cell-Daniel cell-Leclanche cell-Secondary Cell and its Classification-Lithium Ion Battery- Disparity between Lead Acid Battery and Lithium Ion Battery-Hydrogen battery-UPS Battery -Solar cell-Principle and design.

UNIT- III

DC CIRCUITS

Kirchhoff's Current and Voltage Law-Wheatstone's bridge-Source conversion-Superposition theorem-Thevenin's theorem-Norton's theorem-Joule's law of electric heating-Electric power-D.C generator-Construction and working-D.C motor-Speed of a D.C motor.

UNIT - IV

AC FUNDAMENTALS

Generation of Alternating voltages and alternating currents-Equations of the alternating voltages and currents-Simple waveforms - Cycle-Time Period - Frequency-Amplitude-Different forms of emf equation - Phase-Phase difference-RMS, Average and Peak values-RLC circuit in series-Resonance in RLC circuit-Graphic representation of series resonance-Single phase and three phase connections-Star and delta connection.

UNIT- V

TRANSFORMERS & MOTORS

Transformer-Step and Step down transformers-Construction and working-Losses in a transformer-Efficiency of a transformer-Types of a transformers-AC generator/alternator-Principle and construction-Single phase and three phase induction motors-Principle and construction

Text Books

Unit-1 to Unit-5

1. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, S. Chand & Company Ltd., New Delhi, 2008.
2. B.L. Theraja and A.K. Theraja, A Text book of Electrical Technology, Volume I & II, Chand & Company Ltd., New Delhi, 2007.

Reference Books

1. V.K. Mehta and Rohit Mehta, Basic Electrical Engineering, S. Chand & Company Ltd., New Delhi, 2009.
2. Basic Electrical Engineering-Vocational Theory-Plus One Text Book-TN State Board.

E-Materials

1. <https://www.electrical4u.com/>
2. <https://www.youtube.com/watch?v=WtymNvcBdIU>
3. <https://www.atlantictraining.com/blog/15-safety-precautions-electricity/>
4. <https://www.explainthatstuff.com/solarcells.html>
5. https://www.youtube.com/watch?v=L_q6LRgKpTw
6. <https://www.youtube.com/watch?v=3rOvQ3qFZpI>
7. https://en.wikipedia.org/wiki/Wheatstone_bridge
8. <https://www.electronics-tutorials.ws/accircuits/series-resonance.html>
9. <https://www.youtube.com/watch?v=smXF1UeN0EI> (Tamil video)
10. <https://www.youtube.com/watch?v=hXLA5sdT9Cs>
11. <http://www.circuitstoday.com/transformer>

Course Outcomes

1. After studied unit-1, the student will be able to know principle of Voltage, Current, Resistance, Ohm's law and Electrical safety.
2. After studied unit-2, the student will be able to distinguish between cells and batteries and able to explain the different types of batteries.
3. After studied unit-3, the student will be able to understand the Wheatstone's bridge, Thevenin and Norton's theorem and also able to describe the function of DC generator and motor.

4. After studied unit-4, the student will be able to know the fundamentals of alternating currents and voltages and able to differentiate the single phase and three phase connections.
5. After studied unit-5, the student will be able to acquire the principle and construction of transformers and its types and also able to demonstrate the function of AC generator.

NON-MAJOR ELECTIVE
PAPER-1
ENVIRONMENTAL PHYSICS

Course Objectives

1. Students will have the basic knowledge about atmosphere, weather and cyclones.
2. To understand the reasons for climate change and global warming.
3. To analyse the need and usage of non-conventional energy resources.
4. To learn the concepts of Radiation detection.
5. To realise the importance of Radiation safety measures.

UNIT- I

ATMOSPHERIC PHYSICS

Basics of the structure and composition of atmosphere - Layers of atmosphere - Measurement of atmospheric pressure and temperature - Weather patterns - Weather analysis and forecasting - Characteristics of cyclones and anti-cyclones.

UNIT- II

CLIMATE CHANGE

Climate - Definition and classification - Basic reasons for climate change - Greenhouse effect and gases - Effects of global warming - Ozone depletion - Acid rain.

UNIT- III

ENERGY RESOURCES

Need for non-conventional energy resources- Solar water heater - Solar cell -Merits and Demerits of Solar energy - Wind energy conversion systems - Bio mass energy - Bio gas generation - Industrial applications.

UNIT- IV

RADIATION DETECTION

Nuclear reactions - Nuclear fission and fusion - Interaction between energetic particles and matter - Ionisation Chamber - Proportional counter - Geiger Muller Counter - Wilson cloud chamber - Diffusion cloud chamber - Bubble chamber - Nuclear emulsions - Scintillation counter - Cerenkov counter.

UNIT- V

RADIATION SAFETY

Biological effects of nuclear radiations - Radiation hazards - Radiation protection standards - Radiation protection methods -Nuclear waste disposal management - Nuclear disasters - Chernobyl disaster - Hiroshima and Nagasaki disaster - Nuclear reactors in India - Radiation safety measures in India.

Text Books

Unit 1 and Unit 2

1. Frederick Lutgens K, Edward J Tarbuck, Dennis Tasa, Atmosphere- An Introduction to Meteorology, Prentice Hall of India.
2. S.R.Ghadekar, Meteorology, Agromet Publishers, 2001.
3. AnupChatterjee, Global Warming and Climate Change, Global publications.

Unit 3

1. B.H.Khan, Non-Conventional Energy Resources, McGraw Hill Publications.
2. Agarwal, Renewable and Sustainable Energy Sources,

Unit 4 and Unit 5

1. R.Murugesan, Modern Physics, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2007
2. S.N.Ghoshal, Nuclear Physics, S.Chand& Co, New Delhi, 2006
3. AN.Subrahmaniyam, Brijlal, Atomic and Nuclear Physics, S.Chand&Co, New Delhi, 2006
4. K.Gopalakrishnan, Atomic and Nuclear Physic, Mcmillan Publishers, 2006

Reference Books

1. I.C.Joshi, Aviation Meteorology, Himalayan Books, 2014
2. V.Devanathan, Nuclear Physics, Narosa Publishing House, New Delhi, 2013.
3. D.P. Kothari, K.C. Singal & Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies, Prentice Hall of India pvt. Ltd., New Delhi, 2008.
4. A.Martin and S.A.Harbisor, An Introduction to Radiation Protection, John Wiley & Sons, 1981.
5. Atmospheric Science - An Introductory Survey, John M.Wallace, Peter V.Hobbs, Elsevier Publishers
6. NCRP, ICRP, ICRU, IAEA, AERB publications

E-Materials

1. <https://easyengineering.net/non-conventional-energy-resources-khan/>
2. <http://nap.edu/631>
3. <https://ocw.mit.edu/courses/nuclear-engineering/22-091-nuclear-reactor-safety-spring-2008/>
4. https://en.wikipedia.org/wiki/Atmosphere_of_Earth
5. <https://www.youtube.com/watch?v=zaQWhEtLxeU> (Tamil video)

6. <https://www.youtube.com/watch?v=Nf8cuvl62Vc>
7. https://en.wikipedia.org/wiki/Acid_rain
8. https://nptel.ac.in/content/storage2/courses/108108078/pdf/chap7/teach_slides07.pdf
9. <https://www.youtube.com/watch?v=Rf9whdycpLI>
10. <https://www.youtube.com/watch?v=WyyIuiV4rKE>
11. https://en.wikipedia.org/wiki/Geiger_counter

Course Outcomes

1. After studied unit-1, the student will be able to basic concepts of atmosphere and also able to know how it can be measured and study the characteristics of cyclones.
2. After studied unit-2, the student will be able to explain the details of climate, greenhouse effect and global warming.
3. After studied unit-3, the student will be able to describe the different renewable energy sources and its applications.
4. After studied unit-4, the student will be able to know how to detect the nuclear radiation with different instruments.
5. After studied unit-5, the student will be able to know how to saveourselves from nuclear radiation hazards.

SEMESTER IV

CORE PAPER-4

Waves and Optics

Course Objectives

1. To expose the knowledge of different types of waves motion and oscillations.
2. To study the property of surface tension and viscosity of a liquid.
3. To learn the different types of aberrations and phenomenon of interference.
4. To teach the Fresnel's and Fraunhofer's class diffraction and its applications.
5. To know the basics of polarization phenomenon.

UNIT- I

WAVES & OSCILLATIONS

Progressive waves-Equation for progressive wave-Simple harmonic motion - Superposition of Two Perpendicular Harmonic Oscillations - Lissajous Figures - Forced oscillations-Differential equation and solution-Laws of transverse vibration of stretched string - Sonometer-Frequency of AC mains - Acoustics-Intensity and Loudness-Reverberation and reverberation time - Absorption coefficient - Sabine's formula -measurement of reverberation time - Acoustic aspects of halls and auditoria - Ultrasonics-Production-Piezoelectric oscillator - Applications-Non Destructive Testing (NDT)-B-Scan-Problems solving

UNIT- II

FLUIDS

Surface Tension-Excess pressure inside a curved liquid surface-Synclastic and anticlastic surface - Surface tension-Jaeger's method-Drop weight method-Interfacial surface tension- Variation of surface tension with temperature - Viscosity-Poiseuille's formula - Determination of coefficient of viscosity of a liquid -Burette method-Variations of viscosity of a liquid with temperature and pressure - Lubrication-Problems solving

UNIT- III

GEOMETRICAL OPTICS & INTERFERENCE

Spherical aberration in lenses -Condition for minimum spherical aberration in the case of two lenses separated by a distance-Chromatic aberration in lenses - Condition for achromatism of two thin lenses(in contact and out of contact) - Astigmatism-Huygen's and Ramsden's eyepieces - Air wedge- Determination of diameter of a thin wire by air wedge- Fringes of equal thickness-Michelson's Interferometer-Determination of wave length- Thickness of thin transparent material-Refractive index of gases -Jamin's& Rayleigh's Interferometers-Problems solving

UNIT- IV

DIFFRACTION

Fresnel's diffraction-Diffraction at circular aperture and straight edge- Fraunhofer's diffraction -Single slit-Theory of Plane diffraction grating -Experiment to determine wavelength-normal incidence- Determination of wavelengths-Missing orders-Overlapping spectra-Rayleigh's criteria -Resolving power of telescope-Microscope-Prism - Grating-Distinguish between prism and grating spectra-Problems solving

UNIT- V

POLARISATION

Introduction to polarisation-Brewster's law- Double refraction-Huygen's explanation of double refraction in uniaxial crystal-Nicol Prism-Double image polarizing prisms-Dichroism -Polaroids and their uses-Production and detection of Plane, circularly and elliptically and polarized light -Optical Activity -Fresnel's explanation of optical activity -Specific Rotation-Laurent's Half Shade Polarimeter -Faraday effect-Problems solving

Text Books

Unit 1 to Unit 2

1. K. Ilangovan, Properties of Matter and Sound, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2018.
2. J.Jayachitra and M. Gunasekaran, Properties of Matter and Acoustics, KRU Publications, Kumbakonam, 2007.

Unit 3 to Unit 5

1. N.SubrahmanyamBrijlal and M.N Avadhanulu, A Text Book of Optics, S.Chand& Co.Ltd, New Delhi, 2015.
2. R. Murugesan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

Reference Books

1. R. Murugesan, Properties of Matter and Acoustics, S.Chand&Co.Ltd, New Delhi, 2016
2. BrijLal and N. Subrahmanyam, Properties of Matter, S.Chand&Co.Ltd, New Delhi, 2002
3. N.Subrahmanyam and BrijLal, A Text Book of Sound,Vikas Publications, New Delhi,1982.
4. C.L.Arora, Waves, Vibrations & Sound, S.Chand&Co.Ltd, New Delhi, 1984.
5. B.K. Mathur, Principles of Optics, Gopal Printing, 1995

6. H.R. Gulati and D.R. Khanna, Fundamentals of Optics, R. Chand Publication, 2011.

E-Materials

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/shm.html>
2. <https://www.youtube.com/watch?v=tudxily5Qu0>
3. https://en.wikipedia.org/wiki/Surface_tension
4. <https://www.youtube.com/watch?v=CC7Q5cvmuTA> (Tamil video)
5. https://www.youtube.com/watch?v=aKY_GnwDyZc
6. https://ta.wikipedia.org/wiki/%E0%AE%AA%E0%AE%9F%E0%AE%BF%E0%AE%AE%E0%AE%AE%E0%AF%8D:Chromatic_aberration_lens_diagram.svg (Tamil)
7. https://www.diffen.com/difference/Fraunhofer_Diffraction_vs_Fresnel_Diffraction
8. <https://www.youtube.com/watch?v=Q-oQKSLhLKw>
9. <https://www.slideshare.net/AnuroopAshok/polarization-birefringence-and-huygens-theory-of-double-refraction>
10. https://www.youtube.com/watch?v=lhUUGWA_uFE

Course Outcomes

1. After studied unit-1, the student will be able to formulate the equation for plane progressive wave and able to understand the concept of simple harmonic motion and other types of waves
2. After studied unit-2, the student will be able study the property of surface tension of a liquid and know how the surface tension varies with temperature and also able to explain the property of viscosity of a liquid.
3. After studied unit-3, the student will be able to describe the different optical of a lens system and able to design the eyepieces. Also able to know the phenomenon of interference and its applications.
4. After studied unit-4, the student will be able to distinguish between Fresnel class of diffraction and Fraunhofer class of diffraction. Also formulate the expression for resolving power of telescope, microscope, prism and grating.
5. After studied unit-5, the student will be able to explain the phenomenon of polarization and able to study the double refraction in uniaxial crystals. Also they can define optical activity, specific rotation and know the applications of polaroids.

ALLIED - 2
Paper - 4
MATHEMATICS - II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume - Fourier series for functions in $(0, 2\pi)$ and $(-\pi, \pi)$.

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Gauss, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) *Allied Mathematics* Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, *Allied Mathematics*. New Gamma Publishing House, Palayamkottai

**SKILL BASED SUBJECT
PAPER-2
Physics Workshop Skills**

Course Objectives

1. Employ the specific skills in the testing of instruments.
2. Express the functions and working of different power supply system
3. To know the principle and working of different electrical and electronics appliances
4. State the concept of mobile Communication in real time process and digital communication.
5. Explain the Identification, classification, and working principle of various Biomedical Instruments and application of these instruments in diagnosis, therapeutic treatment and imaging fields

UNIT- I

TESTING OF DISCRETE COMPONENTS

Resistors- types - Characteristics -Colour coding -resistors in series and parallel - Capacitors - types -Capacitor in Series and Parallel - Multimeter Analog and Digital - How to Use a Multimeter -Testing of Voltage - Current Continuity (Testing of Fuse) - Resistance -Diode and Transistor-Design of Bread board-Soldering Technique used in PCBs.

UNIT- II

POWER SUPPLY

Power Supply Unit-Parts of Power Supply- Regulated power supply- Zener diode voltage regulator- IC Voltage - Regulators - Inverter-Uninterrupted power supply (UPS) - Switched mode power supply (SMPS)-Cathode Ray Oscilloscope (CRO) and measurement of time period and frequency - Function generator.

UNIT- III

ELECTRICAL & ELECTRONICS APPLIANCES

Electric iron Box-Electric Fan-Construction and Working of Ceiling and Table fans-Water Heater - Types-Function -Wet Grinder-Mixer Grinder-Principle and Design

Microwave Oven-Washing Machine - Function - Types-Semi and Fully Automatic-Top and Front loading-Fuzzy logic washing machine technology – Refrigerator-Air Conditioner-Principle and Design.

UNIT- IV

MASS AND MEDIA COMMUNICATION

Mobile Communication (GSM) -Android version- USB - Various Types of USB Cable and Connectors - VGA- AV port - HDMI- DVI - S Video and Display port- Bluetooth - Wi-fi and Li-fi - Direct broadcast satellite (DBS)- DTH and DTT- Radar Communication System.

UNIT-5

BIO-MEDICAL INSTRUMENTATION

Principle, description, function and recording of ECG, EMG and EEG -artificial pace maker- simulators -Heart lung machine –ventilators and nebulizers-Kidney dialysis machine- pH meter - Laser blood flow meter–Thermal scanner and pulse oximeter.

Text Books

Unit-1

1. B.L. Theraja, A Text book of Electrical Technology, S.Chand& Co., New Delhi, 2007.

Unit-2

1. I.Abraham, Switching Power Supply Design, Keith Billings, Taylor Morey - McGraw Hill.
2. Fundamentals of Power Supply Design: Technology from the Unitrode/Texas Instruments.
3. Robert A. Mammano, Power Supply Design Seminars, , Texas Instruments, 2017.

Unit-3

1. S.P. Bali, Consumer Electronics -, Pearson Education, New Delhi, 2005.
2. Basic Electrical Engineering -Vocational Theory-Plus One Text Book-TN State Board.

Unit-4

1. V.K. Metha, Principles of Electronics, V K Metha, S Chnd&Co.,New Delhi, 2001.
2. V. JeyasriArokiasamy, Mobile Communications,Technical Publications, 2009.
3. John Vivianand Peter Maurin, The Media of Mass Communication,Pearson Education Canada, 2008.
4. R.R. Gulati, Modern Television Practice Principles, Technology & Servicing, New Age International, 2007.
5. K. F. Ibrahim, Newness Guide to Television and Video Technology, Elsevier, 2007.
6. Richard Wise and Routledge, Multimedia: A Critical Introduction, 2005.
7. V.S.Bagad, ,RadarSystem,Technical Publications, 2009.

Unit-5

1. M.Arumugam M, Biomedical Instrumention, Anuradha Publications, Kumbakonam, 2011.
2. V.Yuvaraj, Instrumentation Techniques, Sri Krishna Publications, 2020.
3. Webster, Bioinstrumentation, John Wiley & Sons, 2007.

Reference Items: books, Journal

1. I.J. Nagrath and D. P. Kothari, Electrical Machines, Tata McGraw Hill, 1997.
2. M. D. Singh, K. B. Khanchandani Power Electronics, Tata McGraw Hill, 2006.

E- Materials

1. <https://www.electronicsforu.com/>
2. <https://learnabout-electronics.org/>
3. <https://www.scienceabc.com/innovation/usb-type-c-different-usb-type-type-b.html>
4. <https://www.electronics-tutorials.ws/supplies/power-supplies-for-beginners-part-1.html>
4. <https://electronicspost.com/basic-electronics-tutorials/>
5. <https://www.electrical4u.com/>
6. <https://lecturenotes.in/subject/199/analytical-instrumentation-ai>
7. <https://blog.beaconstac.com/2016/05/li-fi-vs-wi-fi-vs-ibeacon-ble-technology/>
8. <https://www.makeuseof.com/tag/video-cables-explained-difference-vga-dvi-hdmi-ports/>
9. <https://www.ses.com/differences-between-dth-and-dtt>
10. <https://www.ifixit.com/Guide/How+To+Use+A+Multimeter/25632#s64987>
11. <http://electrotel.com.ar/handbook-of-analytical-instruments-r-s-khandpur-download-full-version.pdf>
12. <https://sidneymayireg.files.wordpress.com/2017/04/>
13. <https://en.wikipedia.org/wiki/Electrocardiography>
14. <https://www.youtube.com/watch?v=YbBSf8bnYgw>
15. <https://www.youtube.com/watch?v=1ndqOnjxAU0> (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to test the instruments with specific skills
2. After studied unit-2, the student will be able to express the functions and working of
Linear power supply.
3. After studied unit-3, the student will be able to know the basics of analytical instruments and how to calibrate it.
4. After studied unit-4, the student will be able to explain mobile communication and radar communication system.
5. After studied unit-5, the student will be able to demonstrate the principle and working
of various biomedical equipment.

NON MAJOR ELECTIVE

PAPER-2

Everyday Physics

Course Objectives

1. Students can able to understand the basic measurements and mechanics.
2. To learn the principle applied in Pressure cooker, Refrigerator and Air-conditioner.
3. To know the construction and working of various electrical appliances.
4. To study the fundamentals of laser and its applications.
5. To know the different biomedical instrumentation techniques.

UNIT- I

MEASUREMENTS & MECHANICS

Fundamental quantities-System of Units-CGS,FPS,MKS and SI-Verniercalliper, Screw gauge and their utility-Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet-Newton's law of motion- Lever mechanism - Pulleys-Force -Weight -Work -Energy -Power-Horsepower -Circular motion-Banking of curved tracks.

UNIT-II

THERMO AND HYDRODYNAMICS

Variation of boiling point with pressure - Pressure cooker - First and Second law of thermodynamics-Refrigerator - Air Conditioner - Principle and construction-Bernoulli Theorem-Applications.

UNIT - III

ELECTRICAL APPLIANCES

Electric iron Box-Electric Fan-Construction and Working of Ceiling and Table fans-Water Heater -Types-Function -Wet Grinder-Mixer Grinder-Principle and Design.

UNIT- IV

LASER

Power of a Lens-Human eye- Defects of vision - Laser-Spontaneous emission - Stimulated emission -Meta stable state -Population inversion -Pumping - Laser Characteristics- Ruby Laser - Helium-Neon Laser-Applications of Laser-Laser cutting - Welding- Drilling -Lasers in Surgery - Lasers in ophthalmology.

UNIT- V

BIOMEDICAL INSTRUMENTATION

Digital thermometer-Digital BP apparatus-One touch Glucometer–thermal scanner-pulse oximeter-Lipid profile test-pH meter-BMI calculator - Ventilator-Principle, description, function and recording of ECG, EMG and EEG- artificial pace maker.

Text Books

Unit 1& Unit 2

1. N. Subrahmanyam and BrijLal, Principles of Physics, S.Chand&Co.,Ltd, Chennai.
2. Plus one Physics Book-TN state Board and NCERT Books.
3. D. Jayaraman, K. Ilangovan, Thermal Physics & Stastical Mechanics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2016.
4. BrijLal and N Subrahmanyam, Heat and Thermodynamics, S Chand & Company PvtLtd, New Delhi, 2016.

Unit 3

1. S.P. Bali, Consumer Electronics -, Pearson Education, New Delhi, 2005.
2. Basic Electrical Engineering -Vocational Theory- Plus One Text Book-TN State Board.

Unit 4

1. R. Murugesan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

Unit 5

1. M.Arumugam M, Biomedical Instrumentation, Anuradha Publications, Kumbakonam, 2011.
2. V.Yuvaraj, Instrumentation Techniques, Sri Krishna Publications, 2020.

Reference Books

1. Fundamentals of Physics by D. Hallidy, R. Rensick and J. Walker, 6th Edition, Wiley, NY, 2001.
2. BrijLal and N Subrahmanyam, Heat and Thermodynamics, S Chand & Company PvtLtd, New Delhi, 2016.
3. R. Murugesan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

E-materials

1. https://www.youtube.com/watch?v=M_kHKSKmT6o
2. <https://www.toppr.com/content/concept/fundamental-quantities-and-fundamental-units-208185/>

3. <https://www.youtube.com/watch?v=T-mRqCjv6ak> (Tamil video)
4. <https://www.jagranjosh.com/general-knowledge/the-human-eye-and-its-defects-1456386342-1>
5. https://www.youtube.com/watch?v=c4_5ftlYTbI
6. <https://en.wikipedia.org/wiki/Laser>
7. <https://www.youtube.com/watch?v=oUEbMjtWc-A>
8. <https://techblog.livongo.com/how-do-blood-pressure-monitors-work/>
9. <https://www.youtube.com/watch?v=7oKNewTSF7M>
10. <https://www.youtube.com/watch?v=-UJf-GHz7x4> (Tamil video)
11. <https://www.smartbmiccalculator.com/>

Course Outcomes

1. After studied unit-1, the student will be able to know the fundamental quantities and units and able to some basic ideas of mechanics.
2. After studied unit-2, the student will be able to demonstrate the construction and working of pressure cooker, refrigerator, air conditioner devices.
3. After studied unit-3, the student will be fundamental principles applied in our day today life electrical appliances.
4. After studied unit-4, the student will be able to know the basic properties of laser and characteristics and able to design solid and gas lasers.
5. After studied unit-5, the student will be able to demonstrate the principle and working of biomedical equipment will be used in our daily life.

CORE PRACTICAL-2

Semester: III & IV

Core Practical -2

List of Experiments (Any 15 Experiments only)

1. Young's modulus non-uniform bending –optic lever.
2. Young's modulus uniform bending-Pin and microscope.
3. Searle's double bar pendulum- Determination of Young's modulus, Rigidity modulus and Poisson's ratio
4. Sonometer- Frequency of AC mains - Steel and Brass wires.
5. Spectrometer -i-d curve- μ of a Prism.
6. Spectrometer -Grating -N and λ -Normal incidence method.
7. Spectrometer -Grating -N and λ -Minimum deviation method.
8. Air wedge - Thickness of a thin wire.
9. Carey Foster's bridge - Temperature coefficient of resistance of a coil
10. Potentiometer -Calibration of highrange Ammeter.
11. Potentiometer - Resistance and specific resistance of a wire.
12. Figure of merit- Table Galvanometer.
13. Field along the axis of a circular coil carrying current-Determination of B_H .
14. BG- Figure of merit - Charge sensitiveness.
15. BG- Comparison of capacitances of capacitors.
16. BG- Comparison of emf of two cells.
17. Deflection magnetometer and vibration magnetometer-Determination of m and B_H -
Tan C position.
18. Low range power pack –Bridge Rectifier.
19. Voltage regulator -Bridge Rectifier-Using a Zener diode.
20. Voltage regulator -Bridge Rectifier-Using IC 7805.
21. Transistor characteristics-Common emitter mode.
22. Logic gates-AND, OR (using diodes) and NOT (using transistor).
23. NAND and NOR gates-Universal gates.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Samir Kumar Ghosh, A Textbook of Advanced Practical Physics, NCBA, Kolkatta,

2000.

2. D. Chattopadyay, P.C.Rakshit, An Advanced Course in Practical Physics, NCBA, Kolkatta, 2011
3. C.L.Arora, B.Sc., Practical Physics,S. Chand and Company., New Delhi.
4. D.P..Khandelwal D.P., A Laboratory Manual of Physics for Undergraduate Classes.
Vani Publications.
5. B.Saraf et al, Physics through Experiments,Vikas Publications.
6. Harnaam Singh., B.Sc., Practical Physics,S. Chand and Company., New Delhi.
7. D C Tayal, University Practical Physics, Himalaya Publishing House.
8. Gupta & Kumar, Practical Physics, Pragatiprakashan, Meerut.

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. PHYSICS

DEGREE COURSE

(With effect from 2022 - 2023)

SEMESTER V									
30.	III	Core Theory	Paper-5	6	6	Atomic and Molecular Physics	25	75	100
31.	III	Core Theory	Paper-6	6	6	Relativity and Quantum mechanics	25	75	100
32.	III	Core Theory	Paper-7	6	6	Basic and Applied Electronics	25	75	100
	III	Core Practical	Practical-3	3	0	General Practical	0	0	0
	III	Core Practical	Practical-4	3	0	Electronics Practical	0	0	0
33.	III	Elective	Paper-1	4	3	Group (A) or (B) or (C)	25	75	100
34.	IV	Skill Based Subject	Paper-2	2	2	Cell Phone Technology	25	75	100
		Sem. Total		30	23		125	375	500
SEMESTER VI									
35.	III	Core Theory	Paper-8	6	5	Nuclear and Particle Physics	25	75	100
36.	III	Core Theory	Paper-9	5	5	Solid State Physics	25	75	100
37.	III	Core Practical	Practical-3	3	3	General Practical	25	75	100
38.	III	Core Practical	Practical-4	3	3	Electronics Practical	25	75	100
39.	III	Elective	Paper-2	4	3	Group (A) or (B) or (C)	25	75	100
40.	III	Elective	Paper-3	4	3	Group (A) or (B) or (C)	25	75	100
41.	III	Compulsory Project	Paper-10	3	3	Group / Individual Project	25	75	100
42.	III	NMSDC III : Data Analytics with Advanced Tools for Employability	Paper-3	2	2	Project Based Learning III	25	75	100
43.	V	Extension Activities		0	1		100	0	100
		Sem. Total		30	28		300	600	900
		Grand Total			142				4300

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: V

Paper type: Core

Paper code: Name of the Paper: Atomic and Molecular Physics

Credit: 6

Total Hours per Week: 6 Lecture Hours: 90 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. To study the properties of cathode and positive rays and can formulate the expression for e/m
2. To know the structure of the atom and to understand the spectral lines.
3. To understand effects of magnetic field on atomic spectra
4. To acquire the knowledge about photoelectric effect and can derive the expression for Einstein's photoelectric equation.
5. To teach various energy levels viz., rotational, vibrational etc. and can understand the principle of Infrared spectroscopy, Raman effect and Laser

UNIT- I

Teaching Hours: 15

CATHODE AND POSITIVE RAYS

Properties of cathode rays-Mass of an electron-Determination of the electronic charge: Milikan's oil drop method-Dunnington's method for determining e/m -Properties of positive rays-Positive ray analysis-Thomson's parabola method-Aston's Mass spectrograph-Bain Bridge Mass spectrograph- Dempster's Mass Spectrograph-Mass defect and packing fraction.

UNIT - II

Teaching Hours: 20

ATOMIC STRUCTURE

Rutherford's Experiments on scattering of α -particle-Theory of α -particle Scattering-Rutherford formula-Bohr Atom model-Spectral series of hydrogen atom-Bohr Correspondence Principle-Critical potentials-Experimental determination of critical potentials-Drawbacks of Bohr Atom model- Sommerfeld's relativistic atom model-Vector atom model-Quantum numbers associated with the vector atom model-Coupling schemes

UNIT- III

Teaching Hours: 20

EFFECTS OF MAGNETIC FIELD ON ATOMIC SPECTRA

Pauli's exclusion principle - Periodic table- Magnetic dipole moment due to orbital motion of the electron-Magnetic dipole moment due to spin-Optical spectra-Fine structure of H_α line-Zeeman effect-Larmor's theorem-Quantum mechanical explanation of Zeeman effect-Anomalous Zeeman effect – Paschen-Back effect-Stark effect-Problems solving

UNIT- IV

Teaching Hours: 15

PHOTOELECTRIC EFFECT

Introduction-Lenard' method to determine e/m -Richardson and Compton experiment-Experimental investigations on the photoelectric effect-Laws of photoelectric emission-Einstein's photoelectric equation-Photo-emissive cell-Photo-voltaic cell-Photoconductive cell-Applications of photoelectric cells-Planck's quantum theory-Wien's displacement law-Derivation of Planck's law of radiation-Problems solving.

UNIT- V

Teaching Hours: 20

MOLECULAR PHYSICS

Introduction -Theory of the origin of pure rotational spectrum of a molecule-Non-Rigid Rotator-The energy of a diatomic molecule- Vibrating diatomic molecule as a harmonic oscillator-Infrared Radiation - Range of IR radiation-IR spectrometer – Instrumentation-Molecular vibrations of water molecule (H_2O)-Raman effect-Characteristics of Raman lines-Quantum theory of Raman effect-Raman spectrum of Nitrous oxide (N_2O) - Laser - Characteristics-Stimulated Emission-Population Inversion-Optical Pumping - He-Ne laser-Applications of Laser-Problems solving.

Text Books

Unit 1 to Unit 4

1. R. Murugesan and KiruthigaSivaprasath, ModernPhysics, S.Chand&Co.,Ltd, New Delhi,2016
2. B.L. Theraja, Modern Physics, S.Chand&CO.,Ltd, New Delhi,2016

Unit 4 and Unit 5

1. R. Murugesan and KiruthigaSivaprasath, Modern Physics, S.Chand&Co.,Ltd, New Delhi,2016
2. R. Murugesan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016

Reference Books

1. J.B. Rajam, Atomic Physics, S. Chand & Co Ltd., New Delhi, 2009.
2. Sehgal, Chopra and Sehgal, Modern physics, Sultan Chand & Sons, New Delhi.
3. S.N .Ghoshal, Atomic Physics, S. Chand & Co Ltd., New Delhi, 2004.
4. C.L.Arora, Modern Physics and Electronics, S. Chand & Co Ltd., New Delhi, 1992.
5. C.N. Banwell, Fundamentals of Molecular Spectroscopy,McGraw Hill Education; Fourth edition, 2017.
6. G. Aruldhas, Molecular structure and Spectroscopy, Prentice Hall of India, New Delhi, 2005.
7. William T. Silfvast, Laser fundamentals, University Press, Published in South Asia by Foundation books, New Delhi, 1998.
8. K. Thyagarajan and A.K. Ghatak, LASER Theory and Application, McMillan, India

Ltd, 1984.

9. அணு இயற்பியல்-A சுந்தரவேலுசாமி ,பிரியா பப்ளிகேஷன்ஸ், கரூர் (தமிழ் வழியில் பயிலும் மாணவர்களுக்கு)
10. நிறமாலையியலும் லேசர் இயற்பியலும்-A சுந்தரவேலுசாமி ,பிரியா பப்ளிகேஷன்ஸ், கரூர் (தமிழ் வழியில் பயிலும் மாணவர்களுக்கு).

E-Materials

1. <https://www.youtube.com/watch?v=wSe3oBZDTUI>
2. <https://vlab.amrita.edu/?sub=1&brch=195&sim=357&cnt=1>
3. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
4. <https://www.youtube.com/watch?v=CBUjVHq6Grs>
5. <https://www.youtube.com/watch?v=Ju-3Eu133KE>
6. https://en.wikipedia.org/wiki/Zeeman_effect
7. https://en.wikipedia.org/wiki/Photoelectric_effect
8. https://www.youtube.com/watch?v=O0wchw_Mi30
9. http://www.iiserpune.ac.in/~bhasapat/phy420_files/Demtroeder_rotovibrazioni.pdf
10. https://www.youtube.com/watch?v=gJc4_6NNIhM
11. <https://www.youtube.com/watch?v=djMVjULfRII> (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to know the properties of cathode rays and positive rays. Also will be able to study the determination of specific charge of an electron.
2. After studied unit-2, the student will be know the different atom models and can get an idea about coupling schemes..
3. After studied unit-3, the student will be able to study the Zeeman effect, Paschen Back effect and Stark effect.
4. After studied unit-4, the student will be able to know the basic idea of photoelectric effect and can able to derive the equation for Einstein's photoelectric equation.
5. After studied unit-5, the student will be able to study the rotational and vibrational energy of a molecule and also learn the Infrared spectra, Raman Effect and Laser.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	No
5	Yes	Yes	Yes	Yes	No	Yes

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	S	M	S	M	L
CO2	S	M	M	M	S	S	M	M	M	L
CO3	S	S	M	M	S	S	M	M	M	M

CO4	M	S	S	M	M	S	M	S	M	L
CO5	S	S	M	M	S	L	M	S	M	L

PO – Programme Outcome, CO – Course outcome S – Strong , M – Medium L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: V

Paper type: Core

Paper code: Name of the Paper: Relativity and Quantum Mechanics Credit: 6

Total Hours per Week: 6 Lecture Hours: 90 Tutorial Hours: Nil Practical Hours: Nil

Course Outcomes

1. To teach the fundamental aspects of relativity and special theory of relativity.
2. Ability to understand the concepts of matter waves and to study the phase velocity and group velocity.
3. To learn the Heisenberg's Uncertainty Principle and to derive the time dependent and time independent Schrödinger equation.
4. To apply the Schrödinger's equation to various quantum mechanical systems.
5. To expose the ideas of postulates of quantum mechanics and operators.

UNIT- I

Teaching Hours: 20

RELATIVITY

Introduction - Frame of reference - Newtonian relativity - Galilean Transformation equations - The Ether hypothesis - The Michelson -Morley experiment - Special theory of relativity - The Lorentz Transformation equations - Length contraction - Time Dilation - relativity of simultaneity- addition of velocities - variation of mass with velocity - Mass Energy equivalence -Minkowski's Four dimensional Space-Time continuum-General theory of relativity-Gravitational red shift.

UNIT- II

Teaching Hours: 15

WAVE MECHANICS

Inadequacy of classical mechanics -Matter waves - de Broglie wavelength - Expression for de Broglie wavelength-Other expressions for de Broglie wavelength- Phase velocity (wave velocity) of de Broglie waves-Group Velocity- Expression for Group velocity-Group velocity of de Broglie waves- Relation between group velocity and phase velocity-Davisson and Germer's experiment-G.P.Thomson's experiment.

UNIT- III

Teaching Hours: 20

SCHRODINGER EQUATION

Electron microscope-Heisenberg's Uncertainty Principle-Determination of position with γ -ray microscope-Diffraction of a beam of electrons by a slit-Elementary proof between Displacement and Momentum, Energy and Time- Derivation of time dependent form of Schrödinger equation-Time independent form of Schrödinger equation-Eigenvalues and Eigenfunctions-Physical significance of wave function-Orthogonal wave function-Normalized wave function.

UNIT-4

Teaching Hours: 15

APPLICATIONS OF SCHRÖDINGER EQUATION

The free particle-Particle in a box: Infinite square well potential-Rectangular Potential well-The Barrier Penetration problem-Tunnel effect-Linear harmonic oscillator-Energy levels-Zero point energy-Rigid rotator-Schrödinger's equation for the hydrogen atom-Separation of variables-Equations only.

UNIT-5

Teaching Hours: 20

OPERATOR FORMALISM OF QUANTUM MECHANICS

Postulates of quantum mechanics-Operator for momentum, Kinetic energy, Total energy, Angular momentum-Commuting operators-Commutator algebra-Hermitian operator-Properties of Hermitian operator-Parity operator-Properties of Parity operator-Probability density-Probability current density-Wave packet-Ehrenfest's theorem-Hilbert space-Dirac's Bra and Ket notation-Properties of Bra and Ket notation.

Text Book

Unit 1 to Unit 5

1. R.Murugesan and KiruthigaSivaprasath, Modern Physics, S Chand & Co, New Delhi, 2016.

Reference Books

1. P.M Mathew and K.Venkatesan, A Text Book of Quantum Mechanics, Tata McGraw Hill Publishing Co.Ltd., New Delhi, 2016.
2. Gupta, Kumar and Sharma, Quantum Mechanics, Jai PrakashNath Publications, Meerut, Sathyaprakash, Quantum Mechanics, PragatiPrakashan, Meerut.
3. G. Aruldhas, Quantum Mechanics, Prentice-Hall Of India Pvt. Limited, 2008.
4. G.R.Chatwal and S.K.Anand, Quantum Mechanics, Himalaya Publishing House, Mumbai, 2010.
5. V. Devanathan, Quantum Mechanics, Narosa, Chennai.
6. V.K. Thangappan, Quantum mechanics, New Age International, 1993.
7. AjoyGhatak & S. Loganathan, Quantum Mechanics, Springer, 2004.

E-Materials

1. http://psi.phys.wits.ac.za/teaching/Connell/phys284/2005/lecture-01/lecture_01/node5.html
2. https://www.youtube.com/watch?v=NH3_1IkSB9s
3. https://en.wikipedia.org/wiki/Matter_wave

4. https://www.youtube.com/watch?v=X-m9L0_pKU8 (Tamil video)
5. <https://www.youtube.com/watch?v=cH5QexEN0sk>
6. https://en.wikipedia.org/wiki/Schr%C3%B6dinger_equation
7. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-007-electromagnetic-energy-from-motors-to-lasers-spring-2011/lecture-notes/MIT6_007S11_lec40.pdf
8. <https://www.youtube.com/watch?v=uK60QAKooyM>
9. <https://www.youtube.com/watch?v=r2NMWEsNcTs>
10. https://en.wikipedia.org/wiki/Bra%E2%80%93ket_notation

Course Outcomes

1. After studied unit-1, the student will be able to know the frames of reference and able to formulate the Galilean Transformation equations and Lorentz Transformation equations.
2. After studied unit-2, the student will be understand the matter waves and can derive an equation for de Broglie wavelength. Also able to distinguish between phase velocity and group velocity and demonstrate Davison & Germer experiment.
3. After studied unit-3, the student will be able to state the Heisenberg's Uncertainty Principle and able to derive the time dependent and time independent Schrödinger's equations.
4. After studied unit-4, the student will be able to know the basic idea of photoelectric effect and can able to derive the equation for Einstein's photoelectric equation.
5. After studied unit-5, the student will be able to learn postulates of quantum mechanics, operators and also able to acquire knowledge on Dirac's bra and ket notations.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	No	No	Yes	Yes	No
4	Yes	Yes	No	No	Yes	No
5	Yes	No	Yes	Yes	Yes	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	S	M	M	M	L
CO2	S	S	M	M	M	S	S	M	M	L
CO3	S	M	M	S	S	S	M	S	M	M
CO4	M	S	M	M	S	M	M	S	S	L
CO5	S	M	M	M	S	S	M	S	M	M

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: V

Paper type: Core

Paper code: Name of the Paper: Basic and Applied Electronics Credit: 6

Total Hours per Week: 6 Lecture Hours: 90 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. Students will gain knowledge about semiconducting diodes and transistors.
2. To teach the different types of amplifiers and oscillators.
3. To learn the working multivibrators and wave shaping circuits.
4. To study the basics of fabrication of integrated circuits and fundamentals of operational amplifiers.
5. To expose the various applications of OP-AMP and 555 Timer.

UNIT- I

Teaching Hours: 18

SEMICONDUCTING DIODES & TRANSISTORS

Classification of solids and energy bands- PN Junction Diode-Full wave Bridge Rectifier-Zener Diode-Voltage Regulated Power supply-Tunnel diode - Characteristics-Tunnel diode as an oscillator-Construction and working of Photo diode -Photo transistor -Solar Cell-LED-FET-Construction and working-FET as an amplifier-Output Characteristics and parameters of FET-MOSFET-Construction and working Principle-SCR-Working of SCR-SCR as a switch and half wave rectifier- UJT-Equivalent circuit and V-I characteristics of UJT - UJT as relaxation oscillator.

UNIT- II

Teaching Hours: 18

AMPLIFIERS & OSCILLATORS

R-C coupled amplifier (Two stage)-Power amplifiers-Class A,B and C-Push-Pull amplifier-Feedback amplifier-Principles of negative feedback in amplifier-Gain of negative feedback amplifier-Hybrid parameters-Determination of h parameters-h parameter equivalent circuit-Performance of a linear circuit in h parameters-h parameters for a transistor in CE mode - Sinusoidal oscillators -Circuit operation and frequency of oscillation of -Hartley, Colpitt's, Phase shift, Wein bridge and Crystal oscillator.

UNIT- III

Teaching Hours: 18

MULTIVIBRATORS& WAVE SHAPING CIRCUITS

Multivibrators-Types of multivibrators-Transistor astable, monostable and bistablemultivibrators - Differentiating and Integrating-Circuits-Clipping circuits-Positive clipper-Biased clipper-Combination clipper-Clamping circuits-Positive clamper-Negative clamper.

UNIT- IV

Teaching Hours: 18

INTEGRATED CIRCUITS & OP-AMP

Integrated circuit-Classification of ICs-Advantages-Limitations-Integrated circuit technology- Fabrication of Transistors, diodes, capacitors and resistors - Symbol and Terminals of an OP-AMP- Parameters - Inverting and Non-inverting amplifier - Gain - Miller effect - Virtual ground - Offset voltage - offset current - PSRR - CMRR.

UNIT- V

Teaching Hours: 18

OP-AMP APPLICATIONS & TIMER

OPAMP -Sign and Scale changer -Adder, subtractor and average-Integrator and differentiator -OP AMP Logarithmic amplifier -Antilogarithmic amplifier-OP-AMP-Comparator-Schmitt Trigger OP-AMP-Astablemultivibrator-Monostablemultivibrator-Bistablemultivibrator - 555 Timer-Internal structure- Pin configuration of 555 Timer-555 Timer as Schmitt Trigger-555 Timer as Astablemultivibrator.

Text Books

Unit 1 to Unit 5

1. V.K. Mehta and Rohit Mehta, Principles of Electronics, S Chand &Co., New Delhi, 2007.
2. M Arul Thalpathi, Basic and Applied Electronics, Comptek, Publishers, Chennai 2005.

Reference Books

1. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, S Chand &Co., New Delhi, 2008.
2. R.S.Sedha, A Text Book of Applied Electronics, S Chand &Co., New Delhi, 2010.
3. V. Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007
4. Hand Book of Electronics - Gupta & Kumar, PragatiPrakashan, Meerut, 2014.
5. மின்னணுவியல்-A சுந்தரவேலுசாமி ,பிரியா பப்ளிகேஷன்ஸ், கரூர் (தமிழ் வழியில் பயிலும் மாணவர்களுக்கு)

E-Materials

1. https://www.electronics-tutorials.ws/diode/diode_6.html?nab=0&utm_referrer=https%3A%2F%2Fwww.google.com%2F
2. <https://www.youtube.com/watch?v=EkHch86UXpY>
3. <https://www.youtube.com/watch?v=jZ-pD8nVD6s&app=desktop>
4. <https://www.electrical4u.com/hybrid-parameters-or-h-parameters/>
5. <http://www.circuitstoday.com/category/clipping-and-clamping-circuits>
6. <https://www.youtube.com/watch?v=XsawrtWmm9M>
7. https://www.youtube.com/watch?v=ek_H6efvwxA (Tamil video)
8. <https://www.electronicsforu.com/resources/learn-electronics/555-timer-working-specifications>
9. <https://www.youtube.com/watch?v=yBVGU02rlAg>
10. https://www.electronics-tutorials.ws/waveforms/555_timer.html

Course Outcomes

1. After studied unit-1, the student will be able to classification of solids on the basis of band theory and know the construction, working and applications of semiconducting diodes and transistors.
2. After studied unit-2, the student will be able to design the RC-coupled amplifier and to study its frequency response curve. Also students will be able to classify the power amplifiers, to learn the h-parameters and to able to design oscillator circuits.
3. After studied unit-3, the student will be able to understand the multivibrators using transistors and can able to study the different wave shaping circuits.
4. After studied unit-4, the student will be able to know the basic idea of integrating circuits and able to fabricate diode, transistors, resistor and capacitors. Also students will be study the structure of operational amplifier and its parameters.
5. After studied unit-5, the student will be able to analyze the different applications of op-amp circuits like adder, subtractoretc.and also able to demonstrate 555 Timer and its applications.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	Yes	No
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	No	Yes	No	No
4	Yes	Yes	No	Yes	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	L	M	M	M	M
CO2	S	S	M	M	S	M	M	S	M	S
CO3	S	M	S	S	S	M	M	S	S	S
CO4	S	S	M	M	S	M	S	S	M	M
CO5	S	S	M	S	M	S	M	S	S	M

PO – Programme Outcome, CO – Course outcome S – Strong , M – Medium L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: III

Paper type: Skill Based Subject (SBS)-3

Paper code: Name of the Paper: Cell Phone Technology

Credit: 2

Total Hours per Week: 2 Lecture Hours: 30 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. To learn the back ground information about cellular system.
2. To study the various mobile standards.
3. To teach the chip level information of mobile phones.
4. To expose the idea about trouble shooting of problems in mobile phones.
5. To acquire the knowledge about mobile service tools.

UNIT- I

Teaching Hours: 06

CELLULAR SYSTEM

Background - The cellular concept - interference Vs capacity, cell splitting, sectorisation. The cellular system-mobile location, in call handover and power control in cell planning. TACS standard. The cellular network - Base stations, MSC, services.

UNIT - II

Teaching Hours: 06

MOBILE STANDARDS

SmartPhones (Android, IOS, Windows) APPs - Mobile Software (PC suite)-WPAN standards - IrDA, Bluetooth, 1G, 2G standards, 2.5G applications. 3G devices and applications. Network protocols - TDMA(2G), GSM(2G), cdma one(2G), PDC 2(G), GPRS(2.5G), CDMA 2000 1x(2.5G), EDGE(3G), CDMA 2000 1xEV(3G), WCMA(G)-WiMax (4G)

UNIT- III

Teaching Hours: 06

CHIP LEVEL STUDY

Block Diagrams -Schematic Diagrams - Chip Level Information of Mobile -Phones - BGA - SMD Reworking Station - Soldering lead -Soldering paste -De- Soldering wire - Identification of IC's - Assembling &Disassembling ofSmart Phones.

UNIT- IV

Teaching Hours: 06

TROUBLE SHOOTING

Causes for various problems & Troubleshooting of Problems in a SmartPhone - Network Problems - Display Problems -Touch Problems - Sim CardProblems -Charging problems - Battery Problems - Software Problems -IMEI information - Problems related to mobile phonehandsets - replacement of Various components ICS.

UNIT- V

Teaching Hours: 06

MOBILE SERVICE TOOLS

Ultrasonic Cleaner - Computer Connectors - SIM Card Reader – MemoryCard Reader - Mobile Virus - Virus Prevention - Removing Virus – HealthHazards with Mobiles - SAR.

Text Book

Unit 1 to Unit 5

1. ManaharLotia , Modern Mobile phone Introduction & Servicing, BPB Publications, 2017

Reference Books

1. ManaharLotia, Modern Mobile Phone Repair using Computer Software & Service Devices , BPB Publications, 2017.
2. ManaharLotia, Modern Mobile Phone Unlocking & Utility Codes For GSM & CDMA Phones, BPB Publications, 2017
3. Mobile Telephony, Digit Magazine, Jasubhai Digital Media Publications.
4. Raj Pandya, Mobile & Personal Communication Systems & Services, PHI Publications
5. William C.Y.Lee, Mobile Cellular Telecommunications (Analog & Digital Systems), McGraw Hill, New Delhi, 1995
6. Andy Dornan, The Essential Guide to Wireless Communications & Applications, Prentice Hall, New Delhi, 2002.

E-Materials

1. <https://www.slideshare.net/priyahada/cellular-concepts-41556741>
2. <https://www.youtube.com/watch?v=whYljse4Abc>
3. <https://electronics.howstuffworks.com/cell-phone7.htm>
4. <https://www.youtube.com/watch?v=IvWYk3FAVak>
5. https://www.youtube.com/watch?v=eRe_nD2t0Hk
6. [https://en.wikipedia.org/wiki/Rework_\(electronics\)](https://en.wikipedia.org/wiki/Rework_(electronics))
7. <https://www.mobiledic.com/android-tips/sim-card-can-not-be-detected.html>
8. <https://www.youtube.com/watch?v=MZz5zrNnAec> (Tamil video)
9. <https://www.youtube.com/watch?v=JmDz0HOzvVU>
10. <https://www.who.int/news-room/q-a-detail/what-are-the-health-risks-associated-with-mobile-phones-and-their-base-stations>

Course Outcomes

1. After studied unit-1, the student will be able understand the cellular communication system.
2. After studied unit-2, the student will be able to study the smart phones and various mobile standards like 1G,2G, etc.
3. After studied unit-3, the student will be able to learn chip level information and soldering and desoldering the various components.
4. After studied unit-3, the student will be able to understand the network problems and SIM card problems and to learn the trouble shooting process.
5. After studied unit-5, the student will be able to know how to use the ultrasonic cleaner, mobile virus and other service tools.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	No	No	Yes
5	Yes	No	No	No	Yes	Yes

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	M	L
CO2	M	S	M	M	S	S	M	M	S	M
CO3	M	M	M	M	S	M	S	S	S	S
CO4	S	S	S	S	M	S	M	M	M	S
CO5	S	S	M	S	S	S	M	M	S	M

PO – Programme Outcome, CO – Course outcome S – Strong , M – Medium L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Core

Paper code: Name of the Paper: Nuclear and Particle Physics Credit: 5

Total Hours per Week: 6 Lecture Hours: 90 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. To have a clear idea about the fundamentals of nucleus and its structure.
2. To understand the concept of radioactivity.
3. To have a clear understanding of the design and working of particle accelerators and detectors.
4. To understand the nuclear reactions and the nuclear reactors.
5. To gain knowledge about the elementary particles

UNIT- I

Teaching Hours: 20

GENERAL PROPERTIES OF NUCLEI AND NUCLEAR MODELS

Constituents of nuclei - Classification of nuclei - Nuclear mass and binding energy - Stability of nucleus, Mass defect and Packing fraction, Binding fraction Vs Mass number curve - Nuclear size - Nuclear spin - Nuclear energy levels - Nuclear magnetic moment --Parity of nuclei - Nuclear forces - Yukawa's model of nuclear forces.

Nuclear models - Liquid drop model, Semi-empirical mass formula - Shell model - Salient features of shell model-Problems solving.

UNIT- II

Teaching Hours: 20

RADIOACTIVITY

Radioactive decay law - Half life and Average life - Activity or strength of a radioactive sample- Successive transformation - Radioactive chain- Radioactive equilibrium - Radioactive dating - α -decay - Geiger-Nuttall law - Tunnel effect - Gamow's theory of α -decay - β -decay - energetics of β -decay - Continuous β -spectrum - Inverse β -decay -Parity violation in β -decay - Neutrino hypothesis - Properties of neutrino - Gamma rays - Origin of the gamma rays - Internal conversion-Problems solving.

UNIT- III

Teaching Hours: 15

PARTICLE ACCELERATORS AND DETECTORS

Linear accelerator - Cyclotron -Betatron - Electron synchrotron - Accelerators in India

Radiation detectors - Ionisation chamber - Proportional counter - G.M. Counter - Cloud chamber - Scintillation counter - Solid state track detector - Semiconductor detector- Problems solving.

UNIT- IV

Teaching Hours: 20

NUCLEAR REACTIONS AND NUCLEAR REACTORS

Nuclear reactions - Types of nuclear reactions - Conservation laws in nuclear reactions - Energetics of nuclear reactions - Kinematics of nuclear reactions -Threshold energy of nuclear reactions - Solution of the Q-value equation - Cross-section of nuclear reactions.

Nuclear fission - Fission of light nuclei - Prompt and delayed neutrons - Neutron speed, Classifications - Nuclear chain reaction - Neutron cycle - Nuclear reactor - Types of reactor - Fission bomb - Nuclear power in India- Fusion -Thermonuclear reaction - Hydrogen bomb - Possibility of fusion reactor-Problems solving.

UNIT- V

Teaching Hours: 15

ELEMENTARY PARTICLES

Classification of elementary particles -Pions and Muons - K-mesons -Hyperons - Conservation laws - Exact laws - Approximate conservative laws- Fundamental interactions - Antiparticles - Resonance particles -Hypernucleus - Symmetry classification of elementary particles - Quark model.

Text Books

Unit 1 to Unit 5

1. R. Murugesan and KiruthigaSivaprasath, Modern Physics,S Chand &Co.New Delhi,2006.
2. Gupta and Roy., Physics of the Nucleus, Books and Allied (P) Ltd. Kolkatta, 2011
3. J. B. Rajam, Nuclear Physics, S Chand Publishing Co.
4. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

Reference Books

1. SatyaPrakash, Nuclear Physics, APragatiPrakasan Publication, 2011.
2. S. N. Ghoshal, Nuclear Physics, S. Chand & Co., Edition, 2003
3. M. L. Pandya& R.P.S. Yadav, Elements of Nuclear Physics, KedarNath& Ram Nath, 2000
4. Jahan Singh, Fundamentals of Nuclear Physics, APragati Publication, 2012.
5. V.Devanathan, Nuclear Physics, Narosa Publications, New Delhi, 2016.
6. அணுக்கரு இயற்பியல்-A சுந்தரவேலுசாமி ,பிரியா பப்ளிகேஷன்ஸ், கரூர் (தமிழ் வழியில் பயிலும் மாணவர்களுக்கு)

E-Materials

1. <https://courses.lumenlearning.com/introchem/chapter/nuclear-binding-energy-and-mass-defect/>
2. <https://www.khanacademy.org/science/physics/quantum-physics/in-in-nuclei/v/mass-defect-and-binding-energy>
3. <https://www.youtube.com/watch?v=ZqdxGZOipD4>

4. <http://hyperphysics.phy-astr.gsu.edu/hbase/Nuclear/halfli2.html>
5. <https://www.slideshare.net/sailakshmipullokkar/linac-ppt>
6. <https://www.youtube.com/watch?v=jSgnWfbEx1A>
7. https://en.wikipedia.org/wiki/Nuclear_fission
8. <https://www.youtube.com/watch?v=vurL9UVa95A> (Tamil video)
9. <https://www.youtube.com/watch?v=2zZ1kv6vlq0>
10. https://en.wikipedia.org/wiki/Elementary_particle

Course Outcomes

1. After studying Unit 1, the student will have a clear idea about the fundamentals of nucleus and its structure.
2. After studying Unit 2, the student would have understood the concept of radioactivity.
3. After studying Unit 3, the student will be having a clear understanding of the design and working of particle accelerators and detectors.
4. After studying Unit 4, the student will be having a thorough understanding about the nuclear reactions and nuclear reactors.
5. After studying Unit 5, the student would have gained adequate knowledge about the elementary particles like pions, muons, hyperons etc.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	No	Yes	Yes	Yes	No
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	S	S	M	M	M	L
CO2	S	S	M	M	S	M	S	M	M	L
CO3	S	M	M	S	M	S	M	M	M	M
CO4	S	S	M	M	S	M	M	S	S	L
CO5	S	M	M	M	S	S	M	S	M	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Core

Paper code: Name of the Paper: Solid State Physics

Credit: 5

Total Hours per Week: 5

Lecture Hours: 75

Tutorial Hours: Nil

Practical Hours: Nil

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Course Objectives

1. To gain the knowledge of the crystal system and to know the different crystal structure.
2. To know the different types of bonding in crystals and to know the basics of superconductors and their applications.
3. To learn how the X-ray diffraction helps to know the crystal structure and to know the defects present in the crystals
4. To know the different types of magnetism and their theories.
5. To understand the electric polarization in a dielectric material.

UNIT- I

Teaching Hours: 15

CRYSTALLOGRAPHY

Crystalline and amorphous solids -Crystal lattice -Basis -Unit cell -Primitive and non-primitive unit cell -Elements of Symmetry - Seven Classes of Crystals - Bravais lattices - Miller indices -Calculation of atomic radius, coordination number and atomic packing factor for SC, FCC, BCC and HCP structures- simple numerical problems- Structure of KCl, NaCl and diamond crystals .

UNIT- II

Teaching Hours: 15

DIFFRACTION IN CRYSTALS & CRYSTAL DEFECTS

Bragg's law- conditions for X-ray diffraction - Experimental Method- Laue Method, Rotating Crystal Method - Powder Photograph Method - Crystal defects - point, line, surface and volume defects - effects of crystal imperfections.

UNIT- III

Teaching Hours: 15

CHEMICAL BONDS & SPECIFIC HEAT CAPACITY

Types of bonding in crystals - ionic, valence, metallic, Vanderwaal's and hydrogen bonding-optical properties -Specific heat capacity -Dulong and Pettit's law -Einstein's and Debye's theory of specific heat capacity

UNIT- IV

Teaching Hours: 15

MAGNETISM IN SOLIDS& SUPER CONDUCTIVITY

Basic terms in magnetism -Classification of magnetic materials -Weiss theory of Paramagnetism- Domain theory of ferromagnetism- Hysteresis- Soft and hard magnetic materials - Superconductivity - Properties of Superconductors - Types of Superconductors - Meissner effect-BCS theory of superconductivity- Cooper Pair- First and Second London equation-Josephson effect-Application of Superconductors.

UNIT- V

Teaching Hours: 15

DIELECTRIC IN SOLIDS

Introduction to dielectrics- Basic definitions- - Different types of Electric polarization - dependency on frequency and temperature - Dielectric Loss -Local or Internal Field- Clausius-Mosotti Relation -Determination of dielectric constant- Dielectric Breakdown-Uses of dielectric materials.

Text Books

Unit 1 to Unit 5

1. K. Elangovan, Solid State Physics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007.
2. S.O.Pillari, Solid State Physics, New Age International Publishers, New Delhi, 2015

Reference Books

1. Gupta and Kumar, Solid State Physics,
2. R. Murugesan and KiruthigaSivaprasath, Modern Physics, S Chand & Co., 2006
3. M. Arumugam, Material Science, Anuradha Publishers.
4. Kittel, Introduction to Solid State Physics, Wiley and Sons,

E- Materials

1. https://www3.nd.edu/~amoukasi/CBE30361/Lecture_crystallography_A.pdf
2. <https://ocw.mit.edu/courses/chemistry/5-069-crystal-structure-analysis-spring-2010/lecture-notes/>
3. http://www.issp.ac.ru/ebooks/books/open/Superconductivity_Theory_and_Applications.pdf
4. <https://www.iitk.ac.in/che/pdf/resources/XRD-reading-material.pdf>
5. https://nptel.ac.in/content/storage2/courses/112108150/pdf/Lecture_Notes/MLN_03.pdf
6. <http://tiicmitm.com/profanurag/Physics-Class/Unit-2-DM.pdf>
7. <https://www.youtube.com/watch?v=D81zc-LK6fc>
8. https://en.wikipedia.org/wiki/Crystallographic_defect
9. <https://www.youtube.com/watch?v=D-9M3GwoBrw>
10. <https://www.youtube.com/watch?v=ByViA0H--5c> (Tamil video)

Course Out Comes

1. After studied unit-1, the student will be able to Distinguish between crystalline and amorphous solids, Classify the crystal systems and able to understand the crystal structure
2. After studied unit-2, the student will be able to Relate the X-ray diffraction with crystal structure and explain the various differences in properties of solids due to crystal imperfections
3. After studied unit-3, the student will be able to understand the different types of bonding in crystals, apply this to understand the optical, specific heat capacity of solids
4. After studied unit-4, the student will be able to gain the knowledge of magnetism in

materials and able to distinguish different magnetic materials. Also able to understand the phenomena of superconductivity and their applications

- After studied unit-5, the student will be able to explain the electric polarization in dielectric materials and also gain the knowledge in dielectric breakdown mechanisms in a dielectric material.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	No	No	Yes	Yes	No
4	Yes	Yes	No	No	Yes	No
5	Yes	No	Yes	Yes	Yes	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	S	M	M	M	S
CO2	M	S	M	M	M	S	S	M	S	L
CO3	M	M	S	S	S	S	M	S	M	M
CO4	M	S	M	M	S	S	M	S	S	L
CO5	S	M	S	S	S	S	M	M	M	S

PO – Programme Outcome, CO – Course outcome S – Strong , M – Medium L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Core Elective 1 – Group (A)

Paper code: Name of the Paper: Digital Electronics

Credit: 3

Total Hours per Week: 4 Lecture Hours: 60 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. Understanding the different number systems and conversion between them and also to study the basic logic gates.
2. To teach the laws of Boolean Algebra, De Morgan's theorems and other logic circuits.
3. To Study combination of logic circuits and understanding concepts of various flip-flops.
4. To expose the knowledge on various registers and counters.
5. To learn the digital to analog and analog to digital converters.

UNIT – I

Teaching Hours: 14

NUMBER SYSTEMS AND BASIC LOGIC GATES

Number systems -Decimal, Binary, Octal and Hexadecimal system - Conversion from one number system to another- Binary Arithmetic -Addition -Subtraction-Multiplication-Division- 1's and 2's complement - Subtraction using Complements-Signed Binary Numbers-Binary codes- BCD code - Excess 3 code, Gray code - ASCII code - Basic logic gates-NOT,OR,AND-Design of AND, OR gates using diodes and NOT gate using transistor-Logic circuits and logic expressions-Sum of Products-Product of Sum- NAND, NOR and EX-OR - functions and truth tables.

UNIT- II

Teaching Hours: 14

BOOLEAN ALGEBRA AND LOGIC CIRCUITS

Laws of Boolean algebra - De Morgan's theorems-NAND & NOR as Universal gates (AND,OR and NOT only)-Karnaugh map - Minterms-Relationship between K-Map and truth table- 2,3 and 4 variable K Map using minterms- Simplification of Boolean function using K Map - Arithmetic Circuits-Half adder and Full adder- Four Bit Adder-BCD Adder- Half subtractor and Full subtractor-Four Bit Adder/subtractor.

UNIT- III

Teaching Hours: 12

COMBINATION OF CIRCUITS & FLIP-FLOPS

Multiplexer-Demultiplexer- Decoder- 2 to 4 and 3 to 8 Decoder-BCD to seven segment decoder- BCD to decimal decoder-Encoder-Programmable Logic Array (PLA)-Binary to Gray and Gray to Binary Conversion using EX-OR gates-Parity Generator and Checker - Flip Flops -SR Flip Flop -Clocked SR-Edge triggered Flip – Flops- D Flip-Flop - JK Flip-Flop -JK Master-Slave Flip - Flop-T Flip-Flop.

UNIT- IV

Teaching Hours: 10

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring Counter-Johnson's Counter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit Binary Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

Teaching Hours: 10

D/A AND A/D CONVERTERS

Binary weighted resistors D/A converter-R-2R Resistive Ladder - Analog to Digital Converter (ADC)-Counter Type A/D Converter-Successive Approximation A/D Converter-Dual Slope A/D Converter-Parallel Comparator A/D Converter.

Text Book

Unit 1 to Unit 5

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007.

Reference Books

1. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
2. V.Vijayendran, Digital Fundamentals, S.Viswanathan, Printers & Publishers PrivateLtd, Chennai,2004.
3. R.P. Jain, Modern Digital Electronics, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. H. Taub and D. Schilling , Digital Integrated Electronics -, McGraw-Hill Book Company.
5. T.L. Floyd , Digital Fundamentals -, Pearson Education, 8/e.
6. W.H. Gothmann , Digital Electronics -, Prentice Hall of India Private Limited, 2/e.

E-Materials

1. <https://www.youtube.com/watch?v=4ae9sJBBkvw>
2. <https://learnabout-electronics.org/Digital/dig11.php>
3. <https://www.youtube.com/watch?v=RrynEQ7sG5A>
4. <https://www.sciencedirect.com/topics/computer-science/de-morgans-theorem>
5. [https://en.wikipedia.org/wiki/Flip-flop_\(electronics\)](https://en.wikipedia.org/wiki/Flip-flop_(electronics))
6. <https://www.youtube.com/watch?v=tSti91b6qec>
7. <https://www.youtube.com/watch?v=vRBnZMJA0LY>
8. https://en.wikipedia.org/wiki/Shift_register
9. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_digital_to_analog_converters.htm
10. <https://www.youtube.com/watch?v=Y2OPnrgb0pY>
11. https://www.youtube.com/watch?v=_xxQZEVbPwU (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various Binary codes and to design basic logic gates.
2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates.
3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits.
4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters.
5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	No	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	L	M	M	M	M
CO2	S	S	M	M	S	M	M	S	M	S
CO3	S	M	S	S	S	M	M	S	S	S
CO4	S	S	M	M	S	M	S	S	M	M
CO5	S	S	M	S	M	S	M	S	S	M

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Core Elective 2 – Group (A)

Paper code: Name of the Paper: Fundamentals of Microprocessor-8085 Credit: 3

Total Hours per Week: 4 Lecture Hours: 60 Tutorial Hours: Nil Practical Hours: Nil

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Couse Objectives

1. To know the complete basic details and architecture of microprocessor 8085
2. To study the different types of instructions and addressing modes
3. To write the simple assembly language programs for arithmetic operations and to learn about the instruction cycles
4. To understand the functions of ROM/RAM memory devices and peripheral devices
5. To expose the idea of pin function, working and interacting of peripheral devices with microprocessor

UNIT- I

Teaching Hours: 12

MICROPROCESSOR ARCHITECTURE

Evolution of Microprocessor-Applications of Microprocessors of Different Generations-The system bus and bus structure-Execution of an instruction-Pin functions of 8085- Architecture of 8085-Block diagram-Register array-ALU and associated circuitry -Instruction Register and Decoder-Timing and Control Unit- Interrupt and Serial I/O units-Types of Interrupts-Programmer's model of 8085.

UNIT- II

Teaching Hours: 12

INSTRUCTIONS & ADDRESSING MODES

Data transfer/ copy Instructions-Arithmetic, Logical- Two examples each instructions-Branch instructions-Unconditional and conditional jump- Call and Return instructions-Stack and Stack related instructions- I/O and Machine control instructions- Addressing modes.

UNIT- III

Teaching Hours: 12

ALP & INSTRUCTION TIMINGS

Assembly language programs-Addition, Subtraction, Multiplication and Division (8-bit only)-Largest/smallest in an array-Sum of series of a set- T-State-Machine cycle-Instruction cycle-Memory read cycle-Memory write cycle-Wait state-Halt state-Hold state- Delay calculations-Time delay using a single register.

UNIT- IV

Teaching Hours: 12

MEMORY AND I/O INTERFACE

Memory interface basics-Demultiplexing address/data bus-Generation control signals- $2K \times 8$ ROM/RAM Interface - Direct I/O Interface-IN FE_H instruction and its timing diagram-Design of Output Port using octal latch only-Memory mapped I/O- Difference between

Direct I/O and Memory mapped interface.

UNIT- V

Teaching Hours: 12

PERIPHERAL DEVICES & APPLICATIONS

Hand shake signals-Single Handshake I/O and Double Handshake I/O- Pin function and Block diagram and working of 8255-Pin function and Block diagram and working of 8279-LED Interface-Temperature Controller.

Text Books

Unit 1 to Unit 5

1. Fundamental of Microprocessor - 8085 - Architecture, Programming and interfacing – V. Vijayendran, S. Viswanathan, Pvt. Ltd., 2003.
2. A. NagoorKani, 8085 Microprocessor and its Applications, Tata McGraw Hill, New Delhi, 2013.

Reference Books

1. R.S. Goankar , Microprocessor Architecture, Programming and Applications with the 8085, 3rdEdn. Prentice Hall,
2. B.Ram, Fundamentals of Microprocessors and Microcomputers,DhanpatRai Publications, New Delhi.
3. Aditya P Mathur, Introduction to Microprocessors, Tata McGraw Hill Publishing Company Ltd., New Delhi,

E-Materials

1. <https://www.youtube.com/watch?v=ii7PCV2zvms>
2. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_pin_configuration.htm
3. <https://www.youtube.com/watch?v=7nWt5dixiX0> (Tamil video)
4. https://www.tutorialspoint.com/microprocessor/microprocessor_8085_instruction_set
5. <https://www.youtube.com/watch?v=G3iUO96XhC4>
6. <https://www.youtube.com/watch?v=Mlx6khOFFoU> (Tamil video)
7. <https://www.geeksforgeeks.org/8085-program-to-divide-two-8-bit-numbers/>
8. <http://www.psnacet.edu.in/courses/ECE/Microcontroller%20and%20Microprocessor/lecture4.pdf>
9. https://www.youtube.com/watch?v=-FGw_MPlfbk&vl=en
10. https://www.youtube.com/watch?v=_M8hDkRAL6M&vl=en
11. <https://www.geeksforgeeks.org/programmable-peripheral-interface-8255/>

Course Outcomes

1. After studied unit-1, the student will be able to know the evolution of microprocessor, pin and architecture of 8085 microprocessor in detail.
2. After studied unit-2, the student will be able to describe different types of instructions like data transfer, arithmetic, logical and branching instructions with examples and it will be used for writing the assembly language programs.
3. After studied unit-3, the student will be able to write assembly language programs for simple arithmetic operations and hence they can apply it for interfacing applications.
4. After studied unit-4, the student will be able to learn the memory interface and

peripheral interface devices.

- After studied unit-5, the student will be able to know how to interface the peripheral device with microprocessor 8085 and they are able to write the programs for LED and Temperature control interface system.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	No	Yes	Yes	No
4	Yes	Yes	Yes	Yes	No	No
5	Yes	No	Yes	No	Yes	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	M	M	M	M	M	M
CO2	S	S	M	S	S	M	M	S	M	L
CO3	S	M	S	S	S	M	M	S	S	S
CO4	S	S	M	S	S	S	S	S	M	L
CO5	S	S	M	S	M	M	M	S	S	L

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Core Elective 3 – Group (A)

Paper code: Name of the Paper: Nanophysics

Credit: 3

Total Hours per Week: 4 Lecture Hours: 60 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. To know the fundamentals of nanotechnology.
2. To learn about carbon nanostructures and its properties.
3. To study the preparation of nanomaterial by different methods.
4. To analyse the synthesized nanomaterial by various characterization techniques.
5. To understand the various applications of nanotechnology.

UNIT- I

Teaching Hours: 12

INTRODUCTION TO NANO AND TYPES OF NANOMATERIAL

Need and origin of nano - Emergence of nanotechnology with special reference to Feynman. Size & Scales: definition of nanostructures; Top-down and bottom-up approaches- Introductory ideas of 1D, 2D and 3D nanostructured material- Quantum dots - Quantum wire - Quantum well - Exciton confinement in quantum dots-surface to volume ratio- semiconducting and magnetic nanoparticles.

UNIT- II

Teaching Hours: 12

CARBON NANOTUBES

Carbon materials – Allotropes of carbon – Structure of carbon nanotubes – Types of CNTs – Electronic properties of CNTs – Band structure of Graphene – Band structure of SWNT from graphene – Electron transport properties of SWNTs – Scattering in SWNTs – Carrier mobility in SWNTs.

UNIT- III

Teaching Hours: 12

FABRICATION OF NANOMATERIAL

Synthesis of nanoparticles- Co-precipitation method-sol-gel method –Hydrothermal method- Ball milling method-Physical vapor deposition-thin film deposition method-spray pyrolysis- Molecular beam epitaxy –Pulsed laser deposition-Chemical vapor deposition-Plasma

enhanced CVD- Laser induced CVD-Chemical beam epitaxy.

UNIT- IV

Teaching Hours: 12

CHARACTERIZATION OF NANOMATERIAL

Principle, Design and utility-XRD (X-ray diffraction)-particle size analysis using Scherer formula-UV-Visible spectroscopy-Band gap energy-Tau plot-FTIR spectroscopy-structural analysis-EDAX-elemental analysis-Scanning electron microscopy (SEM)- Transmission electron microscopy (TEM)-morphology.

UNIT – V

Teaching Hours: 12

APPLICATIONS

Nanoelectronics–OLEDs-OTFTs-SWNTFETs-Nanorobots–Nanomedicine-bio sensors-targeted drug delivery-Energy storage applications-nanosilicon for solar cells-MEMS and NEMS-Photonic crystals.

Text Books

Unit 1 to Unit 5

1. T.Pradeep et al., A Textbook of Nanoscience and Nanotechnology, Tata McGraw Hill, New Delhi, 2012.
2. T.Pradeep , Nano: The Essentials, Tata McGraw Hill, New Delhi, 2012.
3. R.W. Kelsall, I.W. Hamley and M. Geoghegan, Nanoscale Science and Nanotechnology (John-Wiley & Sons, Chichester, 2005.
4. G. Cao, Nanostructures and Nanomaterials, Imperial College Press, London, 2004.
5. C.P. Poole and F.J. Owens, Introduction to Nanotechnology, Wiley, New Delhi, 2003.

Reference Books

1. H.S. Nalwa, Nanostructured Materials and Nanotechnology, Academic Press, San Diego, 2002.
2. M. Wilson, K. Kannangara, G. Smith, M. Simmons, B. Raguse, Nanotechnology: Basic Science and Emerging Technologies, Overseas Press, New Delhi, 2005.

E-Materials

1. <https://en.wikipedia.org/wiki/Nanotechnology>
2. https://en.wikipedia.org/wiki/Carbon_nanotube
3. https://www.nanowerk.com/nanotechnology/introduction/introduction_to_nanotechnology_22.php
4. <https://www.youtube.com/watch?v=sbuIluJhT4A> (Tamil video)
5. <https://www.youtube.com/watch?v=14DqBIG96W0>
6. <https://www.sciencedirect.com/topics/chemistry/sol-gel-process> (Journal)
7. <https://www.slideshare.net/RamalingamGopal/sol-gel-synthesis-of-nanoparticles>
8. https://en.wikipedia.org/wiki/Scanning_electron_microscope
9. <https://www.youtube.com/watch?v=kdb6dHEHCA0>

10. <https://interestingengineering.com/15-medical-robots-that-are-changing-the-world>
11. <https://en.wikipedia.org/wiki/Nanorobotics>

Course Outcomes

1. After studied unit-1, the student will be able to know the origin and emergence of nanotechnology and also able to define different nanostructures.
2. After studied unit-2, the student will be able to describe carbon nanostructures and its fabrication. Also they can know the electrical, vibrational and mechanical properties of carbon nanostructure and its applications.
3. After studied unit-3, the student will be able to know how to fabricate the Nanomaterials by different methods.
4. After studied unit-4, the student will be able to learn the characterization techniques like XRD, UV-Vis, FTIR, EDAX, SEM, TEM etc for the synthesized nanostructures.
5. After studied unit-5, the student will be able to know the applications of nanotechnology in different field.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	No	No
3	Yes	No	No	Yes	Yes	No
4	Yes	Yes	Yes	Yes	No	No
5	Yes	No	No	No	No	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	M	M	M	M	M	M
CO2	S	M	S	S	S	M	M	S	M	L
CO3	S	M	S	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	M	L
CO5	S	M	S	S	M	M	M	S	S	L

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
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Semester: VI

Paper type: Core Elective 1 – Group (B)

Paper code: Name of the Paper: Digital Electronics

Credit: 3

Total Hours per Week: 4 Lecture Hours: 60 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. Understanding the different number systems and conversion between them and also to study the basic logic gates.
2. To teach the laws of Boolean Algebra, De Morgan's theorems and other logic circuits.
3. To Study combination of logic circuits and understanding concepts of various flip- flops.
4. To expose the knowledge on various registers and counters.
5. To learn the digital to analog and analog to digital converters.

UNIT – I

Teaching Hours: 14

NUMBER SYSTEMS AND BASIC LOGIC GATES

Number systems -Decimal, Binary, Octal and Hexadecimal system - Conversion from one number system to another- Binary Arithmetic -Addition -Subtraction-Multiplication-Division- 1's and 2's complement - Subtraction using Complements-Signed Binary Numbers-Binary codes- BCD code - Excess 3 code, Gray code - ASCII code - Basic logic gates-NOT,OR,AND-Design of AND, OR gates using diodes and NOT gate using transistor-Logic circuits and logic expressions-Sum of Products-Product of Sum- NAND, NOR and EX-OR - functions and truth tables.

UNIT- II

Teaching Hours: 14

BOOLEAN ALGEBRA AND LOGIC CIRCUITS

Laws of Boolean algebra - De Morgan's theorems-NAND & NOR as Universal gates (AND,OR and NOT only)-Karnaugh map - Minterms-Relationship between K-Map and truth table- 2,3 and 4 variable K Map using minterms- Simplification of Boolean function using K Map - Arithmetic Circuits-Half adder and Full adder- Four Bit Adder-BCD Adder- Half subtractor and Full subtractor-Four Bit Adder/subtractor.

UNIT- III

Teaching Hours: 12

COMBINATION OF CIRCUITS & FLIP-FLOPS

Multiplexer-Demultiplexer- Decoder- 2 to 4 and 3 to 8 Decoder-BCD to seven segment decoder- BCD to decimal decoder-Encoder-Programmable Logic Array (PLA)-Binary to Gray and Gray to Binary Conversion using EX-OR gates-Parity Generator and Checker - Flip Flops -SR Flip Flop -Clocked SR-Edge triggered Flip – Flops- D Flip-Flop - JK Flip-Flop -JK Master-Slave Flip - Flop-T Flip-Flop.

UNIT- IV

Teaching Hours: 10

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring Counter-Johnson's Counter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit Binary Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

Teaching Hours: 10

D/A AND A/D CONVERTERS

Binary weighted resistors D/A converter-R-2R Resistive Ladder - Analog to Digital Converter (ADC)-Counter Type A/D Converter-Successive Approximation A/D Converter-Dual Slope A/D Converter-Parallel Comparator A/D Converter.

Text Book

Unit 1 to Unit 5

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007.

Reference Books

1. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
2. V.Vijayendran, Digital Fundamentals, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004.
3. R.P. Jain, Modern Digital Electronics, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. H. Taub and D. Schilling, Digital Integrated Electronics -, McGraw-Hill Book Company.
5. T.L. Floyd, Digital Fundamentals -, Pearson Education, 8/e.
6. W.H. Gothmann, Digital Electronics -, Prentice Hall of India Private Limited, 2/e.

E-Materials

1. <https://www.youtube.com/watch?v=4ae9sJBBkvw>
2. <https://learnabout-electronics.org/Digital/dig11.php>
3. <https://www.youtube.com/watch?v=RrynEQ7sG5A>
4. <https://www.sciencedirect.com/topics/computer-science/de-morgans-theorem>
5. [https://en.wikipedia.org/wiki/Flip-flop_\(electronics\)](https://en.wikipedia.org/wiki/Flip-flop_(electronics))
6. <https://www.youtube.com/watch?v=tSti91b6qec>
7. <https://www.youtube.com/watch?v=vRBnZMJA0LY>
8. https://en.wikipedia.org/wiki/Shift_register
9. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_digital_to_analog_converters.htm
10. <https://www.youtube.com/watch?v=Y2OPnrgb0pY>
11. https://www.youtube.com/watch?v=_xxQZEVbPwU (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various binary codes and to design basic logic gates.
2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates.
3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits.
4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters.
5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	No	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	L	M	M	M	M
CO2	S	S	M	M	S	M	M	S	M	S
CO3	S	M	S	S	S	M	M	S	S	S
CO4	S	S	M	M	S	M	S	S	M	M
CO5	S	S	M	S	M	S	M	S	S	M

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Semester: VI

Paper type: Core Elective 2 – Group (B)

Paper code: Name of the Paper: Materials Science

Credit: 3

Total Hours per Week: 4 Lecture Hours: 60 Tutorial Hours: Nil Practical Hours: Nil

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Course Contents

1. To teach the classification of engineering materials and properties.
2. To discuss the mechanical and thermal behavior of materials.
3. To expose the knowledge on polymers, ceramics and nanomaterial.
4. To study the basics of smart materials.
5. To learn the idea of energy storage materials.

UNIT – I

Teaching Hours: 12

ENGINEERING MATERIALS AND CHEMICAL BONDING

Classification of engineering materials- levels of structure - structure-property relationship in materials-stability and metastability- bond energy- bond type and bond length- ionic and covalent bonding -Metallic bonding-secondary bonding-lattice energy-Born Haber cycle - cohesive energy -variation in bonding character and properties.

UNIT- II

Teaching Hours: 12

MECHANICAL AND THERMAL BEHAVIOUR OF MATERIALS

Elastic behaviour -atomic model of elastic behaviour -Young's modulus -Poisson's ratio - shear modulus- bulk modulus-composite materials - the modulus as a parameter of design-rubber like elasticity -plastic deformation -tensile -yield strength -toughness -elongation - hardness- impact strength -stress - strain curve -Heat capacity, thermal conductivity, thermal expansion of materials.

UNIT- III

Teaching Hours: 12

POLYMERS, CERAMICS AND NANOMATERIAL

Polymers - Polymerization mechanism - Polymer structures - Deformation of polymers - Behaviour of polymers-Ceramics-Ceramic phases - Structure - classes - Effect of structure on the behaviour of ceramic phases - composites - Nanomaterial-Need and origin of nano-Introductory ideas of 1D, 2D and 3D nanostructured material-Synthesis of oxide

nanoparticles by sol-gel method -fullerences-Carbon nanotubes- Fabrication and structure of carbon nanotubes

UNIT- IV

Teaching Hours: 12

SMART MATERIALS

Definition of smart materials- Types -Piezoelectric materials-Materials for MEMS and NEMS- Ferro fluid- Magnetic shapememoryalloys (MSMAs)- Shape memory alloy (SMA)- Oneway and Two way memory effect- Dielectric elastomers (DEs).

UNIT- V

Teaching Hours: 12

ENERGY STORAGE MATERIALS

Solar cells: Organic solar cells - Polymer composites for solar cells-Polymer membranes for fuel cells - Acid/ alkaline fuel cells -design of fuel cells-Carbon Nanotubes for energy storage - Hydrogen Storage in Carbon Nanotubes.

Text Books

Unit 1 to Unit 5

1. V. RaghavanV, Materials science and engineering - A FirstCourse, 5th Ed, Prentice Hall India, New Delhi, 2012.
2. M. Arumugam, Materials Science - Anuradha Agencies, 1990.

Reference Books

1. V. Rajendran, Material Science, Tata McGraw Hill Ltd, New Delhi,2001.
2. Dr. M.N. Avadhanulu, Material science, S.Chand& Company, New Delhi, 2014.
3. G.K.Narula, K.S. Narula, V.K. Gupta Materials Science, Tata McGraw Hill Publishing, New Delhi, 1994.
4. M V Gandhi and B S Thompson B S, Smart Materials andStructures. Chapman & Hall 1992.

E-Materials

1. <https://www.learnpick.in/prime/documents/ppts/details/729/classification-of-engineering-materials-part-1>
2. <https://www.youtube.com/watch?v=5hJhRFCUilo>
3. <https://www.youtube.com/watch?v=iegJ76DS3lc>
4. https://nptel.ac.in/content/storage2/courses/112108150/pdf/Web_Pages/WEBP_M15.pdf
5. <https://plastics.americanchemistry.com/plastics/The-Basics/>
6. <https://study.com/academy/lesson/what-are-polymers-properties-applications-examples.html>
7. <https://internetofthingsagenda.techtarget.com/definition/micro-electromechanical-systems-MEMS>

8. https://en.wikipedia.org/wiki/Microelectromechanical_systems
9. <https://www.iitk.ac.in/reach/2008/Energy/REACH2008-SolarCells-SundarIyer.pdf>
10. <https://www.youtube.com/watch?v=zMLrhgSAPHc>
11. https://www.youtube.com/watch?v=4Homfj_ne0Q (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to know the origin engineering materials and its classification. Also students will be able to learn the bonding character and its Properties
2. After studied unit-2, the student will be able to describe mechanical properties like elastic behavior and thermal properties like heat capacity, thermal conductivity etc.
3. After studied unit-3, the student will be able to know the basics of polymers, ceramics and nanomaterial.
4. After studied unit-4, the student will be able to explain definition and types of smart materials.
5. After studied unit-5, the student will be able to conceptualize the energy storage materials.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	No	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	No	No
5	Yes	No	Yes	Yes	Yes	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	L	M	M	M	M
CO2	S	M	M	M	M	M	M	S	M	L
CO3	S	M	S	S	S	M	M	S	S	S
CO4	S	M	M	M	S	M	S	S	M	M
CO5	S	S	M	S	M	S	M	S	S	M

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Core Elective 3 – Group (B)

Paper code: Name of the Paper: Medical Physics

Credit: 3

Total Hours per Week: 4 Lecture Hours: 60 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. To have a fundamental knowledge about the characteristics and production of X-rays.
2. To understand the concept of radiation physics.
3. To have a clear understanding of the design and working of Medical imaging techniques.
4. To understand the concepts and ideas behind radiation therapy.
5. To gain knowledge about the protective measures in radiation therapy.

UNIT- I

Teaching Hours: 12

X - RAYS

Electromagnetic spectrum, production of x-rays, x-ray spectra-Bremsstrahlung, Characteristic x-ray- Coolidge tube, x-ray tube design, tube cooling stationary mode, Rotating anode x-ray tube, Tube rating, quality and intensity of x-ray. X-ray generator circuits, half wave and full wave rectification, filament circuit, kilo voltage circuit, types of X-Ray Generator, high frequency generator, exposure timers and switches, HT cables, HT generation.

UNIT- II

Teaching Hours: 12

RADIATION PHYSICS

Radiation units exposure, absorbed dose, units: rad, gray, relative biological effectiveness, effective dose, inverse square law- Interaction of radiation with matter Compton & photoelectric effect, Rem & Sievert, linear attenuation coefficient - Radiation Detectors: Thimble chamber, condenser chambers, Geiger Muller counter, Scintillation counters and Solid State detectors, ionization chamber, Dosimeters, survey methods, area monitors, TLD, Semiconductor detectors.

UNIT- III

Teaching Hours: 12

MEDICAL IMAGING PHYSICS

Evolution of Medical Imaging, X-ray diagnostics and imaging, Physics of nuclear magnetic resonance (NMR), NMR imaging, MRI Radiological imaging, Ultrasound imaging, Physics of Doppler with applications and modes, Vascular Doppler. Radiography: Filters, grids, cassette, X-ray film, film processing, fluoroscopy- Computed tomography scanner- principle & function, display, generations, mammography. Thyroid uptake system and Gamma camera (only Principle, function and display)

UNIT- IV

Teaching Hours: 12

RADIATION THERAPY PHYSICS

Diagnostic nuclear medicine: Radiopharmaceuticals for radioisotope imaging, -Radioisotope imaging equipment, Single photon and positron emission tomography- Therapeutic nuclear medicine: Interaction between radiation and matter -Dose and isodose in radiation treatment - Medical Instrumentation: Basic Ideas of Endoscope and Cautery, Sleep Apnea and Cpap Machines, Ventilator and its modes

UNIT- V

Teaching Hours: 12

RADIATION PROTECTION

Principles of radiation protection, protective materials-radiation effects, somatic, genetic stochastic and deterministic effect. Personal monitoring devices: TLD film badge -pocket dosimeter, OSL dosimeter- Radiation dosimeter- Natural radioactivity, Biological effects of radiation, Radiation monitors-Steps to reduce radiation to Patient, Staff and Public- Dose Limits for Occupational workers and Public-AERB: Existence and Purpose.

Text Books

Unit 1 to Unit 5

1. Dr. K. Thayalan, Basic Radiological Physics, Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi, 2003.
2. Curry, Dowdey and Murrey, Christensen's Physics of Diagnostic Radiology, Lippincot Williams and Wilkins, 1990.
3. FM Khan-Williams and Wilkins, Physics of Radiation Therapy, Third edition, 2003.

Reference Books

1. Chandra-Lippincot Williams and Wilkins, Nuclear Medicine Physics, 1998.
2. William R Hendee-Mosby Medical Imaging Physics, 3rd edition, 1992.
3. K.N. Govindarajan, Advanced Medical Radiation Dosimetry, Prentice Hall of India Pvt. Ltd. New Delhi, 1992.
4. Muhammad Maqbool, Introduction to Medical Physics, Springer International Publishing, 2017.

E-Materials

1. https://www.youtube.com/watch?v=T1WwHh4b_M
2. <https://en.wikipedia.org/wiki/X-ray>
3. <https://www.studyandscore.com/studymaterial-detail/geiger-muller-counter-construction-principle-working-plateau-graph-and-applications>
4. <https://www.youtube.com/watch?v=Sr1BdM89RnA>
5. https://en.wikipedia.org/wiki/Magnetic_resonance_imaging
6. <https://www.youtube.com/watch?v=Q9-X4uV8ymk>
7. <https://www.adacap.com/nuclear-medicine/>
8. <http://jnm.snmjournals.org/content/57/1/163.full>

9. https://www.youtube.com/watch?v=gXR5Wdmeu_s (Tamil video)
10. <https://www.healthline.com/health/endoscopy>

Course Outcomes

1. After studying Unit 1, the student will have a clear idea about the fundamentals of the production and characteristics of X-rays.
2. After studying Unit 2, the student would have understood the concept of radiation units and radiation detectors.
3. After studying Unit 3, the student will have a clear understanding of the design and working of Medical imaging techniques and computer tomography scanner.
4. After studying Unit 4, the student will be having a thorough understanding about the diagnostic nuclear medicine and some medical instrumentation.
5. After studying Unit 5, the student would have gained adequate knowledge about the protective measures to be undertaken in radiation therapy.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	No	No
2	Yes	Yes	Yes	Yes	No	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	No	No
5	Yes	Yes	Yes	Yes	No	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	L	S	S	M	M
CO2	S	S	M	M	S	M	S	S	M	S
CO3	S	M	S	S	S	M	S	S	S	S
CO4	S	S	M	M	S	M	S	S	M	L
CO5	S	S	M	S	M	S	M	S	S	M

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Core Elective 1 – Group (C)

Paper code: Name of the Paper: Digital Electronics

Credit: 3

Total Hours per Week: 4 Lecture Hours: 60 Tutorial Hours: Nil Practical Hours: Nil

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Course Objectives

1. Understanding the different number systems and conversion between them and also to study the basic logic gates.
2. To teach the laws of Boolean Algebra, De Morgan's theorems and other logic circuits.
3. To Study combination of logic circuits and understanding concepts of various flip- flops.
4. To expose the knowledge on various registers and counters.
5. To learn the digital to analog and analog to digital converters.

UNIT – I

Teaching Hours: 14

NUMBER SYSTEMS AND BASIC LOGIC GATES

Number systems -Decimal, Binary, Octal and Hexadecimal system - Conversion from one number system to another- Binary Arithmetic -Addition -Subtraction-Multiplication-Division- 1's and 2's complement - Subtraction using Complements-Signed Binary Numbers-Binary codes- BCD code - Excess 3 code, Gray code - ASCII code - Basic logic gates- NOT,OR,AND-Design of AND, OR gates using diodes and NOT gate using transistor-Logic circuits and logic expressions-Sum of Products-Product of Sum- NAND, NOR and EX-OR - functions and truth tables.

UNIT- II

Teaching Hours: 14

BOOLEAN ALGEBRA AND LOGIC CIRCUITS

Laws of Boolean algebra - De Morgan's theorems-NAND & NOR as Universal gates (AND,OR and NOT only)-Karnaugh map - Minterms-Relationship between K-Map and truth table- 2,3 and 4 variable K Map using minterms- Simplification of Boolean function using K Map - Arithmetic Circuits-Half adder and Full adder- Four Bit Adder-BCD Adder- Half subtractor and Full subtractor-Four Bit Adder/subtractor.

UNIT- III

Teaching Hours: 12

COMBINATION OF CIRCUITS & FLIP-FLOPS

Multiplexer-Demultiplexer- Decoder- 2 to 4 and 3 to 8 Decoder-BCD to seven segment decoder- BCD to decimal decoder-Encoder-Programmable Logic Array (PLA)-Binary to Gray and Gray to Binary Conversion using EX-OR gates-Parity Generator and Checker - Flip Flops -SR Flip Flop -Clocked SR-Edge triggered Flip – Flops- D Flip-Flop - JK Flip-Flop -JK Master-Slave Flip - Flop-T Flip-Flop.

UNIT- IV

Teaching Hours: 10

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring Counter - Johnson's Counter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit Binary Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

Teaching Hours: 10

D/A AND A/D CONVERTERS

Binary weighted resistors D/A converter-R-2R Resistive Ladder - Analog to Digital Converter (ADC)-Counter Type A/D Converter-Successive Approximation A/D Converter-Dual Slope A/D Converter-Parallel Comparator A/D Converter.

Text Book

Unit 1 to Unit 5

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007.

Reference Books

1. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
2. V.Vijayendran, Digital Fundamentals, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004.
3. R.P. Jain, Modern Digital Electronics, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. H. Taub and D. Schilling , Digital Integrated Electronics -, McGraw-Hill Book Company.
5. T.L. Floyd , Digital Fundamentals -, Pearson Education, 8/e.
6. W.H. Gothmann , Digital Electronics -, Prentice Hall of India Private Limited, 2/e.

E-Materials

1. <https://www.youtube.com/watch?v=4ae9sJBBkvw>
2. <https://learnabout-electronics.org/Digital/dig11.php>
3. <https://www.youtube.com/watch?v=RrynEQ7sG5A>
4. <https://www.sciencedirect.com/topics/computer-science/de-morgans-theorem>
5. [https://en.wikipedia.org/wiki/Flip-flop_\(electronics\)](https://en.wikipedia.org/wiki/Flip-flop_(electronics))
6. <https://www.youtube.com/watch?v=tSti91b6qec>

7. <https://www.youtube.com/watch?v=vRBnZMJA0LY>
8. https://en.wikipedia.org/wiki/Shift_register
9. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_digital_to_analog_converters.htm
10. <https://www.youtube.com/watch?v=Y2OPnrgb0pY>
11. https://www.youtube.com/watch?v=_xxQZEVbPwU (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various binary codes and to design basic logic gates.
2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates.
3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits.
4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters.
5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	No	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	L	M	M	M	M
CO2	S	S	M	M	S	M	M	S	M	S
CO3	S	M	S	S	S	M	M	S	S	S
CO4	S	S	M	M	S	M	S	S	M	M
CO5	S	S	M	S	M	S	M	S	S	M

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Semester: VI

Paper type: Core Elective 2 – Group (C)

Paper code: Name of the Paper: Radiation Safety

Credit: 3

Total Hours per Week: 4

Lecture Hours: 60

Tutorial Hours: Nil

Practical Hours: Nil

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Course Objectives

1. The students can learn the basic concepts of atomic and nuclear physics
2. To teach the different types of radiation and interaction of charged particles
3. To study the basic idea of different units of activity and working principle of radiation detectors
4. To understand the concept of radiation safety management
5. To give the application of nuclear techniques

UNIT- I

Teaching Hours: 12

BASICS OF ATOMIC AND NUCLEAR PHYSICS

Basic concept of atomic structure; X rays characteristic and production; concept of bremsstrahlung and auger electron-The composition of nucleus and its properties, mass number, isotopes of element, spin, binding energy, stable and unstable isotopes, law of radioactive decay- Mean life and half-life, -Basic concept of alpha, beta and gamma decay, concept of cross section and kinematics of nuclear reactions- Types of nuclear reaction, fusion, fission.

UNIT- II

Teaching Hours: 12

INTERACTION OF RADIATION WITH MATTER

Types of Radiation: Alpha, Beta, Gamma and Neutron and their sources, sealed and unsealed sources, Interaction of Photons - Photoelectric effect, Compton Scattering, Pair Production- Linear and Mass Attenuation Coefficients- Interaction of Charged Particles: Heavy charged particles - Beth-Bloch Formula, Scaling laws, Mass Stopping Power, Range, Straggling, Channeling and Cherenkov radiation- Beta Particles- Collision and Radiation loss (Bremsstrahlung)-Interaction of Neutrons- Collision, slowing down and Moderation.

UNIT- III

Teaching Hours: 12

RADIATION DETECTION AND MONITORING DEVICES

Radiation Quantities and Units: Basic idea of different units of activity, KERMA, exposure, absorbed dose, equivalent dose, effective dose, collective equivalent dose, Annual Limit of Intake (ALI) and derived Air Concentration (DAC) - Radiation detection: Basic concept and working principle of gas detectors (Ionization Chambers, Proportional Counter, Multi-Wire Proportional Counters (MWPC) and Gieger Muller Counter), Scintillation Detectors (Inorganic and Organic Scintillators), Solid States Detectors and Neutron Detectors, Thermo luminescent Dosimeter.

UNIT- IV

Teaching Hours: 12

RADIATION SAFETY MANAGEMENT

Biological effects of ionizing radiations - Operational limits and basics of radiation hazards evaluation and control: radiation protection standards - International Commission on Radiological Protection (ICRP) principles, justification, optimization, limitation, introduction of safety and risk management of radiation. Nuclear waste and disposal management. Brief idea about Accelerator driven Sub-critical system (ADS) for waste management.

UNIT-V

Teaching Hours: 12

APPLICATION OF NUCLEAR TECHNIQUES

Application in medical science (e.g., MRI, PET, Projection Imaging Gamma Camera, radiation therapy), Archaeology, Art, Crime detection, Mining and oil-Industrial Uses: Tracing, Gauging, Material Modification, Sterilization, Food preservation.

Text Books

Unit 1 to Unit 5

1. R. Murugesan and Kiruthiga Sivaprasath, Modern Physics, S Chand & Co. New Delhi, 2006.
2. H. Cember and T. E. Johnson, Introduction to Health Physics, 4th Ed., McGraw Hill, 2008.
3. K. Thayalan, Handbook of Radiological Safety, Jaypee Brothers, Medical, Publishers, 2009.

Reference Books

1. Dr. K. Thayalan, Basic Radiological Physics, Jaypee Brothers Medical Publishing Pvt. Ltd. New Delhi, 2003.
2. R. F. Mould Radiation Protection in Hospital (Adam Hilger Ltd., Bristol, 1985).
3. Martin, S. Harbison, K. Beach and P. Cole, An Introduction to Radiation Protection, 6th Ed. CRC Press, 2013.
4. AERB Radiation Protection Rules, 2004.
5. IAEA Safety Series 41

E-Materials

1. https://en.wikipedia.org/wiki/Radioactive_decay
2. <https://www.toppr.com/guides/physics/nuclei/radioactivity-law-of-radioactive-decay/>
3. <https://www.youtube.com/watch?v=9UhmFr2WctU> (Tamil video)
4. https://ta.wikipedia.org/wiki/%E0%AE%92%E0%AE%B3%E0%AE%BF%E0%AE%AE%E0%AE%BF%E0%AE%A9%E0%AF%8D_%E0%AE%B5%E0%AE%BF%E0%AE%B3%E0%AF%88%E0%AE%B5%E0%AF%81
5. <https://www2.lbl.gov/abc/wallchart/chapters/15/2.html>
6. https://www.radiologyinfo.org/en/info.cfm?pg=safety-hiw_09
7. <https://www.youtube.com/watch?v=DvSNImGu55c>
8. http://webfiles.ehs.ufl.edu/rssc_stdy_chp_5.pdf
9. <https://www.world-nuclear.org/information-library/non-power-nuclear-applications/overview/the-many-uses-of-nuclear-technology.aspx>
10. <https://www.youtube.com/watch?v=ySnG4JZa7Go>

Course Outcomes

1. After studied unit-1, the student will be able to study the basics of atomic structure and nuclear composition.
2. After studied unit-2, the student will be able to describe properties of alpha, beta and gamma rays and also to study the interaction of charged particles.
3. After studied unit-3, the student will be able to explain radiation quantities and units and also able to know the principle and working of radiation detectors.
4. After studied unit-4, the student will be able to conceptualize the radiation safety management.
5. After studied unit-5, the student will be able to know the application of nuclear techniques in medicinal science.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	No	No
2	Yes	No	Yes	Yes	No	No
3	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	No	Yes	No	No
5	Yes	Yes	Yes	Yes	Yes	No

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	L	M	M	M	M
CO2	S	S	M	M	S	M	M	M	M	L
CO3	S	M	S	S	S	M	M	M	S	L
CO4	S	S	M	M	S	M	S	M	M	M

CO5	S	S	M	S	M	S	M	S	S	S
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THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Core Elective 3 – Group (C)

Paper code: Name of the Paper: Astrophysics

Credit: 3

Total Hours per Week: 4 Lecture Hours: 60 Tutorial Hours: Nil Practical Hours: Nil

Course Objectives

1. To give basic principle and types of astronomical instruments.
2. To study the big bang theory, types of galaxies and to astronomical units.
3. To learn the birth and age of stars and to know about comets.
4. To teach the structure of the sun and other planets.
5. To give the overview of India's space programme and calendars.

UNIT- I

Teaching Hours: 12

ASTRONOMICAL INSTRUMENTS

Optical telescope - reflecting telescope - types of reflecting telescope - advantages of reflecting telescopes - radio telescope - astronomical spectrographs - photographic photometry - photoelectric spectrometry- detectors and image processing.

UNIT- II

Teaching Hours: 12

SPACE

Introduction -Hubble's Law -Big bang theory - Shape of Universe -Expanding universe in space - Galaxies- Types of Galaxies- Spiral, Elliptical and Irregular Galaxies - Clusters of Galaxies - Milky Way - Quasars - Cislunar space -Translunar space - Inter planetary distance

-Interstellar space - Inter galactic space - Light Year - Astronomical Unit- Astronomical Map.Astronomical Systems -Astronomical co-ordinates - Celestial Sphere - Celestial Equators - Celestial Poles.

UNIT- III

Teaching Hours: 12

STARS

Birth of Stars -Colour and Age- Life of Stars - Red giant stars - White dwarf star - Neutron Star -Black hole - Supernovae - Constellations - Zodiac - Asteroids - Meteors -Meteorites-Comets.

UNIT- IV

Teaching Hours: 12

SOLAR SYSTEM

Introduction - Sun - Structure of Sun - Nuclear reactions in sun - Sun spot and solar flares- Earth - Structure of earth - Atmosphere - Moon and its structure - Inner planets Outer planets - Introduction - Sidereal month - Synodic month - daily motion of the moon- age of moon - phase of moon - position of moon at rising and setting-Eclipses-Introduction - umbra and penumbra - lunar eclipse - solar eclipse -durationof lunar and solar eclipse - comparison of solar and lunar eclipses.

UNIT- V

Teaching Hours: 12

INDIA'S SPACE PROGRAMME

Overview - Methodological issues in cost beneficial analysis of spaceprogramme - The INSAT system - Broadcasting - Telecommunication -Meteorology - Indian remote sensing programme-Geoinformatics (basic idea only) - The launching program-Latest Launchers-PSLV and GSLV - Mission-Chandrayan 2 - Lunar and Solar calendars - Egyptian - Mayan - Roman - Julian andGregorian calendars - Indian National calendar - Tamil and Malayalamcalendars.

Text Books

1. BaidyanathBasu, An introduction to Astrophysics,Pentice Hall of India Private Ltd., New Delhi - 2001.
2. A.Hewish, Physics of the Universe , CSIR publication, New Delhi, 1992.
3. BimanBasu, Inside Stars, CSIR Publication, New Delhi, 1992.
4. K.S.Krishnasamy, Astro Physics a Modern Perspective, New Age International, New Delhi.
5. R. Murugesan, Modern Physics, S. Chand &Co.,New Delhi, 2003.

Reference Books

1. Prof. P. Devadas, The fascinating Astronomy, Devadas Telescopies, Chennai.
2. S. Kumaravelu and SusheelaKumaravelu,Astronomy,2013.
3. Textbook of astronomy an astrophysics with elements of cosmology, V.B.Bhatia, Narosapublishing house, 2001.
4. Astrophysics - Stars and Galaxies, K. D. Abhyankar, University Press, 2001.
5. Theoretical Astrophysics (Vols. I,II,III) - T. Padmanavan (CUP)

6. Black Holes, White Dwarfs and Neutron Stars -S.L.Shapiro and S.A.Teukolsky (John Wiley, 1983).

E-Materials

1. <https://www.youtube.com/watch?v=zlioUjguQk8>
2. https://en.wikipedia.org/wiki/Reflecting_telescope
3. https://en.wikipedia.org/wiki/Milky_Way
4. <https://www.youtube.com/watch?v=BcjmoEspoRI>
5. <https://www.youtube.com/watch?v=ZrS3Ye8p61Y>
6. <https://en.wikipedia.org/wiki/Star>
7. https://en.wikipedia.org/wiki/Solar_System
8. <https://www.youtube.com/watch?v=AC0HdUD1RfA> (Tamil video)
9. <https://www.youtube.com/watch?v=eeS7byxWDM4>
10. https://en.wikipedia.org/wiki/Indian_National_Satellite_System

Course Outcomes

1. After studied unit-1, the student will be able to study the different types of optical instruments like telescopes and spectrographs will be used for observing/recording the space objects.
2. After studied unit-2, the student will be able to describe big bang theory, different types of galaxies, milky way and astronomical unit.
3. After studied unit-3, the student will be able to explain about stars, constellations, asteroids, meteorites and comets.
4. After studied unit-4, the student will be able to know the details of solar system and able to know the formation eclipse due to sun, moon and earth.
5. After studied unit-5, the student will be able to understanding the different space programmers/missions carried out by our Indian Space Research Organization (ISRO) and also to study the lunar and solar calendars.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	No	No
3	Yes	Yes	Yes	Yes	No	No
4	Yes	Yes	Yes	Yes	No	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	M	L	M	M	M	L
CO2	S	S	S	S	S	M	M	S	M	S
CO3	M	M	S	S	S	M	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	M	S	S	S	M	S	M	S	S	M

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Semester: VI **Paper type: Core Practical**
Paper code: **Name of the Paper: Practical –3** **Credit: 3**

Total Hours per Week: 3 **Lecture Hours: Nil** **Tutorial Hours: Nil** **Practical Hours: 45**
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List of Experiments (Any 15 Experiments only)

1. Bifilar Pendulum - Parallel Threads - Verification of Parallel and Perpendicular axes theorems.
2. Young's modulus - Koenig's method - non- uniform bending.
3. Young's modulus -Koenig's method - uniform bending.
4. Newton's rings -Refractive index of material a convex lines.
5. Spectrometer i- i' Curve.
6. Spectrometer -Narrow angled prism - angle of deviation - normal incidence and normal emergence - refractive index.
7. Spectrometer-Dispersive power of a prism.
8. Spectrometer-Dispersive power of a grating.
9. Field along the axis of circular coil -Deflection magnetometer -M and B_H - Null Deflection Method.
10. Field along the axis of circular coil –Vibration magnetometer -Determination of B_H .
11. Potentiometer –Calibration of high range Voltmeter.
12. Potentiometer – EMF of a thermo couple.
13. Potentiometer - Conversion of galvanometer into Voltmeter.
14. Potentiometer - Conversion of galvanometer into Ammeter.
15. BG - Absolute capacitance of a capacitor.
16. BG - Comparison mutual inductances.
17. BG - Internal resistance of a cell.
18. Voltage regulator -Bridge Rectifier-Using IC 7805
19. Transistor Characteristics-CE mode
20. FET -Characteristics.
21. UJT - Characteristics.
22. SCR- Characteristics
23. RC Coupled Amplifier- Single stage.
24. Colpitt's Oscillator- Using transistor.
25. Hartley oscillator-Using transistor.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Samir Kumar Ghosh, A Textbook of Advanced Practical Physics, NCBA, Kolkatta, 2000.

2. D. Chattopadyay, P.C.Rakshit, An Advanced Course in Practical Physics, NCBA, Kolkatta, 2011
3. C.L.Arora, B.Sc., Practical Physics,S. Chand and Company., New Delhi.
4. D.P..Khandelwal D.P., A Laboratory Manual of Physics for Undergraduate Classes. Vani Publications.
5. B.Saraf et al, Physics through Experiments,Vikas Publications.
6. Harnaam Singh., B.Sc., Practical Physics,S. Chand and Company., New Delhi.
7. D C Tayal, University Practical Physics, Himalaya Publishing House.
8. Gupta & Kumar, Practical Physics, Pragatiprakashan, Meerut.

8. Gupta & Kumar, Practical Physics, Pragatiprakashan, Meerut.

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(B.Sc Physics) – 2022-2023 onwards

Semester: VI

Paper type: Project

Paper code:

Name of the Paper: Compulsory Project Credit: 3

Total Hours per Week: 3 Lecture Hours: Nil Tutorial Hours: Nil Practical Hours: 45
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Preamble

The concept of introducing the project will help the student community to learn and apply the principles of Physics and explore the new research avenues - In the course of the project the student will refer books, Journals or collect literature / data by the way of visiting research institutes/ industries or social relevance problem. He/she may even do experimental /theoretical work in his/her college and submit a dissertation report with a minimum of 25 pages not exceeding 30 pages.

Format for Preparation of Project

The sequence in which project should be arranged and bound should be as follows

1. Cover Page and title Page
2. Declaration
3. Certificate
4. Acknowledgement (not exceeding one page)
5. Contents (12 Font size, Times new Roman with double line spacing)
6. Chapters
7. References

Distribution of marks for Project: (25+75 = 100 Marks)

Internal : 25 Marks

External : 75 Marks

- | | |
|---|------------|
| (a) For Organization and presentation of Project | - 40 marks |
| (b) For the novelty /Social relevance | - 10 marks |
| (c) Presentation of work /Participation in state/
National level Seminar/publication | - 5 marks |
| (d) Viva voce (Preparation, Presentation of
work and Response to questions) | - 20 marks |


ANNAMALAI UNIVERSITY
403 - M. Sc. PHYSICS

Programme Structure and Scheme of Examination (under CBCS)
 (Applicable to the candidates admitted in Affiliated Colleges
 from the Academic year 2022 -2023 onwards)

Course Code	Study Components & Course Title	Hours /Week	Credit	Maximum Marks		
				CIA	ESE	Total
SEMESTER - I						
22PPHYC11	Core Course - I: Classical and Relativistic Mechanics	5	4	25	75	100
22PPHYC12	Core Course - II: Mathematical Physics -I	5	4	25	75	100
22PPHYC13	Core Course - III: Electronics	5	4	25	75	100
22PPHYC14	Core Practical - I	8	4	40	60	100
22PPHYE15	Core Elective - I	4	4	25	75	100
22PPHYO16	Open Elective - I	3	3	25	75	100
Total		30	23			600
SEMESTER - II						
22PPHYC21	Core Course - IV: Quantum Mechanics	5	4	25	75	100
22PPHYC22	Core Course - V: Mathematical Physics - II	5	4	25	75	100
22PPHYC23	Core Course - VI: Thermodynamics and Statistical Mechanics	5	4	25	75	100
22PPHYC24	Core Practical - II	8	4	40	60	100
22PPHYE25	Core Elective - II	5	4	25	75	100
22PHUMR27	Compulsory Course : Human Rights	2	2	25	75	100
Total		30	22			600

CORE ELECTIVE COURSES
(Choose 1 out 3 in each Semester)

SEMESTER	COURSE CODE	COURSE TITLE	H/W	C	CIA	ESE	TOTAL
I	22PPHYE15-1	Numerical Methods and Python programming	4	4	25	75	100
	22PPHYE15-2	Solar Energy Utilization	4	4	25	75	100
	22PPHYE15-3	Laser Physics and Non Linear Optics	4	4	25	75	100
II	22PPHYE25-1	Nano Science and Nano Technology	5	4	25	75	100
	22PPHYE25-2	Petro Physics	5	4	25	75	100
	22PPHYE25-3	Communication Electronics	5	4	25	75	100

OPEN ELECTIVE COURSES
For the Students of Other Departments
(Choose 1 out 3 in each semester)

SEMESTER	COURSE CODE	COURSE TITLE	H/W	C	CIA	ESE	TOTAL
I	22PPHYO16-1	Communication Physics	3	3	25	75	100
	22PPHYO16-2	Spectroscopy and Lasers	3	3	25	75	100
	22PPHYO16-3	Basis of Renewable Energy Sources	3	3	25	75	100

SEMESTER: I PART : Core Course	22PPHYC11: CLASSICAL AND RELATIVISTIC MECHANICS	CREDITS : 4 Hours/Week : 5
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COURSE OBJECTIVES

1. To make learning of Classical Mechanics interesting and to teach the Lagrangian and Hamiltonian formalisms and their applications.
2. To study the kinematics of the rigid body through Euler's equations
3. To study the theory of Hamilton Jacobi theory and central force problem
4. To teach the theory of small oscillations and vibrational modes of molecules and to create an understanding of the principles of Nonlinear dynamics and classical chaos.
5. To understand relativity and its consequences

Unit 1: Lagrangian And Hamiltonian Formalisms

Lagrangian formalism: Constrains – classifications – Degrees of freedom – Generalized coordinates – Configuration Space – D'Alembert's principle-Lagrange's equation from D'Alembert's principle- Applications: Double pendulum, Spherical pendulum, Cylinder rolling down an inclined plane.

Hamiltonian Formalism: Hamilton's equations of motion - Physical significance – Hamilton's variational Principle – Hamilton's equation of motion from variational principle – Integrals of Hamilton's equation – Principle of least action – Applications: Linear harmonic oscillator and projectile in space.

Unit 2: Rigid Body Dynamics And Canonical Transformations

Rigid body motion: Angular momentum and rotational kinetic Energy – Euler's angles –Euler's geometrical equations – Euler's equations of motion – Moment of inertia of rigid body Torque-free motion of a rigid body - Motion of a symmetrical top under the action of gravity.

Canonical transformations: Generating function – Condition for a function to be canonical –simple example – Poisson's brackets – Properties – Hamilton's equation of motion in Poisson's bracket-invariance of Poisson's bracket under canonical transformation – Lagrange brackets –properties.

Unit 3 : Central Force Motion And Hamilton - Jacobi Theory

Central Force motion: Reduction of one-body problem – Kepler's law – inverse square law force – Satellite parameters – Communication satellites – Scattering in a central force field –Orbits of artificial satellites.

Hamilton-Jacobi Theory: Hamilton – Jacobi equation Hamilton's characteristic function - Harmonic oscillator in the H-J method – Separation of variables – Action-angle variables – Harmonic oscillator in Action - Angle variables – Kepler's problem in Action-angle variables – Road to Quantization.

Unit 4: Oscillations And Nonlinear Dynamics

Oscillatory motion: Theory of small oscillations – Normal modes – Normal coordinates – Linear triatomic molecule – Stability of Oscillatory motion - Forced Harmonic Oscillator.

Nonlinear Dynamics: Linear and Nonlinear systems – Pendulum equation – Phase portrait of the pendulum – Linear stability analysis – Fixed point analysis of Damped oscillator – Classical Chaos – Bifurcation – Logistic map – Universality of Chaos – Fractals – Routes to Chaos.

Unit 5 : Relativistic Mechanics

Theory of relativity: Postulates of special theory of relativity – Lorentz transformation - length Contraction – time dilation - Relativity of simultaneity - addition of velocities - variation of mass with velocity– Mass energy relation – Relativistic Lagrangian and Hamiltonian for a particle, Space - time diagram – Minkowski four dimension space – Principle of covariance – Four vectors in Mechanics

COURSE OUTCOMES

At the end of the course, student will be able to

1. Have depth knowledge about Lagrangian and Hamiltonian formulations and solve problems using those formulations.
2. Have knowledge about fundamentals of rigid body motion and explain Moment of inertia tensor and Euler's equations of motion and will also be able to solve problems on force free motion of a rigid body and symmetrical top.
3. Apply Hamilton's characteristic function to solve problems. Understand Action Angle variables and solve one degree of freedom and Kepler's problem.
4. Acquire knowledge about oscillatory motion and stability of oscillatory motion. Understand the linear and nonlinear systems and basics of Chaos.
5. Understand the applications relativistic mechanics and its consequences.

Text books

1. G. Aruldhas, *Classical Mechanics* - PHI Learning Private Limited, New Delhi. (2015).
2. H. Goldstein, C. Poole and J. Safko, *Classical Mechanics* - Pearson Education Asia New Delhi, Third Edition. (2002).
3. S. L. Gupta, V. Kumar and H.V. Sharma, PragatiPrakashan, *Classical Mechanics* - Meerut. (2016)
4. M. Lakshmanan, and S.Rajasekar, *Nonlinear Dynamics - Integrability, Chaos and Patterns*, Springer, (2003).

Supplementary Readings

1. S.N. Biswas, *Classical Mechanics*, Books and Allied Ltd., Kolkata. (1998).
2. Upadhyaya, *Classical Mechanics*, Himalaya Publishing Co., New Delhi. (1999)
3. L.D. Landau and E.M. Lifshitz, *Mechanics*, Pergomon Press, Oxford. (1969).
4. J.L. Synge and B.A Griffith, *Principles of Classical Mechanics* Mc.Graw-Hill, NewYork. (1949).

5. R.G.Takwale and P.S.Puranik, *Introduction to Classical Mechanics*, Tata McGraw Hill, New Delhi. (1989).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	2	2
CO3	3	3	3	3	2
CO4	3	3	3	3	3
CO5	3	3	3	3	2

SEMESTER: I PART : Core Course	COURSE CODE: 22PPHYC12 TITLE : MATHEMATICAL PHYSICS – I	CREDITS : 4 Hours/Week : 5
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COURSE OBJECTIVES

1. To introduce the students the concepts of vector analysis and its uses.
2. To make the students to understand matrices and applications.
3. To make the student to study the aspect of tensor analysis.
4. To involve the student to learn special functions.
5. To educate the students in understanding group theory.

UNIT 1: Vector analysis

Integration of vector – Line, Surface, Volume Integrals - Gauss Divergence Theorem -Gauss Theorem - plane and vector form - Green's formula - Poisson's, Laplace's equation with its solution - Stokes Theorem in space. Curvilinear Co-ordinates - Orthogonal curvilinear coordinates - Condition for Orthogonality - Expression for gradient, divergence, curl and Laplacian coordinates - Cylindrical and Spherical co-ordinates - Problems.

UNIT 2: Matrices and applications

Special Matrices with their Properties – Rank of Matrix – Characteristic Matrix and Characteristic equation of a matrix – Transformations – Hermitian forms - Characteristic roots and vector of a matrix – Diagonalization of matrices. Applications – Theorems of rank of matrix – Solution of linear equations – Nature of Diagonalizing Matrices for Special Matrices – Power of Square Matrix – Exponential of Matrix - Problems.

UNIT 3: Tensor analysis

Introduction – Tensor as classification of transformation laws – rank of tensor – Symmetric and Anti symmetric tensors-Invariant Tensors- Inner and outer product – Contraction of a tensor – Quotient Law - Raising and lowering of suffixes – Metric tensor – Conjugate tensors – Christoffel symbols of first and second kind – Equation of a geodesic - Covariant derivatives.

UNIT 4: Special functions

Gamma, Beta Function - Value of $\Gamma(1/2)$ - other forms of Beta Function – Relationship between Beta and Gamma Functions-Reduction & Evaluation of Gamma Function – Contour integral for gamma functions - Derivation of Gamma Function – Stirling's Formula - Wallis's Formula - Incomplete Beta and Gamma Function - Meaning of Asymptotic series-Elliptic Integrals Problems.

UNIT 5 : Group theory

Definition - Subgroups - Cyclic groups and abelian groups - Homomorphism and isomorphism of groups - Classes – Group of Isometries-Symmetry operations and symmetry elements -Representations of groups - Reducible and irreducible representations - Character tables for simple molecular types (C_{2v} and C_{3v} point group molecules).

COURSE OUTCOMES

At the end of the course, student will be able to

1. Solve problems using Vector calculus method.
2. Apply matrices to solve higher level problems in quantum and statistical mechanics.
3. Solve problems using Tensor method.
4. Evaluate problems using Special function
5. Evaluate problems using group theory

Textbooks

1. B.D. GUPTA *Mathematical Physics* – Vikas Publishing House, Pvt Ltd, First Reprint (2015).
2. B.S. Rajput, *Mathematical Physics*, PragatiPrakashan, 19th Edition (2007).
3. Sathyaprakash, *Mathematical Physics* – Sultan Chand & Sons, 6th edition (2014).

Supplement Readings

1. R.K.Gupta& H.C. Sharma – *Mathematical Physics*, MeenakshiPrakashan Meerut (1999)
2. A.B. Gupta – *Fundamentals of Mathematical Physics*, Books and Allied (P) Ltd, Kolkata. 3rd Edition (2010).
3. Albert Cotton – *Chemical Applications of Group Theory* – Wiley Eastern Ltd., (1971).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2
CO2	3	2	2	3	3
CO3	3	2	3	3	2
CO4	3	3	3	2	2
CO5	3	3	3	3	3

SEMESTER : I PART: Core Course	COURSE CODE: 22PPHYC13 TITLE : ELECTRONICS	CREDITS : 4 Hours/Week : 5
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COURSE OBJECTIVES

- 1) To understand the working of semiconductor devices and diodes.
- 2) To educate the various types of semiconductor memories.
- 3) To study the importance and applications of operational amplifier.
- 4) To know about the basics of IC fabrication and applications of timer IC – 555.
- 5) To learn basic idea about the nanoelectronics.

UNIT 1 : Special semiconductor devices

Principle, construction, characteristics, working and uses of - Varactor diode - Schottky diode - Tunnel diode - Gunn diode - Optoelectronic diodes - LASER diode, LED and photo diode - photo transistor, LDR and solar cell.

UNIT 2: Semiconductor memories

Classification of memories and sequential memory – Static Shift Register and Dynamic Shift Register, ROM, PROM and EPROM principle and operation Read & Write memory - Static RAM, dynamic RAM, Content Addressable Memory - principle, block diagram and operation.- Programmable Logic Array (PLA) - Operation, Internal Architecture. Charge Couple Device (CCD) - Principle, Construction, Working and Data transfer mechanism.

UNIT 3: Operational amplifiers as filters and oscillators

Operational amplifier -op-amp as comparator - Voltage to current and current to voltage conversions-active filters : low-pass, high pass, band pass, notch and rejection filter - Wien bridge and phase shift oscillator-triangular, saw-tooth and square wave generators-Schmitt's trigger - Voltage control oscillator - phase locked loops.

UNIT 4: IC Circuits AND IC Timer

Basic monolithic ICs - epitaxial growth - masking – etching- impurity diffusion –fabricating monolithic resistors, diodes, transistors, capacitors and inductor - circuit layout – contacts and inter connections – logic families – RTL, TTL, CMOS - 555 timer - description of the functional diagram - mono stable operation - applications of mono stable – bistable operation - astable operation - pulse generation - Schmitt's trigger

UNIT 5: Nanoelectronics

Physical properties of nanoscale electronics materials – energy subbands – density of states in quantum wire – ballistic transport – silicon nano transistors – carbon nanotubes for nano devices – CNT transistor – high electron mobility transistor using heterojunction – nano electromechanical systems – quantum dot cellular automata.

COURSE OUTCOMES

At the end of the course, the student will be able to

- 1) Understand the principles, working of semiconductor devices and diodes.
- 2) Study the various classifications and applications of semiconductor memories
- 3) Study the applications of operational amplifier.
- 4) Highlight the concept of IC circuits and IC 555 timer.
- 5) Understand basics idea about the nanoelectronics.

Text books:

- 1) Satnam P.Mathur, *Electronic Devices - Applications and Integrated Circuits*, John Wiley and Sons. (1986).
- 2) V.K.Mehta, *Principles of Electronics-* 6th Revised Edition,S.Chand and Company. (2001).
- 3) J. Millman, C. Halkias and C.D. Parikh, *Integrated Electronics, Analog and Digital Circuits and Systems* TMGH. (2010).
- 4) D. C. Dube, *Electronics circuits and analysis* – 2nd Edition, Narosa (2013).
- 5) Bhotkar , *Integrated Circuits*. Khanna Publishers , (2010).
- 6) B.L.Theraja , *BasicElectronic*, S.Chand& company ltd(2007)
- 7) Gupta and Kumar, *Handbook of Electronics-* Pragati Prakashan-34th edition (2007).
- 8) D.Chattopadhyay and P.C. Rakshit, *Electronics-Fundamentals and Applications*, New Age International Publications, New Delhi. (2010).
- 9) R.F. Coughlin and F.F, Driscoll, *Op-Amp and linear integrated circuits*, Prentice Hall of India, New Delhi. (1996).
- 10) Ramakant A. Gayakwad, *Op-Amps and Linear Integrated Circuits*, Pearson Education: Fourth Edition. (2015).

Supplementary Readings:

- 1) T.F. Schubert and E.M.Kim, "*Active and Nonlinear Electronics*", John Wiley Sons, New York. (1996)
- 2) L.Floyd, *Electronic Devices*, "Pearson Education" New York. (2004)
- 3) Mottershed, *Semiconductor Devices and Applications*, Prentice Hall India Learning Private Limited.(1979)
- 4) Ben.G.Streefman, *Solid state electronic devices*, Printice Hall, Englewood Cliffs, NJ. (1999).
- 5) Albert Malvinoand DavidJ Bates, *Electronic Principles-* 7 th Edition, McGraw Hill. (2007).
- 6) David A. Bell ,*Electronic Devices and Circuits*, 4th Edition, Prentice Hall. (2007).
- 7) L. Floyd, *Electronic Devices*, Pearson Education, New York. (2004).
- 8) R.A. Gayakwad, *Op-Amps & Linear Integrated Circuits*,Printice Hall, New Delhi. (1999).
- 9) D. Roy Choudhury and S.B. Jain, *Linear Integrated Circuit*, New Age International Publications, New Delhi. (2010).
- 10) R.P.Jain, *Modern Digital Electronics*, Tata McGraw Hill. (1991).

11) Jacob Millman and Halkias, *Integrated Electronics*, McGraw Hill. (1972).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	2	3	3	2
CO3	3	3	3	3	2
CO4	2	3	3	2	3
CO5	3	3	3	3	3

SEMESTER: I PART : Core Practical	COURSE CODE: 22PPHY14 TITLE : PRACTICAL – 1 GENERAL & ELECTRONICS-I	CREDITS : 4 Hours/Week : 8
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COURSE OBJECTIVES

1. To make the students to understand experimental physics
2. To apply the theoretical knowledge for developing new devices
3. To study the aspects related to the application side of the experiments
4. To understand the usage of basic laws and theories to determine various properties of the materials given

List of Experiments (Any 15 out of the given 22)**GENERAL EXPERIMENTS - I (Choose Minimum 6 experiments)**

1. Young's modulus - Cornu's method – forming elliptical fringes.
2. Young's modulus - Cornu's method – forming hyperbolic fringes.
3. Spectrometer - Polarizability of liquids.
4. Spectrometer - Biprism - Wavelength of sodium light - Refractive Index of a liquid.
5. Hydrogen spectrum - Rydberg's constant.
6. Solar spectrum - Hartmann's Interpolation formula.
7. Co-efficient of linear expansion - Air wedge method.
8. Determination of specific rotatory power of liquid using polarimeter.
9. Forbe's method of determining thermal conductivity.
10. Identification of prominent lines by spectrum photography – Iron spectrum.

ELECTRONICS EXPERIMENTS- I (Choose Minimum 6 experiments)

1. Construction of dual regulated power supply.
2. V-I characteristics of solar cell.
3. OP-AMP-Active 2nd order filter circuits : Low pass, High pass and Band pass filters.
4. OP-AMP- Design of Phase-shift Oscillator-Study of attenuation characteristics
5. OP-AMP- Design of Wien Bridge Oscillator-Study of attenuation characteristics.
6. OP-AMP - Solving simultaneous equations.
7. OP-AMP - Design of square wave, saw tooth wave, and Triangular wave generators.
8. OP-AMP - Design of Schmitt Trigger and construction of Monostablemultivibrator.
9. OP-AMP- Instrumentation amplifier
10. OP-AMP- Design of Pulse with modulator
11. Characteristics of a silicon controlled rectifier (SCR) and firing angle control

12. Characteristics of a unijunction transistor (UJT) and UJT as a relaxation oscillator.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Apply knowledge of Physics fundamentals and instrumentation to arrive solution for various problems.
2. Understand the usage of basic laws and theories to determine various properties of the materials given.
3. Understand the application side of the experiments
4. Acquire in depth knowledge regarding the basic concepts in electronics.
5. Apply theoretical knowledge to establish electronic experiments.

Text books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, *Practical Physics and Electronics*, Ananda Book Depot, Chennai. (2018).
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, *A Text Book of Practical Physics*, Sultan Chand & Sons, New Delhi. (2015).

Supplementary readings

1. Samir Kumar Ghosh, *A Textbook of Advanced Practical Physics*, NCBA, Kolkatta. (2000)
2. D. Chattopadyay, P.C.Rakshit, *An Advanced Course in Practical Physics*, NCBA, Kolkatta. (2011).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	3	3	2	2	2
CO3	3	3	2	2	2
CO4	3	3	2	2	3
CO5	3	3	2	2	3

SEMESTER: I PART : Core Elective	COURSE CODE: 22PPHYE15 - 1 TITLE: NUMERICAL METHODS AND PYTHON PROGRAMMING	CREDITS : 4 Hours/Week : 4
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COURSE OBJECTIVES

1. To educate the students in understanding Numerical solution of algebraic, transcendental and Simultaneous linear algebraic equations.
2. To make the students to understand Numerical Interpolation.
3. To educate the students in understanding Numerical Differentiation, Integration and Solutions of ordinary differential equations.
4. To involve the student to learn python fundamentals.
5. To involve the student to learn File management and Data Management in python tools.

UNIT 1: Numerical solution of algebraic, transcendental and simultaneous linear algebraic equations

Iteration method – The method of false position - Newton-Raphson method - Convergence and rate of convergence - Gauss elimination method – Jordan's modification – Gauss – Seidel method of iteration.

UNIT 2: Interpolation

Linear interpolation – Lagrange interpolation - Gregory – Newton forward and backward interpolation formula – Central difference interpolation formula – Gauss forward and backward interpolation formula – Divided differences – Properties Newton's interpolation formula for unequal intervals.

UNIT 3: Numerical differentiation, integration and solutions of ordinary differential equations

Newton's forward and backward difference formula to compute derivatives – Numerical integration : Trapezoidal rule, Simpson's rule – Extended Simpson's rule – Euler's method – Improved Euler's method – Runge - Kutta method – second and fourth order – Runge - Kutta method for solving first order differential equations.

UNIT 4: Python fundamentals

Building object type : operator basics, numbers, strings, lists, Tuples, working with sequences, dictionaries, files, object storage, type conversion, type comparisons, statements : statement format, comments, assignments, print, control statements, common traps – example - Functions, Arguments, Importing a modules-python's built in functions – example.

UNIT 5 : Python programming

File processing - Reading-Writing to a file - Changing Position - Controlling file I/O - File Control - I/O Control - File Locking-Getting File list - Basic File/Directory Management - Access and Ownership - Checking Access - Getting File Information-Setting File Permissions -Manipulating File Paths-Managing Internal Structures - Sorting Sequences - Coping Objects -Objects Persistence - Object Storage - DBM Database - Commercial Database.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Solve problems using Numerical solution of algebraic, transcendental and Simultaneous linear algebraic equations.
2. Solve problems using Interpolation.
3. Evaluate problems using Numerical Differentiation, Integration and Solutions of ordinary differential equations.
4. Represent Python tool in different formats.
5. Apply Python tool in File and Data management.

Text books

1. Dr.M.K.Venekataraman, *Numerical methods in Science and Engineering*. The National Publishing Company Madras (1996).
2. Martin C. Brow- *The Complete Reference Python*- McGrawHill -(2018)

Supplementary reading

1. S.S. Sastry, *Introductory Methods of Numerical analysis*. Prentice – Hall of India, New Delhi (2003) 3rd Edition.
2. Mark Lutz, *Learning Python: Powerful Object-Oriented Programming*, 5th edition O'REILLY (2013).
3. Charles R. Severance, *Python for Everybody: Exploring Data Using Python 3*, Elliott Hauser, Sue Blumenberg (2016).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	3	2	2
CO3	3	3	3	3	2
CO4	3	2	3	2	2
CO5	3	2	3	2	3

SEMESTER: I PART : Core Elective	COURSE CODE: 22PPHYE15 - 2 TITLE : SOLAR ENERGY UTILIZATION	CREDITS : 4 Hours/Week : 4
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COURSE OBJECTIVES

1. Understand basic characteristics of Solar Energy and Technologies.
2. Learn the design and importance of Solar Energy Collectors for Solar energy utilization.
3. Use the testing methods to analyze various solar energy collectors.
4. Understand different types of energy storage devices and its uses.
5. Learn and use the concepts of Solar thermal and Photovoltaic power generation.

UNIT 1: Solar radiation analysis

Solar radiation outside the Earth's atmosphere - Solar radiation at the earth surface - Basic Terms and Earth Sun angles - Determination of Solar time - Equation of time - Derived solar angles - Solar day length - Measurement of Solar energy radiation - Pyrheliometer - Pyranometer - Sunshine recorder - Estimation of Direct and Diffused radiation - Total solar radiation on horizontal and tilted surfaces.

UNIT 2: Solar energy collectors

Physical Principles of the Conversion of Solar radiation into heat - Description of Flat Plate Collector (FPC) - Liquid heating type FPC - Energy balance Equation and Collector efficiency - General Characteristics of FPC - Thermal analysis of FPC and Useful heat gained by the fluid - Fin efficiency - Types of Air heaters - Performance of Solar Air heaters - Efficiency.

UNIT 3: Performance testing of solar collectors and storage

Governing Performance Equations - Measuring Instruments and Measurement Methods - Testing Procedure - Testing of Liquid Flat plate Solar collector and Solar Air collector - Storage of Solar Energy - Thermal Storage - Electrical storage - Storage in the form of Fuel - Hydro storage.

UNIT 4: Solar thermal power generation

Introduction - Principle of Solar thermal power generation - Low temperature systems - Medium temperature systems with concentrating collectors - Stirling cycle and Brayton cycle Solar thermal power generation - Tower concept of power generation - Total energy systems - selective coatings - Cost effectiveness.

UNIT 5: Solar electric power generation

Semiconductor principles - Photo Voltaic principles - Power output and Conversion efficiency - Basic Photovoltaic system for power generation - solar cell modules - advantages and disadvantages of Photo - Voltaic Solar energy conversion - Solar cell modules - Types of Solar Cells - Solar Cell construction - Design of Photovoltaic systems.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Understand the characteristics of solar radiation.
2. Gain knowledge in measuring the availability of solar radiation at a given location
3. Realize the role of solar collectors for effective solar energy utilization
4. Explain with the essentials of Solar thermal power generation
5. Familiarize with Photovoltaic method of Solar energy conversion into power.

Text books

1. G.D.Rai, *Solar Energy Utilization*, Khanna Publishers, Fifth edition. (2001).
2. S.P. Sukhatme, *Solar energy – Principles of Thermal Collection & Storage*, Tata McGraw Hill, Delhi. (1999).
3. Peter J. Lunde, *Solar Thermal engineering*, John Wiley New York. (1980).

Supplementary reading

1. Chetan Singh Solanki, *Solar Photovoltaics - Fundamentals, Technologies and Applications*, PHI Learning Pvt. Ltd., 3rd edition. (2015).
2. Garg .H.P, Prakash .J, *Solar Energy Fundamentals and Applications*, Tata McGraw-Hill. (2005).
3. Foster .R, Ghassemi M., Cota A., *Solar Energy*, CRC Press, (2010).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	3
CO2	3	3	2	2	3
CO3	3	2	2	3	3
CO4	3	2	3	3	3
CO5	3	2	2	3	3

SEMESTER: I PART : Core Elective	COURSE CODE: 22PPHYE15 – 3 TITLE : LASER PHYSICS AND NON LINEAR OPTICS5	CREDITS : 4 Hours/Week : 4
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COURSE OBJECTIVES

1. To understand the basic theory of laser action and the concept of Q-switching
2. To explain illustrate the working of various advanced Lasers available
3. To describe the basic Physics of nonlinear optics and demonstrate different NLO phenomena
4. To understand the Multiphoton process
5. To learn the vitals Fiber Optics.

UNIT 1 : Basic principles of lasers

Einstein's quantum theory of radiation - Population inversion – Laser Pumping - Issues in designing a laser - Pumping mechanisms - Resonators – Vibrational modes of resonator – Open resonator - Losses inside Cavity – Q-switching - Mode locking - Laser amplification - Frequency conversion.

UNIT 2 : Laser systems:

Basics of tunable - ultrafast and power lasers - Gas Lasers : He-Ne - He-Cd – Ar - Kr ion – CO₂ - Solid state lasers : Ruby - Nd-YAG - Fibre lasers - Liquid laser : Dye laser – Liquid Eu³⁺ laser – Semiconductor laser - Quantum cascade lasers - p-Ge lasers, Vertical - cavity – surface - emitting laser.

UNIT 3: Introduction to nonlinear optics:

Origin of nonlinearity - Polarization – Anisotropic media - Light propagation through anisotropic media – Nonlinear polarization – Nonlinear susceptibility - Wave equation - Second harmonic generation (SHG) - Phase matching - Parametric amplification - Sum and Difference frequency generation - Parametric oscillation.

UNIT 4: Multiphoton process:

Third harmonic generation (THG) - Two photon process – Experiment evidences of 2PA materials – Multi and Three photon process - Electro-optic Shutter (Kerr effect and Pockels effect) - Self-focusing – Spontaneous and Stimulated Raman Scattering, Hyper - Raman effect - Higher-order Raman processes - Photorefractive effect.

UNIT 5: Fiber optics

Step – Graded index fibres – Wave propagation – Fiber modes – Single and multimode fibres – Numerical aperture – Dispersion – Fiber bandwidth – Fiber losses - Scattering, absorption, bending, leaky mode and mode coupling losses – Attenuation coefficient - Material absorption.

COURSE OUTCOME

At the end of the course, student will be able to

1. Explain the fundamental theory of laser actions
2. Brief out the various concepts of advanced laser systems
3. Describe the elementary ideas of nonlinear optics
4. Elaborate the utilization of NLO phenomenon in various optical scenarios.
5. Illustrate the outline of application of lasers in Fiber Optics

Text books

1. K.R. Nambiar, *Lasers Principles, Types and Applications*, New Age International Publishers Ltd, New Delhi. (2014).
2. B.B. Laud, *Lasers and Nonlinear Optics*, 3rdEdn. New Age, New Delhi. (2011).
3. R.W. Boyd, *Nonlinear Optics*, 2ndEdn. Academic Press, New York, (2003).
4. G.P. Agarwal, *Fiber-Optics Communication Systems*, 3rdEdn. John Wiley, Singapore. (2003).

Supplementary reading

1. W.T. Silvast, *Laser Fundamentals* Cambridge University Press, Cambridge (2003).
2. D.L. Mills, *Nonlinear Optics – Basic Concepts* (Springer, Berlin (1998).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	3
CO2	3	3	3	2	2
CO3	3	3	3	2	3
CO4	3	2	2	2	3
CO5	3	3	3	2	3

SEMESTER : II PART : Core Course	COURSE CODE : 22PPHYC21 TITLE : QUANTUM MECHANICS	CREDITS : 4 Hours/Week : 5
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COURSE OBJECTIVES

1. To introduce the basic postulates of quantum mechanics.
2. To make the student to understand exactly solvable systems.
3. To elucidate the aspects of time – independent and time-dependent perturbation theories.
4. To introduce the concepts of angular momentum and identical particles.
5. To make the students to understand relativistic quantum mechanics.

UNIT 1 : Foundations of wave mechanics

Schrodinger Equation – Physical meaning and conditions on the wave function – Expectation values and Ehrenfest's theorem – Hermitian operators and their properties – Commutator relations – Uncertainty relation – Bra and Ket Vectors – Hilbert space – Eigen value problem- Schrodinger , Heisenberg and interaction pictures.

UNIT 2 : Exactly solvable systems

Solving the one and three dimensional Schrodinger equation - Linear harmonic oscillator – Particle in a box – Square well potential – Rectangular barrier potential – Rigid rotator – Hydrogen atom.

UNIT 3 : Approximation methods

Time independent perturbation theory: Non-degenerate and degenerate case – Stark effect – WKB Approximation – Application to tunneling problem and potential well. Time dependent perturbation theory – Constant in time-Harmonic perturbation – Transition probability – Adiabatic and sudden approximation.

UNIT 4 : Angular momentum and identical particles

Angular momentum - Total Angular momentum operators - Spin angular momentum Commutation relation - Matrix representation of J – Eigen values of J_x and J_y , J^2 and J_z , and J_x and J_y - Matrix representation of J - Addition of angular momenta – Clebsch-Gordan coefficients – Pauli matrices – Identical particles and spin – Symmetric and Anti symmetric wave functions-Hydrogen molecule.

UNIT 5 : Relativistic quantum mechanics

Klein-Gordon equation for a free particle and in an electromagnetic field-Dirac's Relativistic equation – Dirac equation for a free particle – Dirac equation – Dirac matrices – Plane wave solution – Charge and current densities-Existence of electron spin – Negative energy states – Spin-orbit coupling – Zitterbewegung: jittery motion of a free particle.

COURSE OUTCOME

At the end of the course, student will be able to

1. Recognize the concept of quantum mechanical tool
2. Describe the application of Schrodinger's equation to exactly solvable problems
3. Analyse the approximations of quantum mechanical problems.
4. Represent various momentum tools
5. Understand and apply the Relativistic quantum field.

Text books

1. SatyaPrakash and SwadiSaluja - *Quantum Mechanics*, Kadharnath, Ramnath publications. (2005)
2. SatyaPrakash - *Advanced Quantum Mechanics*, Arihant publications. (2012)
3. Gupta, Kumar, Sharma - *Quantum Mechanics*, Jai Prakashnath publications, Meerut. (2018)
4. V.Devanathan - *Quantum Mechanics*, Alpha Science Publications, 2nd Ed., (2020)

Supplement readings

1. L.Schiff - *Quantum Mechanics* Tata Mcgraw Hill, New Delhi. (1968)
2. G.Aruldas - *Quantum Mechanics* PHI Ltd., (2008)
3. P.M.Mathews and K.Venkatesan - *A Text Book of Quantum Mechanics* -Tata McGraw Hill, New Delhi. (1987)
5. V.K.Thankappan - *Quantum Mechanics* - Wiley -Eastern, New Delhi. (1985)
6. A.Goswami - *Quantum Mechanics* - W.C.Brown , Dubuque.(1992)

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	3
CO2	3	2	2	2	2
CO3	3	2	2	2	2
CO4	2	3	3	2	2
CO5	3	3	2	2	3

SEMESTER : II PART : Core Course	COURSE CODE : 22PHYC22 TITLE : MATHEMATICAL PHYSICS – II	CREDITS : 4 Hours/Week : 5
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COURSE OBJECTIVES

1. To make the students understand partial differential equations in physics problems.
2. To make the student gain knowledge of complex variable.
3. To involve the student to learn special functions.
4. To educate the students to develop the understanding of integral transforms.
5. To introduce the probability theory.

UNIT 1 : Partial differential equations in physics problems

Solution of Second order Differential equation - with Constant Coefficients - with Variable Coefficients - Frobenius method - Problems - Solution of Laplace differential equations - Two Dimensional Steady flow of heat in Cartesian, Cylindrical Coordinates - Solution of variable heat flow in one dimension - Solution of variable heat flow in two dimension - Solution of wave equation - Solution of Schrodinger equation for one dimensional Harmonic Oscillator.

UNIT 2 : Complex variable

Introduction - Function of a Complex variable - Analytic Function-Cauchy - Riemann conditions - proof - Sufficient conditions - proof - Polar form of Cauchy - Riemann Conditions - Harmonic function - Complex integrations - Contour - Cauchy's Integral Formula - Taylor's Expansion - Laurent's Series - Cauchy's residue theorem-problems.

UNIT 3 : Special functions

Legendre, Bessel, Hermite and Laguerre differential equations - Power series solutions -

Polynomials-Generating functions - Rodrigue's formula - Recursion relations - Orthogonality relations.

UNIT IV: Integral transforms

Introduction - Laplace Transform-Properties-Derivative of Laplace Transform-proof-Integration of Laplace transforms-Laplace Transform of Periodic Functions- Initial and final value theorems-Inverse Laplace Transform-properties-Fourier Transform-Fourier Cosine Transforms- Fourier sine Transforms-Linearity, Similarity, Parseval's Theorem .Problems.

UNIT 5 : Probability theory

Theorem of Total Probability-Dependent and independent event-Distribution Functions-Constant of Binomial, Normal, Poisson distribution - variance, Covariance and correlation-Arithmetic Mean and Estimate of Variance-theorem, proof-Theory of Errors - Problems.

COURSE OUTCOME

At the end of the course, student will be able to

1. Apply Partial Differential equation to solve various physics problems.
2. Solve problems using complex variable method.
3. Evaluate problems using Special functions
4. Solve problems using Fourier series and Fourier transforms.
5. Analyse problems using Probability theory.

Text book

1. B.D. Gupta Mathematical physics – Vikas Publishing House, Pvt Ltd, First Reprint 2015.
2. B.S. Rajput, *Mathematical Physics* – PragatiPrakashan, 19th Edition. (2007).
3. Sathyaprakash, *Mathematical Physics* – Sultan Chand & Sons, 6th edition (2014).

Supplement readings

1. R.K.Gupta& H.C. Sharma, *Mathematical Physics* –MeenakshiPrakashan Meerut, (1989).
2. A.B. Gupta, *Fundamentals of Mathematical Physics* – Books and Allied (p) Ltd, Kolkata, 3rd Edition. (2010).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	3
CO2	3	2	2	2	3
CO3	3	3	2	2	3
CO4	3	3	3	2	2
CO5	3	3	2	3	3

SEMESTER : II	COURSE CODE : 22PPHYC23	CREDITS : 4
PART : Core Course	TITLE : THERMODYNAMICS AND STATISTICAL MECHANICS	Hours/Week : 5

COURSE OBJECTIVES

1. To provide adequate introduction on the postulates of Thermodynamics
2. To understand the Transport properties and related equilibrium concepts
3. To learn the basics of classical statistical mechanics and to understand some of their applications
4. To learn the basics of quantum statistical mechanics and to understand some of their applications
5. To train to apply quantum mechanical statistics to various applications

UNIT 1 : Thermodynamics and basic concepts

Basic postulates of Thermodynamical laws and consequences – Gibbs free energy and Helmholtz free energy – Thermodynamical potential – Entropy – Changes in entropy in reversible processes – Principle of increase of entropy – Phase transitions – Clausius – Clayperon equation – Gibb’s phase rule- van der Wall equation of state.

UNIT 2 : Kinetic theory and transport properties

Boltzmann transport equation and its validity – Boltzmann H theorem – Mean free path – Conservation laws – Transport phenomena – Equipartition and Virial theorems – Random walk - Brownian motion - Non-equilibrium process; Joule-Thompson process - Free expansion and mixing - Viscosity of gases – Thermal conductivity – Diffusion process - The heat equation

UNIT 3 : Classical statistics

Phase space - Density of states – Macro and micro states – Ensembles and their types – Statistical equilibrium - Liouville’s theorem - Maxwell-Boltzmann’s distribution law – Partition function- Principle of equipartition of energy – Entropy and Probability.

UNIT 4 : Bose – einstein statistics fermi-dirac statistics

Quantum statistics of identical particles — Bose–Einstein distribution law – Ideal Bose-Einstein gas – Degeneracy - Chemical potential of bosons – The principle of detailed balance – Bose-Einstein condensation

Fermi-Dirac distribution – Ideal Fermi - Dirac gas – Degeneracy – Weak degeneracy – Strong degeneracy.

UNIT 5 : Applications of quantum statistical mechanics

Phase transition – Phase transition of first and second kind- Phase diagrams for pure systems – Clausius - Clapeyron equation – Gibbs phase rule.

Ideal Bose system : Black body radiation – Planck’s radiation law – Specific heat of solids – Einstein’s theory – Debye’s theory – Liquid Helium.

Ideal Fermi system : Electron gas in metals – Thermionic emission of electrons – Specific heat of gases – Variation with temperature- Pauli paramagnetism - Ising and Heisenberg models in Ferromagnetism

COURSE OUTCOME

At the end of the course, student will be able to

1. Have adequate knowledge on the basics of thermodynamics.
2. Understand the kinetic theory and transport properties.
3. Know the Basic concepts of classical statistics and applications
4. Know the Basic concepts of quantum statistics.
5. Describe the role of quantum statistics to various real life problems.

Text books

- 1) S.K. Sinha, *Introduction to Statistical Mechanics* Narosa, New Delhi. (2007).
- 2) F. Reif, *Fundamentals of Statistical and Thermal Physics* McGraw Hill, Singapore. (1985).
- 3) Gupta M.C, *Statistical Thermodynamics* New Age International (P) Ltd., (1995).
- 4) Singhal, Agarwal, Prakash, *Thermodynamics and Statistical Physics* Prakashan, Meerut. (2003).

Supplementary readings

- 1) K. Huang, *Statistical Mechanics* Wiley Eastern Limited, New Delhi. (1963).
- 2) W. Greiner, L. Neise and H. Stocker, *Thermodynamics and Statistical Mechanics* Springer, New York. (1995).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2
CO2	3	2	3	2	3
CO3	3	3	2	2	2
CO4	3	3	3	2	3
CO5	3	3	3	2	3

SEMESTER: II PART:Core Practical	COURSE CODE: 22PPHYP24 TITLE : PRACTICAL – II : GENERAL & ELECTRONICS-II	CREDITS : 4 Hours/Week : 8
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COURSE OBJECTIVES

1. To provide adequate introduction on the postulates of Thermodynamics
2. To understand the Transport properties and related equilibrium concepts
3. To learn the basics of classical and quantum statistical mechanics and to understand some of their applications
4. To study the microscopic and macroscopic properties of matter through the statistical probability laws and distribution of particles

List of Experiments (Any 15 out of the given 21)**GENERAL EXPERIMENTS - II (Choose Minimum 5 experiments)**

1. Determination of Stefan's constant.
2. Thermistor-Band gap energy.
3. Specific charge of an electron -Thomson's method.
4. Lasers : Determination of particle size and Wave length.
5. Spectrometer - Charge of an electron.
6. Determination of dielectric constant of solid samples.
7. Identification of Prominent lines by spectrum photography – Brass spectrum.
8. Young's Modulus by Koenig's method.
9. Determination of Planck's constant.

ELECTRONICS EXPERIMENTS- II (Choose Minimum 7 experiments)

1. Study of (i) Multiplexer using IC 74150 for the generation of Boolean functions and (ii) Demultiplexer using IC 74154
2. Study the function of Decoder and Encoder.
3. IC 7490 -as modulus counters and display using IC-7447
4. Up-down counters - Design of modulus counters.
5. IC 7476 - 4 bit Shift Register - Ring counter and Johnson counters.
6. IC 555 – Astablemultivibrator and Voltage Controlled Oscillator.
7. IC 555 –Monostablemultivibrator and Frequency Divider.
8. IC 555 - Schmitt Trigger and Hysteresis.
9. A/D converter using comparator LM 339.
10. Study of A/D converters-4 bit simultaneous A/D converter and successive approximation A/D converter using ADC IC 0801/IC 0804.
11. Arithmetic operations (Adder/ Subtractor) Using IC 7483.
12. Design Full adder and Full subtractor using NAND/NOR gates.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Understand the basic laws and theories regarding the various properties of the materials.
2. Handle advanced instruments for the accurate determination of physical parameters.
3. Apply the theory to design the basic electronic circuits
4. Use of these basic circuits to create multivibrators, converters and flip flops etc.
5. To provide a hands-on learning experience and understand the basic concepts and applications of digital electronics.

Text books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, *Practical Physics and Electronics*, Ananda Book Depot, Chennai. (2018).

Supplementary reading

1. Samir Kumar Ghosh, *A Textbook of Advanced Practical Physics*, NCBA, Kolkatta, (2000).
2. D. Chattopadyay, P.C.Rakshit, *An Advanced Course in Practical Physics*, NCBA, Kolkatta. (2011).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	3	3	2	2	2
CO3	3	3	2	2	3
CO4	3	3	2	2	3
CO5	3	3	2	2	3

SEMESTER: II PART: Core Elective	COURSE CODE: 22PPHYE25-1 TITLE : NANO SCIENCE AND NANO TECHNOLOGY	CREDITS : 4 Hours/Week : 5
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COURSE OBJECTIVES

1. To provide the Knowledge about the basics of Nanoscience and Technology.
2. To understand the structures, properties, characterization and applications of nanomaterials.
3. To attain the knowledge about types of synthesis methods and characterization techniques.
4. To apply their acquired skill in research to synthesis and to select appropriate characterization for nanomaterials.
5. To acquire a knowledge about the types of nanomaterials used for various applications.

UNIT 1 : Introduction to nanotechnology and nanomaterials

Introduction - History - Definition and Nanoscale range - Evolution of nanotechnology in 20th century - Concepts of 0D, 1D, 2D and 3D nanostructured materials - Quantum dots - Quantum wire - Quantum well. Types of nanomaterials: Carbon based materials - C₆₀: Buckminster fullerene - Carbon nanotubes: Structure - Types and Applications - Nano diamond. Metal based nanomaterials, Nanocomposites, Nano porous materials and Dendrimers.

UNIT 2 : Properties of nanomaterials

Physical properties of nanomaterials: Melting points - Specific heat capacity and lattice constants - Mechanical properties - Optical properties: Surface Plasmon Resonance - Quantum size effects - Electrical property: Surface scattering - Charge of Electronic structure - Quantum transport - effect of Microstructure. Variation of magnetism with size – Super para magnetism – Diluted magnetic semiconductors.

UNIT 3 : Synthesis methods

Methods to Synthesis Nanomaterials - Top down and bottom up approaches - Physical vapour deposition - Chemical vapour deposition - plasma arching - Ball milling technique - Reverse miceller technique - Nano lithography - Synthesis of oxide nanoparticles by sol-gel method – Hydrothermal Method - Electrochemical deposition method - Electrospinning method - Organic and inorganic hybrids, Self-assembly (Supramolecular approach).

UNIT 4 :Characterization of nanomaterials

Principle, Construction, working and Applications of Powder X-Ray Diffraction (XRD) - Fourier Transform Infrared Spectroscopy (FTIR) - Scanning Electron Microscopy (SEM) - Transmission Electron Microscopy (TEM) - Ultraviolet-Visible Spectroscopy (UV-VIS) - Vibrating Sample Magnetometer (VSM) - I-V Characteristics by Four Probe - and Photoluminescence (PL).

UNIT 5 : Applications

Molecular electronics and Nano electronics - CNT emitters - Photo electrochemical cells - Nano diodes, Nano switches - nanoparticles based solar cells - fuel cells, chemical sensors, catalysts, Colorants and pigments. Nanotechnology in Agriculture, Nanotechnology in Food, Nanotechnology in Textile industry and Nanotechnology in Environmental Conservation.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Differentiate the Different dimensions of nanomaterials
2. Apply their acquired knowledge to synthesis and to characterize the nanomaterials
3. Select the appropriate element and to synthesize the nanomaterials with desired property.
4. Identify the suitable characterization methods to characterize the prepared nanomaterials.
5. Realize the application of nanomaterials in various fields

Text books

1. T.Pradeep et al., *A Textbook of Nanoscience and Nanotechnology*, Tata McGraw Hill, New Delhi. (2012).
2. M.A.Shah, Tokeer Ahmad, *Principles of Nanoscience and Nanotechnology*, **Alpha Science International Ltd, (2010).**
3. G. Cao, *Nanostructures and Nanomaterials*, Imperial College Press, London. (2004).
4. Viswanathan B, *Nano Materials*, Narosa Publishing house.(2010).

Supplementary readings

1. C.P. Poole and F.J. Owens, *Introduction to Nanotechnology*, Wiley, New Delhi. (2003).
2. Pradeep T, *The Essentials, Nano: Tata MC Graw-Hill publishing company limited.* (2007).
3. Gregory Timp editor, *Nanotechnology*, AIP Press, Springer-Verlag, New York. (1999).
4. *William A. Goddard III, Donald Brenner, Sergey Edward Lyshevski, Gerald J Iafrate, Hand Book of Nanosciene, Engineering and Technology – The Electrical Engineering handbook series*, CRC Press, (2012).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2
CO2	3	2	2	2	2
CO3	3	3	3	3	3
CO4	3	3	2	2	3
CO5	3	3	2	3	3

SEMESTER : II PART : Core Elective	COURSE CODE : 22PPHYE25 - 2 TITLE : PETRO PHYSICS	CREDITS : 4 Hours/Week : 5
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COURSE OBJECTIVES

1. To learn the basics of magnetic properties of minerals
2. To understand knowledge on various fundamentals of geomagnetic elements.
3. To gain in depth knowledge about the classification of rock forming minerals and geophysical methods.
4. To study the importance of seismic waves
5. To study the geochronology and thermoluminescence.

UNIT 1 : Earth as a magnet

Magnetic properties of mineral systems – Intrinsic properties, magnetization process, weak field remanance. Remanance properties- NRM, TRM, CRM, DRM, VRM, PRM – their mechanisms – Thermal demagnetization technique – partial TRM – additive law – Neel’s theory of TRM. Primary and Secondary magnetization – Testing for stability of remanance.

UNIT 2 : Geomagnetic elements

Geomagnetic elements of the earth – initial susceptibility of rocks – single and multidomain cases – Curie point determination and its importance. Laboratory and field instruments for magnetic measurements – Astatic magnetometer – spinner magnetometer – Fluxgate magnetometer – Theory, practice and applications.

UNIT 3 : Geo physical properties

Classification of rock forming minerals – physical properties of minerals with special reference to optical properties – elementary details of a polarizing microscope and petrographic analysis. Geophysical prospecting – different methods – Geophysical properties of rocks and minerals – Resistivity methods – Two current electrode method – measuring equipment – application to ground water survey.

UNIT 4 : Seismic waves

Seismic waves – S waves & P waves – elastic, plastic behavior of rocks – modulus of elasticity in rocks – Time distance curves and the location of epicenters – recent developments.

Seismic waves – S waves & P waves – elastic, plastic behavior of rocks – modulus of elasticity in rocks – Time distance curves and the location of epicenters – recent developments.

UNIT 5 :Geochronology

Geochronology – the geological time scale – archaeo-magnetic dating – Radioactive methods of dating – Rubidium, Strontium method – Potassium Argon method – Thermoluminescence.

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Understand the various magnetites and behaviour of the remanence properties.
2. Study the geomagnetic elements of the earth and various magnetometer instruments.
3. Understand the classification and properties of of rock forming minerals
4. Highlight the concept of seismic waves and various dating methods.
5. Study the geochronology and thermoluminescence.

Text books

1. RL. Singhal, *Solid State Physics* Kedarnath Ramnath & Co. Meerut (2018).
2. A.J. Dekker, *Solid State Physics*, Prentice Hill. (2015).
3. Saxena and Gupta and Saxena, *Solid State Physics*, Pragati Prakash, Meerut. (2016).
4. Eve and Keys, *Applied Geophysics*, Cambridge University Press. (1933).
5. W.O. Reilly, *Rock and Mineral magnetism*, Blackmoore. (1984).

Supplementary reading

1. Howell, *Introduction to Geophysics*, McGraw Hill Book Co. (2013).
2. G.D. Garland, *Introduction to Geophysics*, Saunder's Book Co., 2nd Edn. (1979).
3. McElhinny, *Paleomagnetism and Plate Tectonics*, Cambridge University Press. (1973).
4. Dobrin, *Introduction to Geophysical prospecting*, McGraw Hill Book Co. (1988).

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	3
CO2	3	3	2	2	3
CO3	2	3	2	3	2
CO4	3	2	3	3	3
CO5	3	3	2	3	3

SEMESTER : II PART:Core Elective	COURSE CODE: 22PPHYE25 – 3 TITLE : COMMUNICATION ELECTRONICS	CREDITS : 4 Hours/Week : 5
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COURSE OBJECTIVES

1. To understand the basics of wave propagations and the concepts of micro wave communication
2. To learn the basic principles of Fiber Optics Communication & networking system.
3. To study the elements of RADAR communication.
4. To update the knowledge on satellite communication and the equipment used.
5. To introduce the preliminary concepts of mobile communication systems.

UNIT 1 : Wave propagation and micro wave communication:

Ionospheric Layers – Ground Wave Propagation – Sky Wave Propagation – Skip Waves – Space Waves.

Micro Waves :Generation – Multicavity Klystron – Reflex Klystron – Magnetron – Travelling Wave Tubes (TWT) – MASER – Gun Diode – Micro Wave Antennas.

UNIT 2 : Optical fibre communication:

Elements of an optical fibre communication system – fiber lasers - Multiplexers - wavelength division multiplexing - Electrooptic and Acousto-optic modulation - Coherent optical fibre communication system – OFC Networks -Local Area Networks - Bus, ring and star topologies - optical fibre regenerative repeater - optical amplifiers - basic applications - Low speed industrial optical fibre networks – principles of WDM – passive components – Couplers – Multiplexing and De-multiplexing.

UNIT 3 : Radar communication:

Basic RADAR System – Radar equation - Radar range - Antenna Scanning, pulsed radar system – Radar Antennas – Duplexer – Radar Receivers - Plan position indicators - search radar - tracking radar - moving target indicators - Doppler effect - MTI Principle - CW Doppler radar - frequency modulator CW radar.

UNIT 4 : Satellite communication:

History of satellites - Satellite orbit - basic components of satellite communication system - constructional features of satellites - commonly used frequency in satellite communication system – Transponders – Digital Carrier Transmission - multiple access - communication package - antenna power – source - satellite foot points - satellite communication system in India.

UNIT 5: Mobile communication:

Evolution of Mobile Communication – Multiplexing – Modulation - The concept of cell - the cellphone, Principles of SDMA, FDMA, TDMA and CDMA and their comparison VSAT (very small aperture terminals), GPRS – Protocol – Mobile IP, IP Packet delivery – optimization - Modem, Wi-Fi-4G (basic ideas only).

COURSE OUTCOMES

At the end of the course, student will be able to

1. Know the basics of wave propagations and the concepts of micro wave communication
2. Understand the basic principles of Fiber Optics Communication & Networking system.
3. Describe the elements of RADAR communication.
4. Acquire the knowledge on satellite communication and the equipments used.
5. Learn and apply the preliminary concepts of mobile communication systems.

Text books

1. George Kennedy and Davis, *Electronic Communication System*, TATA McGraw Hill, Fourth edition, (1999).
2. K.C.Kupta, *Micro Waves*, Wiley Eastern Ltd., (1995).
3. Anokh Singh and Chopra A.K., *Principles of communication Engineering*, S.Chand& Company Ltd. (2013).
4. L.PoornimaThangam, *Satellite communication*,Charulatha Publications (2012).
5. Jochen H Schiller, *Mobile Communication*, Pearson Education, (2004).
6. J.C.Palais, *Fiber Optic Communications*, Pearson, 2005.
7. E. John M. Senior, *Optical Fibre Communications: Principles and Practice*, Pearson, 2010.
8. F. Govind P. Agrawal, *Fiber Optic Communication Systems*, John Wiley & Sons Inc., New York, 2012

Supplementary readings

1. A.K. Maini, *Micro Waves and Radar - Principles and applications*,Khanna Publications, New Delhi, (2001).
2. Wayne Tomasi,*Advanced Electronic Communications Systems*, PHI Learning Pvt. Ltd., New Delhi, (2009).
3. G. Gerd Keiser, *Optical fibre Communications*, Tata-McGraw-Hill, 2008.
4. H. Sudhir Warier, *The ABC's of Fiber Optic Communication*, Artech House, 2017.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2
CO2	3	3	2	3	3
CO3	3	2	2	3	3
CO4	3	3	2	3	3
CO5	3	3	2	2	3

ANNAMALAI UNIVERSITY
MASTER OF SCIENCE
M.Sc. Physics
(With effect from 2021– 2022)

SEMESTER III						CIA	Uni. Exam	Total
15.	Core-Theory	Paper-7	5	5	Condensed Matter Physics	25	75	100
16.	Core-Theory	Paper-8	4	5	Nuclear Physics	25	75	100
17.	Core-Theory	Paper-9	4	4	Microprocessors and Microcontrollers	25	75	100
	Core-Practical	Paper-3	5	-	Advanced General Experiments	0	0	0
	Core-Practical	Paper-4	5	-	Programming & Problem solving skills	0	0	0
Internal Elective for same major students								
18.	Core Elective	Paper-3	4	3	(to choose one out of 3) A. Research methodology B. Material Science C. Numerical Methods and C programming	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
19.	Open Elective	Paper-3	3	3	(to choose one out of 3) A. Electrical and Electronics Appliances B. Physics of Materials C. Geophysics	25	75	100
20.	**MOOC Courses		-	-	Choose any two courses from the list given	0	0	100
			30	20		125	375	600
SEMESTER IV								
						CIA	Uni. Exam	Total
21.	Core-Theory	Paper-10	6	3	Spectroscopy	25	75	100
22.	Core-Practical	Paper-3	5	4	Advanced General Experiments	25	75	100
23.	Core-Practical	Paper-4	5	4	Programming & Problem solving skills	25	75	100
24.	Core	Project	5	5	Project with viva voce (Compulsory)	100 (75 Project +25 viva)		100
Internal Elective for same major students								
25.	Core Elective	Paper-4	6	3	(to choose one out of 3) A. Crystal Growth and Thin Films B. Medical Physics C. MATLAB and Python Programming	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
26.	Open Elective	Paper-4	3	3	(to choose one out of 3) A. Nanophysics B. Astrophysics C. Weather forecasting	25	75	100
			30	22		125	475	600
			120	90				2600

*** Field Study**

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

- (i). Head of the respective department
- (ii). Mentor
- (iii). One faculty from other department

****Mooc Courses**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

SEMESTER: III

PAPER-7

CONDENSED MATTER PHYSICS

Course Objectives

1. To understand the basic crystal structures, bonding of solids and the lattice energy calculations.
2. To study the lattice dynamics and phonon momentum.
3. To explain the free electron gas in three dimensions and electronic heat capacity.

4. To understand basics concept of magnetism and its applications.
5. To study the properties of superconducting materials and its applications.

Unit-1: Crystal Physics

Types of lattices - Miller indices – symmetry elements and allowed rotations - simple crystal structures – Atomic packing factor - Crystal diffraction - Bragg's law –Scattered wave amplitude - Reciprocal lattice (sc, bcc, fcc) – Diffraction conditions - Laue equations – Brillouin Zone - Structure factor - Atomic form factor - Inert gas crystals.

UNIT-2: Lattice Dynamics

Monoatomic lattices - Lattice with two atoms per primitive cell - First Brillouin zone - Group and phase velocities - Quantization of lattice vibrations - Phonon momentum - Inelastic scattering by phonons - Einstein's model and Debye's model of specific heat.

UNIT-3: Band theory of metals and Semiconductors

Free electron gas in three dimensions - Electronic heat capacity - Wiedmann-Franz law - Band theory of metals and semiconductors - Bloch theorem - Kronig-Penny model - Semiconductors - Intrinsic carrier concentration – Temperature dependence - Mobility - Impurity conductivity – Impurity states - Hall effect.

UNIT-4: Magnetism

Diamagnetism - quantum theory of Paramagnetism - Rare earth ion - Hund's rule - Quenching of orbital angular momentum - Adiabatic demagnetization - Quantum theory of ferromagnetism - Curie point - Exchange integral - Heisenberg's interpretation of Weiss field - ferromagnetic domains - Bloch Wall - Spin waves - Quantization - Magnons - thermal excitation of magnons

UNIT-5: Super conductors and its applications

Experimental facts: Occurrence - Effect of magnetic fields - Meissner effect – Critical field – Critical current - Entropy and heat capacity - Isotope effect - Energy gap - Type I and Type II superconductors. Theoretical explanation: Thermodynamics of super conducting transition - London equation - BCS Theory - Coherence length – Cooper pairs - Single particle Tunneling - Josephson tunneling - DC and AC Josephson effects - High temperature super conductors - SQUIDS.

Text Books

Unit 1 to Unit 5

1. S.O. Pillai, Solid State Physics, New Age International, New Delhi, 2016.

Reference Books

1. C. Kittel, Introduction to Solid State Physics, 7th Edition, Wiley, New York, 1996.
2. M. Ali Omar, Elementary Solid State Physics-Principles and Applications, Addison-Wesley, London, 1974.
3. K. Ilangoan, Solid State Physics, S. Viswanathan (Printers&Publishers) Pvt.Ltd.,Chennai,2007.
4. N.W. Aschroft, N.D. Mermin, Solid State Physics, Rhinehart and Winton, New York.
5. J.S. Blakemore, Solid State Physics, 2nd Edition, W.B. Saunder, Philadelphia, 1974.
6. A.J. Dekker, Solid State Physics, Macmillan India, New Delhi.
7. H.M. Rosenburg, The Solid State, 3rd Edition, Oxford University Press, Oxford, 1993.
8. S.L. Altmann, Band Theory of Metals, Pergamon, Oxford.
9. M.A. Wahab, Solid State Physics, Structure and Properties of Materials, Narosa, New Delhi, 1999.
10. J.M. Ziman, Principles of the Theory of Solids, Cambridge University Press, London, 1971.

E-Materials

1. https://web.iit.edu/sites/web/files/departments/academic-affairs/academic-resource-center/pdfs/Miller_Indices.pdf
2. https://www.youtube.com/watch?v=LcoUFX3_A1s
3. <https://www.youtube.com/watch?v=-MTYPNfVw5Y>
4. https://en.wikipedia.org/wiki/Brillouin_zone
5. http://yclept.ucdavis.edu/course/215b.W17/Kronig-Penney_Rapp-3.pdf
6. <https://www.youtube.com/watch?v=6EdotZPaCIA>
7. <https://www.youtube.com/watch?v=IMbGqcb8aN4>
8. https://en.wikipedia.org/wiki/Hund%27s_rules
9. https://en.wikipedia.org/wiki/Meissner_effect
10. <https://www.youtube.com/watch?v=NVeAmKUvA>

Course Outcomes

1. After studied unit-1, the student will be able to know the types of lattices and crystal structures.
2. After studied unit-2, the student will be able to explain lattice dynamics like Einstein's model and Debye's model of specific heat.
3. After studied unit-3, the student will be able to study Band theory of metals and semiconductors and also able to explain Kronig-Penny model.
4. After studied unit-4, the student will be able to understand the quantum theory of paramagnetism and ferromagnetism.

5. After studied unit-5, the student will be able to basics of superconductors and its applications. Also able to differentiate Type I and Type II superconductors.

PAPER-8

NUCLEAR PHYSICS

Course Objectives

1. To teach the basic properties of nuclear properties like energy levels, angular momentum, parity and isopin.
2. To study the alpha, beta, gamma decay and nuclear reactions.
3. To acquire the knowledge on different nuclear models
4. To know the principle and working of nuclear detectors.

5. To learn the classification of elementary particles and its properties.

UNIT-1: Nuclear Properties

Nuclear energy levels - Nuclear angular momentum, parity, isospin – Nuclear magnetic dipole moment – Nuclear electric quadrupole moment - Ground state of deuteron – Magnetic dipole moment of deuteron – Proton-neutron scattering at low energies – Scattering length, phase shift – Nature and properties of nuclear forces – Spin dependence – Charge symmetry – Charge independence – Repulsion at short distances – Exchange forces – Meson theory.

UNIT-2: Decay and Reactions

Alpha decay: Energy relations - Q values – Spectrum and selection rules - Gamow's theory.
Beta decay: Energy relations - Q values – Spectrum - Pauli's neutrino hypothesis – Electron capture - Fermi's theory of beta decay – Selection rules .
Gamma decay- Kinematics of Gamma decay – Spectrum – Internal conversion – Selection rules
Nuclear Reactions -Types and conservation laws – Q-equation -Threshold energy -General solution of the Q equations – Cross section of nuclear reactions –Scattering and reaction cross section - Compound nucleus model -Breit Wigner single level formula-Ghosal's experiment

UNIT-3: Nuclear Models

Liquid drop model: Semi empirical mass formula – Applications of LDM - Mass parabola – Q-values (Alpha, Beta and Fission) – Energetics of fission – Fissility parameter - Bohr-Wheeler's theory Shell model:Evidences in favour of shell model - Shell model potential – Square well, Harmonic Oscillator, Woods-Saxon – Spin – Orbit coupling – Nuclear Ground state configuration and spin parity – Nuclear moment – Nuclear isomerism – Predictions and failures of the shell model Collective model: Vibrational model – Rotational model – Quadrupole moment – Fermi gas model

UNIT-4: Detectors and applications

Detectors: General Properties- Energy proportionality – Pulse shape – Energy resolution – Detection efficiency – Time resolution - Ionization Chamber – Geiger-Muller counter – Scintillation detectors – Semiconductor detectors Accelerators –Linear Accelerator – Cyclotron – Large Hadron Collider.
Applications – Neutron activation analysis – Rutherford backscattering spectrometry – Accelerator mass spectroscopy

UNIT-5: Elementary Particles

Nucleons, leptons, mesons, baryons, hyperons, hadrons, strange particles -Classification of fundamental forces and elementary particles – Basicconservation laws-Additional conservation laws: Baryonic, leptonic, strangeness and isospin charges/quantum numbers – Gell-mann--Nishijimaformula - Invariance under charge conjugation (C), parity (P) and time

reversal (T) -CPT theorem -Parity non-conservation in weak interactions – CPviolation – Eight-fold way and supermultiplets – SU(3) symmetry and quark model-Gell – Mann Okubo mass formula for octet and decaplet-Ideas of Standard model and Higgs particle.

Text Books

1. K. S. Krane, Introductory Nuclear Physics, John-Wiley, New York, (1987).
2. S. B. Patel, Nuclear Physics: An Introduction, Wiley-Eastern, New Delhi, (1991).
3. B. L. Cohen, Concepts of Nuclear Physics, Tata McGraw Hill, New Delhi, (1988).
4. M.L Pandya and R.P.S Yadav, Elements of Nuclear Physics, KedarNath Ram, Meerat (1994).

Reference Books

1. H. S. Hans, Nuclear Physics: Experimental and Theoretical, New Age International Publishers, New Delhi, (2001).
1. D. C. Cheng and G. K. O'Neill, Elementary Particle Physics: An Introduction, Addison-Wesley, (1979).

E-Materials

1. <https://www.youtube.com/watch?v=Jf6MSWoZRmc>
2. http://www.scholarpedia.org/article/Nuclear_Forces
3. https://en.wikipedia.org/wiki/Alpha_decay
4. <https://www.youtube.com/watch?v=CwExbnOzc4o>
5. <https://www.youtube.com/watch?v=nqSs7vrF9DY>
6. <http://hyperphysics.phy-astr.gsu.edu/hbase/Nuclear/liqdrop.html>
7. https://en.wikipedia.org/wiki/Geiger_counter
8. <https://www.youtube.com/watch?v=jxY6RC52Cf0>
9. https://www.youtube.com/watch?v=fivOAjr_suA
10. https://en.wikipedia.org/wiki/Gell-Mann%E2%80%93Nishijima_formula

Course Outcomes

1. After studied unit-1, the student will be able to understand the concept of nuclear energy levels, nuclear angular momentum, parity and isospin. Also able to explain nature and properties of nuclear forces.
2. After studied unit-2, the student will be able to describe Gamow's theory, Fermi's theory of beta decay and kinematics of gamma decay. Also able to derive the Breit Wigner single level formula.
3. After studied unit-3, the student will be able to differentiate different nuclear models.
4. After studied unit-4, the student will be able to know the principle and working of G.M. counter, scintillation detectors and particle accelerators.

5. After studied unit-5, the student will be able to obtain Gell-mann--Nishijimaformula and Gell – Mann Okubo mass formula. Also able to explain the classification of elementary particles.

PAPER-9

MICROPROCESSORS & MICROCONTROLLERS

Course Objectives

1. To learn interrupts of 8085, Timing diagram and assembly language programming.
2. To understand the principle of interfacing with peripheral devices
3. To acquire new knowledge on fundamentals of microcontroller 8051.
4. To study the Interrupts and instructions set of 8051 and hence to acquire the knowledge on Programming.
5. To expose PUSH and POP, Jump and Call instructions and some interfacing devices.

Unit-1: Instructions & ALP

8085- Instructions- Data transfer, Arithmetic, Logical, Branch and I/O and Machine Control Instructions-Timing Diagram for Memory Read/Write Cycle-Timing diagram for MOV/MVI instructions-Delay Calculations-Time delay using a single register-Two register-Register pair.

Assembly language programs -8-bit Addition with Carry-Multibyte addition-8-bit Subtraction with Borrow-Multibyte subtraction-BCD subtraction-16-bit Multiplication-BCD Multiplication-8-bit Division-BCD division-Square and Square root-Largest and smallest numbers in a data set – Ascending order and descending order –Binary to ASCII-ASCII to Binary-BCD to ASCII and ASCII to BCD-Debugging a program.

Unit-2: Peripheral Devices and Interface (8085)

Data transfer schemes -- Synchronous and asynchronous data transfer-Interfacing memory and devices- I/O and Memory mapped I/O – Pin function, working and interfacing of Programmable peripheral interface (8255)-Programmable keyboard / display interface (8279)-Interfacing Seven segment display interface-Block diagram and interfacing of analog to digital converter (ADC) and Digital to analog converter (DAC)- Stepper motor with clockwise and anti-clockwise rotation-Traffic control.

Unit-3: Basic of Microcontroller 8051

8051 Micro-controller hardware: 8051 oscillator and clock - Program counter and data pointer - A and B CPU register - Flags and PSW - Internal memory - Internal RAM - Stack and stack pointer - Special function registers - Internal ROM-Input / output pin, ports and circuits - External memory.

Counter and Timer: Counter / Timer interrupts - Timing - Timer modes of operation – Counting-Serial data input / Output: Serial data interrupt - Data transmission - Data reception - serial data transmission modes.

UNIT-4: Interrupts & Instructions

Interrupts: Timer flag interrupt - Serial port interrupt - External interrupt - reset - Interrupt control - Interrupt priority - Interrupt destination - Software generated interrupts.

Introduction - Addressing modes - Byte level logic operations - Bit level logic operations - Rotate and swap operations - Simple program.

Arithmetic Operations: Introduction - Flags - Incrementing and Decrementing - Addition - Subtraction - Multiplication and Division - Simple Program.

Unit-5: Instructions & Interfacing

Introduction - External data move - code memory read only data move - PUSH and POP - Opcodes - Data exchange - Simple Programs.

Jump and Call instructions: Introduction - Jump and call program range - Jumps - Calls and subroutine - Interrupt and returns - more detail on interrupts - Simple programs.

Keyboard interfacing - Display interface - 7 segment and LED display - D/A conversion - A/D conversion - Stepper motor Interface.

Text Books

Unit-1 to Unit-2

1. V.Vijayendran, Fundamentals of Microprocessor 8085 - Architecture, programming and interfacing, S.Viswanathan (Printers & Publishers) Pvt, Ltd, Chennai, 2008.
2. A. NagoorKani, 8085 Microprocessor and its Applications, Tata McGraw –Hill Education Private Ltd, New Delhi,2013.

Unit-3 to Unit-5

1. Kenneth Ayala, The 8051Microcontroller,Cengage Learning India, New Delhi, 2013.

Reference Books

1. R.S. Gaonkar, ‘Microprocessor Architecture Programming and Application’, with 8085, Wiley Eastern Ltd., New Delhi, 2013.
2. B. Ram, Fundamentals of Microprocessors and Microcomputers, DhanpatRai publications, New Delhi.
3. Krishna Kant, “Microprocessor and Microcontrollers”, Eastern Company Edition, Prentice Hall of India, New Delhi , 2007.
4. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.

5. Muhammed Ali Mazidi, Janice Gillespie Mazidi and Rolin D McKinlay, The 8051 Microcontroller and Embedded Systems, Pearson Education , 2013.
6. P.S. Manoharan, Microprocessors and Microcontroller, Charulatha Publications.

E-Materials

1. https://en.wikipedia.org/wiki/Intel_8085
2. https://www.youtube.com/watch?v=fS7FFOaC_iQ
3. <https://www.youtube.com/watch?v=tC4WvbM3hZA>
4. <http://www.uomisan.edu.iq/eng/ar/admin/pdf/90949589293.pdf>
5. <https://www.pantechsolutions.net/how-to-interface-stepper-motor-with-8085-lab-trainer-kit>
6. <http://www.8085projects.info/Stepper-Motor-control-Program70.html>
7. <https://www.youtube.com/watch?v=shJAszu34xY>
8. <https://www.elprocus.com/8051-microcontroller-architecture-and-applications/>
9. https://www.youtube.com/watch?v=iXSXIjN_Xwc
10. <https://www.electronicshub.org/stepper-motor-control-using-8051-microcontroller/>
11. <https://circuitdigest.com/microcontroller-projects/stepper-motor-interfacing-with-8051>

Course Outcomes

1. After studied unit-1, the student will be able to know various interrupts, timing diagram for memory read/write cycle and able to write assembly language programs.
2. After studied unit-2, the student will be able to describe the different interfacing devices and can demonstrate the interfacing of DAC/ADC and stepper motor with 8085.
3. After studied unit-3, the student will be able to understand the hardware of 8051, memories, Counter and Timer.
4. After studied unit-4, the student will be able to explain the interrupts, addressing modes and arithmetic operations.
5. After studied unit-5, the student will be able to describe PUSH-POP, jump and call instructions and able to know how to interface the peripheral devices with 8051.

**CORE ELECTIVE
PAPER -3**

(to choose 1 out of 3)

A. RESEARCH METHODOLOGY

Course Objectives

1. To teach the basics of research philosophies and research approaches.
2. To know how to do the review of literature.
3. To expose the importance of internet in research.
4. To learn how to write a thesis or paper.
5. To understand the different numerical methods.

UNIT-1: Basics of Research

Understanding Research Philosophies and Approaches -Meaning, Objectives and Motivation in research - Types of research - Research Approaches - Research Process - Validity and Reliability in research.

Research Design -Features of a good design - Types of Research Design - Basic principles of Experimental Design-Survey Design-Classroom-Based Research. Sampling Design - Steps in Sample Design - Characteristics of a good sample design - Random Samples and Random Sampling Design.

UNIT-2: Review of literature

Survey of literature including patents - chemical nomenclature and literature primary sources-secondary sources including reviews. Treatise and monographs, literature searching, Review of work relevant to the chosen problems.

UNIT-3: Internet and Presentation

Internet and its applications-Search engines- Wikipedia-Web of Science- SCOPUS-BASE-CORE-Google Scholar-Science Hub.

Presentation: Presenting articles in Seminars, workshops, conferences and symposia.

Publication of research paper:e-journals- National, International and Electronic Journals -UGC CARE list Journals- Open access articles benefits-citations-impact factor, h-index- copy rights-Intellectual property rights and patents.

UNIT-4 : Writing methods

Writing a thesis or paper - General formation - page and chapter formation. The use of quotation - footnotes - tables and figures - referencing - appendixes - revising the paper or

thesis - editing and evaluating and the final product - proof reading -Plagiarism-the final types copy.

UNIT-5: Numerical methods

Linear Interpolation-Gregory-Newton forward and Backward Interpolation formula--Gauss forward and backward interpolation formula.

Numerical Differentiation:-Modified Euler's method-Runge-Kutta second and fourth order method for solving first order differential equations.

Numerical Integration: Trapezoidal rule-Simpson's 1/3rd rule .

Text Books

Unit 1 to Unit 4

1. J Anderson, B.H. Dursten and M. Poole , Thesis and Assignment Writing, Wiley Eastern,1977.
2. C.R.Kothari, Research Methodology: Methods and Techniques. New Delhi: New Age International (P) Publishers, 2004.

Unit 5

1. S.S. Sastry, Introductory Methods of Numerical analysis, PHI, N.Delhi
2. E. Balagurusamy, Numerical Methods,Tata McGraw Hill, New Delhi, 2013.

Reference Books

1. R.Kumar, Research Methodology: A Step-by-Step Guide for Beginners.London: Sage Publications, (2011).
2. J.H. Mathews, Numerical Methods for Mathematics, Science and Engineering Prentice-Hall of India, New Delhi, 1998.
3. P.B. Patil and U.P. Verma, Numerical Computational Methods (Narosa, New Delhi, 2013.
4. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation (New Age International, New Delhi, 1993
5. M.K.Venkataraman, Numerical methods in Science and Engineering, National Publishing Company, Chennai ,2004.

E-Materials

1. https://en.wikipedia.org/wiki/Research_design
2. <https://study.com/academy/lesson/types-of-research-design.html>
3. <https://www.scribbr.com/dissertation/literature-review/>
4. https://www.youtube.com/watch?v=-ny_EUJXHHs
5. <https://www.youtube.com/watch?v=XDfgdwMBPfc>
6. <https://www.colorado.edu/history/undergraduates/paper-guidelines/using-internet-research>
7. https://www.ideo.columbia.edu/~martins/sen_sem/thesis_org.html
8. <https://www.wikihow.com/Write-a-Thesis-Statement>
9. <https://www.youtube.com/watch?v=gt3QZgMNq3s>
10. https://en.wikipedia.org/wiki/Simpson%27s_rule

Course Objectives

1. After studied unit-1, the student will be able to know the basics of research theories, approaches and design.
2. After studied unit-2, the student will be able to demonstrate what do you mean by review of literature and know how to proceed the research work based on review of literature.
3. After studied unit-3, the student will be able to explain the importance of internet in the field of research.
4. After studied unit-4, the student will be able to how to write a thesis or a research paper. Also students will be able to learn how to present a research article in a seminar/conference or how to publish the article in e-journals.
5. After studied unit-5, the student will be able to formulate the Euler's method, Range Kutta method, Trapezoidal rule and Simpson's 1/3rd rule of numerical methods.

**CORE ELECTIVE
PAPER -3**

B. MATERIAL SCIENCE

Course Objectives

1. To understand the basic concepts of phase transition materials.
2. To learn the introduction on ceramic and polymer materials.
3. To teach biomaterials for biomedical applications.
4. To expose the knowledge on nonlinear optical materials.
5. To give an idea about energy conversion and storage materials

UNIT-1: Phase transition materials

Definition and basic concepts - solubility limit -phases - microstructure –phase equilibria – unary phase diagrams-Binary phase diagrams – Binary isomorphous systems – Interpretation of phase diagrams-Development of microstructure in isomorphous alloys -mechanical properties of isomorphous alloys- Binary eutectic systems – Development of microstructure in eutectic alloys – Equilibrium diagrams having intermediate phases or components – Eutectoid and peritectic reactions -Concurrent phase transformations -ceramics and ternary phase diagrams -The Gibbs phase rule - The iron – iron carbide phase diagrams.

UNIT-2: Ceramics and Polymers

Ceramics: Introduction -Glasses - Glass Ceramics - clay products – refractory's –abrasives-cements – advanced ceramics - ceramic phase diagrams - brittle fracture of ceramics- stress - strain behavior – mechanism of plastic deformation – miscellaneous mechanical consideration.

Polymers - Polymerization mechanism - Polymer structures - Deformation of polymers - Behaviour of polymers,

UNIT-3: Biomaterials

Introduction to biomaterials for biomedical applications, Chemical structure and property of biomaterials, Degradation of biomaterials, Polymeric biomaterials: Introduction, preparation, hydrogel biomaterials, Bioconjugation techniques, Biomaterials for drug delivery application (small molecules, gene and protein)-Biomaterials implantation- Biomaterials for imaging and diagnosis.

UNIT-4: NLO materials

Introduction-Harmonic Generation-Second Harmonic Generation-Phase Matching-Third Harmonic Generation-Optical Mixing-Parametric Generation of Light-Selffocusing of Light–nonlinear optical materials.

UNIT-5: Energy conversion and Storage materials

Solar cells: Organic solar cells - Polymer composites for solar cells - p-njunction - Device fabrication and characterization – Nanomaterials for solar cells - Dye-sensitized solar cells - Organic - inorganic hybrid solar cells.

Batteries -primary and secondary batteries, Lithium, Solid-state and molten solvent batteries; Lead acid batteries; Nickel Cadmium Batteries; Advanced Batteries, Super capacitors for energy storage. Role of carbon nanomaterials as electrodes in batteries and super capacitors.

Text Books

Unit 1 to Unit 5

1. G.K. Narula, K.S. Narula, and V.K. Gupta, Material Science, TMH, New Delhi, 1995.
2. Dr. M.N. Avadhanulu, Material science, S.Chand & Company, New Delhi, 2014
3. V.Ragavan, Material Science and Engineering, 4th Edition, Prentice Hall of India, New Delhi, 2003.
4. M. Arumugam, Materials Science, 3rd Edition, Anuradha Agencies, 2002.

Reference Books

1. Lawrence H. Vlack, Elements of Materials Science and Engineering, 6th Edition, Second ISE reprint, Addison-Wesley, 1998.
2. H. Ibach, H. Luth, Solid State Physics, An introduction to principles of Material Science, 2nd Edition, Springer, 2001.
3. Balasubramanian. R., Callister's, Material Science and Engineering, Wiley, India, 2010.
4. A.J. Dekker, Solid State Physics, McMillan Co., 1981.

E-Materials

1. https://www.tf.uni-kiel.de/matwis/amat/iss/kap_6/illustr/s6_1_1.html
2. <https://www.youtube.com/watch?v=3EFu2t94Mrw>
3. <https://www.youtube.com/watch?v=vnVPwf2T4Eo>
4. <https://en.wikipedia.org/wiki/Glass-ceramic>
5. <https://en.wikipedia.org/wiki/Biomaterial>
6. <https://nptel.ac.in/courses/113104009/>
7. <https://www.slideshare.net/krishslide/nonlinear-optical-materials>
8. <https://shodhganga.inflibnet.ac.in/bitstream/10603/36565/4/chapter%201.pdf>
9. https://en.wikipedia.org/wiki/Dye-sensitized_solar_cell
10. <https://www.youtube.com/watch?v=17SsOKEN5dE>

Course Outcomes

1. After studied unit-1, the student will be able to know the concepts of phase diagrams and phase transformations.
2. After studied unit-2, the student will be able to explain the property of ceramic materials and also able to learn polymerization mechanism.

3. After studied unit-3, the student will be able to explain the chemical structure and property of biomaterials.
4. After studied unit-4, the student will be able to understand the properties NLO materials and its harmonic generation.
5. After studied unit-5, the student will be able to design the energy conversion and storage materials.

**CORE ELECTIVE
PAPER -3**

C. NUMERICAL METHODS & C PROGRAMMING

Course Objectives

1. To learn the fundamentals of numerical differential and integration
2. The course gives the principles of scientific research
3. Students can study the basics of C programming
4. To acquire knowledge on operator, arrays and strings
5. To teach how to write the simple programs using C language

UNIT-1: Numerical methods

Solutions of equations - Simple iterative methods - Newton - Raphson method - Numerical Integration - Simpson's 3/8 rule - RungeKutta method II order - Solution of Simultaneous equation.

UNIT-2: Principles of Scientific Research

Identification of the problem - Literature survey - Reference collection - Familiarity with ideas and concept of investigation – Use of Internet in research - Drawing Inferences from data – Qualitative and Quantitative analysis - Results – Presentation in a Seminar - Synopsis writing - Art of writing a Research paper and Thesis - Power point presentation

UNIT-3: Programming in C

Introduction –Importance of C language - Basic structure of C Programming - Character set - constants - Keywords - Identifiers - Variables - declaration of variables - Assigning values to variables - defining symbolic constants – Types of Operators - Arithmetic, relational, logical, assignment, increment, decrement conditional and special type conversion in Expressions.

UNIT-4: Operators, Arrays and Strings

Arrays:Introduction - one, two and multi-dimensional arrays - Initializing two dimensional arrays - Declaring and Initialising string variables - Reading and Writing Strings on the screen – Arithmetic operations on strings.

UNIT-5: Simple Programs

Multiplication programs - Return values and their types - Calling Functions - Categories of functions - Matrix multiplication - Diagonalisation and inversion - Solution to simultaneous equations - differential and integral equations.

Text Books

Unit 1

1. S.S. Sastry, Introductory Methods of Numerical analysis, PHI, N.Delhi
2. E. Balagurusamy, Numerical methods, Tata McGraw-Hill, Delhi

Unit 2

1. J. Anderson B.H. Burston and M. Poole, Thesis and Assignment writing, Wiley, UK,1977
2. Rajammal.P. Devadas, Hand book of Methodology of Research, RMM Vidyalaya Press. 1976

Unit 3- Unit 5

1. E. Balagurusamy, Programming in ANSI C, 4th Edition TMH, New Delhi, 2009
2. V. Rajaraman, 1993, Computer Oriented Numerical Methods, 3rd Edition, PHI, New Delhi.

Reference Books

1. V. Rajaraman, Programming in C, PHI, New Delhi.
2. C.R. Kothari, Research methodology : Methods and Techniques, New Age International Publishers
3. S.D. Conte and C.de Boor, Elementary Numerical analysis-an algorithmic approach, 3rd Edition, McGraw Hill,1981
4. B.F. Gerald, and P.O. Wheatley, Applied Numerical analysis, 5th Edition, Addison-Wesley, M.A,1994

E-Materials

1. <https://nptel.ac.in/courses/122102009/>
2. <httphttps://www.scribbr.com/dissertation/literature-review/s://math.dartmouth.edu/~m3cod/klbookLectures/406unit/trap.pdf>
3. <https://uscupstate.libguides.com/c.php?g=627058&p=4389968>
4. <https://www.geeksforgeeks.org/c-language-set-1-introduction/>
5. <https://www.youtube.com/watch?v=KJgsSFOSQv0>
6. <https://www.youtube.com/watch?v=aMpsKnf6DrQ>
7. <https://www.studytonight.com/c/programs/>
8. <https://www.youtube.com/watch?v=Yzfl3rtFOSM>
9. <https://learnenglish.britishcouncil.org/writing-purpose/literature-surveys-structure-1>
10. https://www.tutorialspoint.com/cprogramming/c_arrays.htm

Course Outcomes

1. After studied unit-1, the student will be able to get the solutions using different numerical methods.
2. After studied unit-2, the student will be able to explain the fundamentals of research and know how to write a thesis or paper.
3. After studied unit-3, the student will be able to understand the basic structure of C programming.
4. After studied unit-4, the student will be able to learn the one, two and multidimensional arrays and also know the reading and writing strings.
5. After studied unit-5, the student will be able to write different programs after learning the structure of C programming.

**OPEN ELECTIVE
PAPER -3
(to choose 1 out of 3)**

A. ELECTRICAL AND ELECTRONICS APPLIANCES

Course Objectives

1. The course gives the some fundamental knowledge of electrical and electronics technology
2. To identify the discrete components will be used in electrical circuits
3. To know basics of household electrical connections
4. To expose the principle and design of electrical appliances used in our day-today life
5. To teach basics of semiconductors and related electronics circuits
6. To give the fundamentals and working design of consumer electronics appliances

UNIT-1: Basics of Electrical Technology I

Resistance and its types – capacitance and its types – Colour codes-inductance and its units – Transformers – Electrical Charge – Current – Electrical Potential-Ohm's law – Galvanometer, Ammeter, Voltmeter and Multimeter -Analog and Digital - Electrical Energy - Power – Watt – kWh – Consumption and electrical power.

UNIT-2: Basics of Electrical Technology II

AC-Single phase and three phase connections - House wiring – Star and delta connection – overloading-Earthing-short circuiting-Fuses-Colour code for insulation wires- Transformers

UNIT-3: Electrical Appliances

Electric iron Box-Electric Fan-Construction and Working of Ceiling and Table fans-Water Heater –Types-Function -Wet Grinder-Mixer Grinder-Principle and Design

UNIT-4: Basics of Electronics

Semiconductors-Junction diode-Zener diode-LED- Transistor-configurations – diode half wave and full wave rectifier -Regulated power supply using Zener diode-Transistor amplifier

UNIT-5: Electronics Appliances

Scientific Calculators, Personal computer-Lap Top-Smart Phones- Laser Printer-Color TV-OLED-QLED TV-Refrigerator-Washing Machine – Function – Types – Semi and Fully Automatic-Top and Front loading-washing technique-Air Conditioner, Microwave Oven-Principle and Design

Text Books

Unit-1 to Unit-4

1. B L Theraja , A text book in Electrical Technology,S. Chand & Co., New Delhi, 2013
2. V K Metha , Principles of Electronics by, S. Chand & Co., 2001.
3. R.S Sedha, A Text Book of Digital Electronics, S.Chand&CO.Ltd., New Delhi,2010
4. Performance and design of AC machines – M G Say ElBSEdn.

Unit-5

1. S.P Bali, Consumer Electronics, Pearson, 2004

Reference Books

1. Bagde and Singh, Elements of Electronics, S. Chand & Co., New Delhi, 2000.
2. Gulati, Monochrome and Colour TV,New Age International (P) limited, Publishers, New Delhi, 2005
3. Mitchel Schultz, Grob'sBasic Electronics,McGraw Hill NY ,2010.

E-Materials

1. <https://www.allaboutcircuits.com/textbook/reference/chpt-2/resistor-color-codes/>
2. <https://www.youtube.com/watch?v=SjlnW5g9np4>
3. <https://circuitglobe.com/difference-between-single-phase-and-three-phase.html>
4. https://www.youtube.com/watch?v=r_DGW3OrPVg
5. <https://www.youtube.com/watch?v=NNkoAJkXUAW>
6. <https://www.slideshare.net/ideseditor/533-28626238>
7. <https://en.wikipedia.org/wiki/Semiconductor>
8. https://www.youtube.com/watch?v=CjAVfW_6juw
9. <https://www.youtube.com/watch?v=7HiNABH1kYE>
10. <https://mrwashingmachine.in/working-principle-of-washing-machine/>

Course Outcomes

1. After studied unit-1, the student will be able to identify the given discrete components like resistors using color coding method.
2. After studied unit-2, the student will be able to understand the theory of household electrical connections.
3. After studied unit-3, the student will be able to know the principle and working of some household electrical appliances.
4. After studied unit-4, the student will be able to acquire knowledge about theory of semiconductors.
5. After studied unit-5, the student will be able to know the principle and working of some household electronics appliances.

**OPEN ELECTIVE
PAPER -3**

B. PHYSICS OF MATERIALS

Course Objectives

1. To teach the basics of bonding in crystals
2. Students can learn the diffraction of X-Rays by crystals
3. To expose the classical and quantum free electron theory of metals
4. To discuss the theory of different energy bands in solids
5. To explain the introduction and properties of superconductors

Unit-1: Crystals

Basic concepts-Symmetry elements-Bravais Lattice-Miller Indices-Basic definitions of crystal structure-BCC and Cesium chloride structure-Bonding in solids: Types of bonds in crystals - Ionic, Covalent, Metallic, Molecular and Hydrogen bonds.

UNIT-2: Diffraction of X-Rays by crystals

X-ray diffraction: Derivation of Bragg's law - Bragg spectrometer -Determination of interatomic distance-Determination of interplanar distance-Interpretation of X-ray diffraction pattern - Laue's, Rotating crystal and Powder methods.

UNIT-3: Conductors

Classical free electron theory- Expression for electrical conductivity-Verification of Ohm's law-Thermal conductivity- Expression for thermal conductivity-Wiedmann-Franz law and Lorentz number- Quantum free electron theory of metals

UNIT-4: Semiconductors

Energy bands in solids: Classification of solids on the basis of energy band theory - Semiconductors- n type and p type semiconductors - Fermi level in intrinsic semiconductor-Electrical conductivity-Determination of band gap-Hall effect-Determination of Hall coefficient

UNIT-5: Superconductors

Introduction-Properties of superconductors-Meissner effect-Types of Superconductors-Type I and Type II-BCS theory of superconductivity-Cooper pair-Josephson Effect-Applications.

Text Book

Unit 1 to Unit 5

K. Ilangoan, Solid State Physics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Reference Books

1. S.O. Pillai, Solid State Physics, New Age International Publishers, 2015.
2. C. Kittel, Introduction to Solid State Physics, Wiley Eastern Limited, 2005.
3. Saxena, Gupta & Saxena, Fundamentals of Solid State Physics, PragatiPrakashan, Meerut, 2015.

E-Materials

1. https://en.wikipedia.org/wiki/Crystal_structure
2. <https://byjus.com/chemistry/crystal-structure/>
3. https://en.wikipedia.org/wiki/Bragg%27s_law
4. https://www.youtube.com/watch?v=8Gma_FfCl2A
5. <https://www.youtube.com/watch?v=vMZOYpOUGZ8>
6. <http://en2k6.blogspot.com/2008/02/free-electron-theory.html>
7. <https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1>
8. <https://www.youtube.com/watch?v=AwbHzwWLo>
9. <https://www.youtube.com/watch?v=Vqx21iqQ7cI>
10. https://en.wikipedia.org/wiki/Meissner_effect

Course Outcomes

1. After studied unit-1, the student will be able to learn the basics of crystal structure and various types of bond exists in the crystals
2. After studied unit-2, the student will be able to know the statement of Bragg's law and to study the Diffraction of X-ray by different methods
3. After studied unit-3, the student will be able to understand the classical and quantum theory of free electrons in metals
4. After studied unit-4, the student will be able to distinguish between intrinsic and extrinsic semiconductor and can determine the Hall coefficient of a material
5. After studied unit-5, the student will be able to describe the properties of superconductors and hence the students can distinguish Type I and Type II superconductors

**OPEN ELECTIVE
PAPER - 3**

C. GEOPHYSICS

Course Objectives

The aim of the course is to understand physical properties of Earth through Physics principles

1. To learn the different concepts related to the earth
2. Study of earth with geophysical and geochemical methods
3. To give an introduction about seismology
4. To study the properties of earth with reference to magnetic field
5. To inculcate knowledge on radioactivity of earth and its thermal properties

Unit 1: Physics of the Earth

Introduction to Geophysics- Earth as a member of the solarsystem-Atmosphere-Ionosphere-Asthenosphere-Lithosphere-Hydrosphere and Biosphere-Meteorology-Oceanography andHydrology.

Unit 2: Geophysical and Geochemical methods

Geophysical methods: Geo referencing using Arc GIS software-Electrical methods- Qualitative interpretation of VerticalElectrical Sounding curves –Preparing pseudo cross section forelectrical resistivity data and interpretation

Geochemical methods: Introduction-Principles of groundwaterchemistry-Sources of contamination- Ground water qualityanalysis.

Unit 3: Introduction to Seismology

The earth's interior and crust as revealed by earthquakes-Rayleigh waves and Love waves-Elastic rebound theory-Continental drift-Earthquake magnitude and intensity-Horizontal seismograph and seismograph equation-Tsunami-Causes andImpacts-Tsunami warning systems.

Unit 4: Geomagnetism and Gravity

Historical introduction –The physical origin of magnetism-Causes of the main field-Dynamo theory of earth's magnetism-Gravitational potential-Laplace's equation and Poisson'sequation-Absolute and relative measurements of gravity-Worden gravimeter.

Unit 5: Geochronology and Geothermal physics

Radioactivity of the earth-Radioactive dating of rocks andminerals-Geological time scale-The age of the earth-Flow of heat to the surface of the earth –Sources of heat withinthe earth-Process and heat transport and internal temperature ofearth.

Text Books

1. Cook,A.H , Physics of the Earth and Planets, McMillanPress,London,1973.
2. Arthur W.Hounslow, Water quality data -Analysis and,Interpretation, Lewis publishers, Washington D.C.1995
3. G.P.Mahapatra,. Physical Geology,CBSPublishers,New Delhi,1994.

Reference Books

1. Garland, Introduction to Geophysics 11 edition, WBSaunder Company, London, 1979.
2. William Lowrie, Fundamentals of Geophysics, 11Edition, Cambridge press,UK.
3. Nils-Axel Morne, Geochronology-Methods and casestudies, INTECH publications .
4. John Raferty, Geochronology –Dating and Precambriantime –The beginning of the world as we know it,Britannica Educational publishers, New York-2011.
5. Don L.Anderson, Theory of the Earth, Blackwellscientific Publications-UK, 1979

E-Materials

1. https://en.wikipedia.org/wiki/Earth_science
2. <https://en.wikipedia.org/wiki/Earth>
3. https://www.youtube.com/watch?v=JGXi_9A_Vc
4. <https://www.youtube.com/watch?v=-ZFmAAHBfOU>
5. <https://mangomap.com/gis-software>
6. <https://en.wikipedia.org/wiki/Earthquake>
7. <https://www.youtube.com/watch?v=GQQCvsxHtJo>
8. <https://www.youtube.com/watch?v=fQt6UaR8Fcw>
9. <https://en.wikipedia.org/wiki/Gravimeter>
10. https://www.radioactivity.eu.com/site/pages/Earth_Heat.htm
11. https://www.youtube.com/watch?v=46MN_okpKbQ

Course Outcomes

1. After studied unit-1, the student will be able to explain about solar system and atmosphere, ionosphere etc.
2. After studied unit-2, the student will be able to demonstrate geo referencing using GIS software and to test the contamination of ground water using geochemical method.
3. After studied unit-3, the student will be able to describe about earthquakes and natural disaster Tsunami and its impacts
4. After studied unit-4, the student will be able to learn about the earth in the presence of magnetic field and gravity
5. After studied unit-5, the student will be able to know the radioactivity of the earth, can calculate the radioactive dating of rocks and minerals and thermal properties of the earth.

SEMESTER IV

PAPER - 10

SPECTROSCOPY

Course Objectives

1. To give an idea about rotational spectra of different molecules using rotational spectroscopy
2. To study the vibrational spectroscopy of diatomic and polyatomic molecules using Infrared spectroscopy
3. To acquire knowledge on Raman spectroscopy and its applications.
4. To expose the concept of Ultra Violet spectroscopy and its applications
5. Students can learn the theory and applications of NMR ,ESR, AAS and Mössbauerspectroscopy.

UNIT-1: Rotational (Microwave) Spectroscopy

Classification of molecules-Interaction of radiation with rotating molecule- Rotational spectra of Rigid –Isotope effect in rotational spectra- Intensity of rotational lines-Non-rigid rotator-Linear polyatomicmolecules- Symmetric and asymmetric top molecules-Stark effect-QuadrupoleHyperfine Interaction-Microwave spectrometer Instrumentation-Applications..

UNIT-2: Infrared spectroscopy

Introduction- Vibrational energy of a diatomic molecule-Vibrating diatomic molecule-Diatomic vibrating rotator-Vibrations of polyatomic molecules-Normal modes of molecular vibrations- Normal mode vibrations of CO₂ and H₂O molecules-Dipole moment change in CO₂ molecule-Hydrogen bonding-Interpretation of vibrational spectra-Instrumentation of IR spectrometer-FTIR spectroscopy-Principle, Instrumentation, sample handling techniques and applications-ATR Technique.

UNIT-3: Raman Spectroscopy

Classical theory of Raman Scattering - Quantum theory of Raman effect-Rotational, Vibrational Raman spectra of molecules; Structure determination using IR and Raman spectroscopy-Instrumentation of Raman spectrometer-Coherent anti-Stokes Raman Spectroscopy - Surfaces for SERS study – Enhancement mechanism – Instrumentation and sampling techniques - FT Raman Spectroscopy: Principle, Instrumentation, sample handling techniques and applications.

UNIT-4: UV Spectroscopy

Energy levels-Molecular orbitals-Theory of UV (electronic) spectra-Franck Condon Principle -transition Probability, measurement of spectrum – Types of transition in Organic molecules -

Types of absorption bands – transition in metal complexes – Selection rules Chromophore concept – Applications of UV Spectroscopy.

UNIT-V: NMR, ESR, AAS and Mössbauer Spectroscopy

Magnetic properties of nuclei-Resonance Condition-NMR instrumentation-Relaxation Process--Bloch equations - Chemical shifts –NMR Imaging.

Introduction-Principle of ESR - ESR spectrometer-Hyperfine Structure- ESR spectrum of Hydrogen.

Atomic Absorption Spectroscopy (AAS): Principle of AAS-single beam Spectrophotometer - Applications of AAS.

Mössbauer Effect - Recoilless emission and absorption - Mossbauer spectrum -Experimental methods - Mossbauer spectrometer-Applications.

Text Books

Unit 1 to Unit 3 and Unit 5

1. G. Aruldas, 2001, Molecular Structure and Spectroscopy, Prentice - Hall of India Pvt.Ltd., New Delhi.

Unit 4

1. H. Kaur, Spectroscopy, PragatiPrakashan, Meerut, 2017.

Reference Books

1. Colin Banwell, Elaine M. McCash, Fundamentals of Molecular Spectroscopy:, TMH publishers, 2013.
2. D.N. Satyanarayana, Vibrational Spectroscopy and Applications, New Age International Publications, New Delhi, 2004.
3. G.R.Chatwal and S.K.Anand, Spectroscopy (Atomic & Molecular), Himalaya Publishing House, 2016

E-Materials

1. https://en.wikipedia.org/wiki/Microwave_spectroscopy
2. <https://www.youtube.com/watch?v=3-8nAn0Mo6w>
3. https://en.wikipedia.org/wiki/Vibrational_spectroscopy_of_linear_molecules
4. <https://www.youtube.com/watch?v=58wqjy-ALLg>
5. https://en.wikipedia.org/wiki/Attenuated_total_reflectance
6. <https://www.youtube.com/watch?v=q0evGXCK-sY>
7. <https://www.youtube.com/watch?v=paZS5gv3P8g>
8. https://en.wikipedia.org/wiki/Raman_spectroscopy
9. <https://nptel.ac.in/content/storage2/courses/115101003/downloads/module3/lecture30.pdf>
10. https://www.youtube.com/watch?v=-76hr_97m10://en.wikipedia.org/wiki/Franck%E2%80%93Condon_principle
11. <https://nptel.ac.in/courses/104108078/>

12. <https://www.vanderbilt.edu/AnS/Chemistry/Rizzo/chem220a/Ch13slides.pdf>
13. https://en.wikipedia.org/wiki/Electron_paramagnetic_resonance

Course Outcomes

1. After studied unit-1, the student will be able to study the rotational spectra of diatomic and polyatomic molecules using rotational/ microwave spectroscopy.
2. After studied unit-2, the student will be able to distinguish between the rigid rotator and non-rigid rotator and students can calculate normal modes of vibrations for H₂O and N₂O molecules.
3. After studied unit-3, the student will be able to derive the expression for classical and quantum theory of Raman effect and also to study the molecular structure of water and CO₂ molecules.
4. After studied unit-4, the student will be able to understand the qualitative idea of UV-spectroscopy and also to learn the electronic spectra of poly atomic molecules.
5. After studied unit-5, the student will be able to know qualitatively the principle, theory, instrumentation and applications of NMR, ESR, AAS and Mössbauer spectroscopy.

**CORE ELECTIVE
PAPER -4
(to choose 1 out of 3)**

A. CRYSTAL GROWTH AND THIN FILMS

Course Objectives

1. To introduce theories of crystal growth.
2. To teach the various mechanisms of crystal growth.
3. To study the crystal symmetry and crystal structures.
4. To know the basics of thin film deposition techniques.
5. To learn the different characterization techniques.

UNIT-1: Theories of Crystal Growth

Introduction to crystal growth – Solubility – Saturation – Supersaturation – Induction Time - nucleation – Metastable Zone width – Gibbs - Thomson equation - kinetic theory of nucleation – Classical Nucleation Theory - homogeneous and heterogeneous nucleation – different shapes of nuclei – spherical, cap, cylindrical and orthorhombic – Temkins model – BCF theory.

UNIT -2: Crystal growth Techniques

Crystal Growth Mechanisms – Solid phase – Liquid Phase and Gas Phase crystal growth - Bridgman technique - Czochralski method – Skull Melting process - Verneuil technique - zone melting – Floating Zone method - gel growth – solution growth methods – low and high temperature solution growth methods – HTSG Flux growth – vapour growth - epitaxial growth techniques - LPE – MOCVD – MBE – Deposition Techniques – PVD – CVD- Sputtering – Ion Implantation – Gel growth – Hydrothermal Growth

UNIT-3: Crystal symmetry and Structures

Symmetry operations, elements - translational symmetries - point groups - space groups - equivalent positions – close packed structures - voids - important crystal structures – Pauling's rules - defects in crystals – Amorphous - polymorphism and twinning.

UNIT-4: Thin Film deposition Techniques

Thin Films – Basic of Thin films and Nanostructures - Role of thin films in Devices - Sol-gel synthesis - Spin coating – Chemical Bath Deposition – Electro Deposition - Chemical Bath Deposition - Physical Methods – Resistive Heating - Electron Beam Gun - Laser Gun-Spray pyrolysis- Evaporation and Flash Evaporations - Sputtering - Reactive Sputtering, Radio-Frequency Sputtering - ion implantation - Cathodic arc deposition - Pulsed laser deposition – Molecular beam epitaxy - Introduction to Vacuum Technology - Deposition Techniques - Films and artificial superstructures.

UNIT-5:Characterization Techniques

X – Ray Diffraction (XRD) – Powder and single crystal – Laue pattern – Spectrometry - UV-Vis-NIR Spectrometer - IR spectroscopy - Fourier transform Infrared analysis (FT-IR) – Elemental analysis – NMR: Nuclear Magnetic Resonance – ESR: Electron Spin Resonance – EPR: Electron Paramagnetic Resonance - Elemental dispersive X-ray analysis (EDAX) - Scanning Electron Microscopy (SEM) – Transmission Electron Microscopy (TEM) – Atomic Force Microscopy (AFM) – Luminescence Studies – Thermo Luminescence – Photo Luminescence — Etching Studies (Chemical) – Micro hardness tests – Vickers – Brinells - Micro hardness – TGA-DTA studies - Dielectric studies – Harmonic generation tests – SHG-higher generation tests.

Text Books

Unit 1 to Unit 3

1. H.E.Buckley. Crystal growth. John Wiley & sons, New York, 1981.
2. P.Ramasamy and P.Santhanaraghavan. Crystal growth processes and methods. KRU Publications, 2000.

Unit 4

1. A.Goswami, Thin Film Fundamentals, New Age International (P) Limited, New Delhi, 1996.

Reference Books

1. J.C. Brice, Crystal Growth Processes, John Wiley and Sons, New York (1986)
2. S.O.Pillai, Solid State Physics, New Age International Publishers, 2016.
3. D.Elwell and H.J.Scheel. Crystal growth from high temperature solution. Academic Press, New York, 1995.
4. R.A.Laudise. The growth of single crystals. Prentice Hall, Englewood, 1970.
5. L.V.Azaroff. Elements of X-ray crystallography. Techbooks, 1992.
6. J.A.K.Tareen and T.R.N.Kutty. A Basic course in Crystallography. University Press, 2001.
7. C.Hammond. The Basics of Crystallography and Diffraction, IUCr-Oxford University Press, 2009.
8. H.H. Willard, L.L. Meritt, J.A. Dean, F.A. Sette, Instrumental Methods of
9. Analysis, CBS Publishers, New Delhi, 1986.
10. S. Zhang, L. Li and A. Kumar, Materials Characterization Techniques (CRC Press, BocaRacon, 2009.
11. J.C. Brice, Crystal Growth Process (John Wiley, New York, 1986).
12. M. Ohring, Materials Science of Thin Films (Academic Press, Boston, 2002) 2nd edition.
13. E. N. Kaufmann, Characterization of Materials, Volume-I, John Wiley, New Jersey, 2012.

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1. <http://14.139.186.108/jspui/bitstream/123456789/16020/1/Chapter%20I%20to%20XI.pdf>
2. https://www.youtube.com/watch?v=G76H7A6_iyo
3. <https://www.slideshare.net/SHASHISHAW1/crystal-growth-techniques>
4. https://shodhganga.inflibnet.ac.in/bitstream/10603/364/9/09_chapter%202.pdf
5. <https://www.slideshare.net/AvinashAvi110/crystal-stmmetry>
6. <https://slideplayer.com/slide/4199534/>
7. <https://www.youtube.com/watch?v=ZBf46mqRGf0>
8. https://shodhganga.inflibnet.ac.in/bitstream/10603/136917/10/10_chapter%203.pdf
9. https://en.wikipedia.org/wiki/Transmission_electron_microscopy
10. <https://www.youtube.com/watch?v=BbBK4T5Yr3M>

Course Outcomes

1. After studied unit-1, the student will be able to learn the different theories of crystal growth and able to formulate Gibbs - Thomson equation.
2. After studied unit-2, the student will be able to demonstrate the Bridgman technique, Czochralskimethod ,Skull Melting process etc. of crystal growth.
3. After studied unit-3, the student will be able to understand the symmetry operations, elements, point groups, space groups and defects in crystals.
4. After studied unit-4, the student will be able to explain the basics of thin film deposition techniques like, spin coating, chemical bath deposition, spray pyrolysis etc.
5. After studied unit-5, the student will be able to know the principle, working and applications of different characterization techniques.

**CORE ELECTIVE
PAPER -4**

B. MEDICAL PHYSICS

Course Objectives

This paper provides a broad knowledge on the

1. Interaction of Non-Ionizing Radiation
2. Applications of Laser in Medicine
3. Ultrasound in tissues and their use in medicine.
4. Medical Ultrasound Applications
5. Radio frequency and Microwaves

UNIT-1: Review of non-ionising Radiation Physics in Medicine

Different sources of Non Ionising radiation-their physical; properties-first law of photochemistry- Law of reciprocity- - Electrical Impedance and Biological Impedance - Principle and theory of thermography – applications.

UNIT-2: Tissue Optics

Various types of optical radiations - UV, visible and IR sources - Lasers: Theory and mechanism-Laser Surgical Systems-Measurement of fluence from optical sources - Optical properties of tissues – theory and experimental techniques-interaction of laser radiation with tissues –photothermal -photochemical – photoablation – electromechanical effect.

UNIT-3: Mediphotonics

Lasers in dermatology, oncology and cell biology - Application of ultrafast pulsed lasers in medicine and biology-Lasers in blood flow measurement - Fiber optics in medicine - microscopy in medicine - birefringence - Fluorescence microscope - confocal microscope - Hazards of lasers and their safety measures.

UNIT-4: Medical Ultrasound

Production, properties and propagation of ultrasonic waves- Bioacoustics – Acoustical characteristics of human body- Ultrasonic Dosimetry - Destructive and nondestructive tests - Cavitation - Piezo electric receivers, thermoelectric probe – Lithotropy - High power ultrasound in therapy

UNIT-5: Radio Frequency and Microwaves

Production and properties - interaction mechanism of RF and microwaves with biological systems: Thermal and non-thermal effects on whole body, lens and cardiovascular systems – tissue characterization and Hyperthermia and other applications-Biomagnetism - Effects - applications.

Text Books

Unit-1

1. S. S Martellucci and A. N. Chester, Laser Photobiology and Photomedicine, Plenum Press, New York, 1985.

Unit-2

1. Markolf H. Neimz, Laser-Tissue Interactions, Springer Verlag, Germany, 1996.

Unit-3 to Unit-5

1. S. S Martellucci and A. N. Chester, Laser Photobiology and Photomedicine, Plenum Press, New York, 1985.

.Reference Books

1. J. R. Greening, Medical Physics, North Holland Publishing Co., New York, 1999.
2. R. Pratesi and C. A. Sacchi, Lasers in Photomedicine and Photobiology, Springer Verlag, West Germany, 1980.
3. Harry Moseley, Hospital Physicists' Association, Non-ionising radiation: microwaves, ultraviolet, and laser radiation, A. Hilger, in collaboration with the Hospital Physicists, Association, 1988

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1. https://www.youtube.com/watch?v=9TCK1Sa0_Vc
2. <https://en.wikipedia.org/wiki/Thermography>
3. https://en.wikipedia.org/wiki/Laser_surgery
4. <https://www.indiamart.com/proddetail/co2-laser-surgical-system-3595170512.html>
5. <https://ilchiro.org/laser-safety-for-clinical-applications/>
6. https://en.wikipedia.org/wiki/Laser_safety
7. <https://grantome.com/grant/NIH/R01-HD021687-06>
8. <https://www.frontiersin.org/articles/10.3389/fbioe.2020.00025/full>
9. <https://www.youtube.com/watch?v=CY4roB9ZTEo>
10. <https://en.wikipedia.org/wiki/Biomagnetism>

Course Outcomes

1. After studied unit-1, the student will be able to study the different sources of non-ionizing radiations.
2. After studied unit-2, the student will be able to know the various types of optical radiations like UV, IR etc.
3. After studied unit-3, the student will be able to explain the laser and fiber optic instruments for mediphotonics.
4. After studied unit-4, the student will be able to learn the properties and propagation of ultrasonic waves and also able to know the ultrasonic dosimetry.
5. After studied unit-5, the student will be able to understand the applications of radio frequency and microwaves.

**CORE ELECTIVE
PAPER -4**

C. MATLAB AND PYTHON PROGRAMMING

Course Objectives

1. To give an basic concepts of MATLAB
2. To teach the BODMAS rules and mathematical operations
3. To expose the fundamentals of Python programming
4. To learn the structured types, mutability and higher-order functions
5. To conceptualize the TKinter modules

UNIT-1: Introduction on MATLAB

Introduction-Use of MATLAB-Introduction to MATLAB software-MATLAB window-Command window-workspace-Command history-Setting Directory-Working with the MATLAB user interface-Basic Commands-Assigning variables-Operations with variables-Character and string-Arrays and vectors-Column vectors-Row vectors.

UNIT-2: Mathematical Operations

BODMAS rules-Arithmetic operations-Operators and special characters-Mathematical and logical operators-Creating rows and columns matrix-Matrix operations-Transpose-Determinant-Inverse-Solving Matrix-Plots-2D plots-3D Plots.

UNIT-3: Basics of Python

The basic elements of python (Software, Development Tools, Programmingwith Python, writing a Python Program, Python Interactive Shell,Values andVariables, Expressions) - Branching Programs - Control Structures – Stringsand Input – Iteration - Functions and scoping – Specifications – Recursion- Global variables – Modules – Files - System - Functions and Parameters –simple programs.

UNIT-4:Structured Types, Mutability and Higher-order Functions

Strings, Tuples, Lists and Dictionaries - Lists and Mutability - Functions asObjects – extrapolation, de'slanders table, – Classes and Object-OrientedProgramming – programs

UNIT-5: TKinter

TKinter modules -Tkinter classes - Tkinter widgets: button, canvas, frame,listbox, messagebox -widget configuration – widget styles – events andbindings - standard dialogs – GUI programs

Text Books

Unit 1

1. Amos Gilat, MATLAB an Introduction with Applications, John Wiley & Sons, INC Publication, 2004

Unit 2 to Unit 4

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India 2013

Unit 5

1. Tkinter manual

Reference Books

1. MATLAB 7.0 Basics, P. Howard, spring, 2005.
2. R. NageswaraRao, "Core Python Programming", dreamtech
3. Wesley J. Chun. "Core Python Programming - Second Edition", Prentice Hall
4. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", Wiley
5. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication

E-Materials

1. <https://www.tutorialspoint.com/matlab/index.htm>www.mathworks.com/products/matlab.html
2. http://mayankagr.in/images/matlab_tutorial.pdf
3. <https://www.mccormick.northwestern.edu/documents/students/undergraduate/introduction-to-matlab.pdf>
4. <https://www.mathworks.com/videos/introduction-to-matlab-81592.html>
5. <https://www.youtube.com/watch?v=uQrJ0TkZlc>
6. <https://www.youtube.com/watch?v=rpscVS0vtbw>
7. <https://www.youtube.com/watch?v=Y8Tko2YC5hA>
8. <https://www.programiz.com/python-programming>
9. https://www.w3schools.com/python/python_intro.asp
10. https://www.tutorialspoint.com/python/python_gui_programming.htm
11. <https://likegeeks.com/python-gui-examples-tkinter-tutorial/>

Course Outcomes

1. After studied unit-1, the student will be able to understand the basics of MATLAB
2. After studied unit-2, the student will be able to develop skills for writing a program using MATLAB
3. After studied unit-3, the student will be able to learn the fundamentals of Python programming
4. After studied unit-4, the student will be able to know the concepts of OOPs in Python
5. After studied unit-5, the student will be able to learn how to develop graphical user interfaces by writing some Python GUI examples using Tkinter package.

**OPEN ELECTIVE
PAPER-4
(to choose 1 out of 3)**

A. NANOPHYSICS

Course Objectives

1. To know the fundamentals of nanotechnology.
2. To learn about carbon nanostructures and its properties.
3. To study the preparation of nanomaterial by different methods.
4. To analyse the synthesized nanomaterial by various characterization techniques.
5. To understand the various applications of nanotechnology.

UNIT-1: Introduction to Nano and Types of Nanomaterial

Need and origin of nano - Emergence of nanotechnology with special reference to Feynman. Size & Scales: definition of nanostructures; Top-down and bottom-up approaches – Introductory ideas of 1D, 2D and 3D nanostructured material– Quantum dots -- Quantum wire – Quantum well -- Exciton confinement in quantum dots.

UNIT-2: Carbon Nanostructures

Carbon molecules and carbon bond-C60: Discovery and structure of C60 and its crystal - Superconductivity in C60-Carbon nanotubes: Fabrication - Structure-Electrical properties – Vibrational properties -Mechanical properties – Applications(fuel cells, chemical sensors, catalysts).

UNIT-3: Fabrication of Nanomaterial

Synthesis of oxide nanoparticles by sol-gel method -Electrochemical deposition method- Electrospinning method –Lithography-Atomic layer deposition-Langmuir--Blodgett films - Zeolite cages -- Core shell structures – Organic and inorganic hybrids.

UNIT-4: Characterization of Nanomaterial

Principles, experimental set-up, procedure and utility of scanning electron microscopy (SEM), transmission electron microscopy (TEM), scanning tunneling microscope (STM) and scanning probe microscopy (SPM).

UNIT-5: Applications

Molecular electronics and nanoelectronics -Nanorobots -Biological applications of nanoparticles -Catalysis by gold nanoparticles-Band-gap engineered quantum devices- Nanomechanics - CNT emitters- Photoelectrochemical cells-Photonic crystals -Plasmon waveguides.

Text Books

Unit 1 to Unit 5

1. T.Pradeep et al., A Textbook of Nanoscience and Nanotechnology, Tata McGraw Hill, New Delhi, 2012.
2. T.Pradeep , Nano: The Essentials, Tata McGraw Hill, New Delhi, 2012.
3. R.W. Kelsall, I.W. Hamley and M. Geoghegan, Nanoscale Science and
4. Nanotechnology (John-Wiley & Sons, Chichester, 2005.
5. G. Cao, Nanostructures and Nanomaterials, Imperial College Press, London, 2004.
6. C.P. Poole and F.J. Owens, Introduction to Nanotechnology, Wiley, New Delhi, 2003.

Reference Books

1. H.S. Nalwa, Nanostructured Materials and Nanotechnology, Academic Press, San Diego, 2002.
2. M. Wilson, K. Kannangara, G. Smith, M. Simmons, B. Raguse, Nanotechnology: Basic Science and Emerging Technologies, Overseas Press, New Delhi, 2005.

E-Materials

1. <https://en.wikipedia.org/wiki/Nanotechnology>
2. https://en.wikipedia.org/wiki/Carbon_nanotube
3. https://www.nanowerk.com/nanotechnology/introduction/introduction_to_nanotechnology_22.php
4. <https://www.youtube.com/watch?v=sbuIluJhT4A>
5. <https://www.youtube.com/watch?v=14DqBIG96W0>
6. <https://www.sciencedirect.com/topics/chemistry/sol-gel-process>
7. <https://www.slideshare.net/RamalingamGopal/sol-gel-synthesis-of-nanoparticles>
8. https://en.wikipedia.org/wiki/Scanning_electron_microscope
9. <https://www.youtube.com/watch?v=kdb6dHEHCA0>
10. <https://interestingengineering.com/15-medical-robots-that-are-changing-the-world>
11. <https://en.wikipedia.org/wiki/Nanorobotics>

**OPEN ELECTIVE
PAPER-4**

B. ASTRO PHYSICS

Course Objectives

1. To acquire the knowledge of astronomical instruments
2. To understand the basic ideas of space
3. To learn about the birth of stars, color, age etc.
4. To study the complete details of our solar system
5. To gain the knowledge on celestial measurements

UNIT -1: Astronomical Instruments

Optical telescope - reflecting telescope - types of reflecting telescope - advantages of reflecting telescopes - radio telescope - astronomical spectrographs - photographic photometry - photoelectric spectrometry- detectors and image processing.

UNIT-2: Space

Introduction – Hubble’s Law – Big bang theory – Shape of Universe – Expanding universe in space – Galaxies – Types of Galaxies – Spiral, Elliptical and Irregular Galaxies – Clusters of Galaxies – Milky Way – Quasars.

UNIT -3 : Stars

Birth of Stars – Colour and Age – Life of Stars – Red giant stars – White dwarf star – Neutron Star – Black hole – Supernovae – Constellations - Zodiac.

UNIT -4: Solar system

Introduction – Sun – Structure of Sun – Nuclear reactions in sun – Sun spot and solar flares – Earth – Structure of earth – Atmosphere – Moon and its structure – Inner planets – Outer planets – Asteroids – Meteors – Meteorites - Comets.

UNIT-5 :Space distance, Units and Co-ordinates

Cislunar space -Translunar space-Inter planetary distance -Interstellar space -Inter galactic space-Light Year- Astronomical Unit-Astronomical Map. Astronomical Systems - Astronomical co-ordinates -Celestial Sphere -Celestial Equators – Celestial Poles.

Text Books

1. BaidyanathBasu, An introduction to Astrophysics, Prentice Hall of India Private limited New Delhi, 2001.
2. A.Hewish., Physics of the Universe, CSIR publication, New Delhi, 1992.

Reference Books

1. BimanBasu, Inside Stars, CSIR Publication, New Delhi, 1992.
2. BimanBasu, Cosmic Vistas, National Book Trust of India, 2002.
3. K.S. Krishnasamy, Astro Physics a Modern Perspective, New Age International, New Delhi.
4. R. Murugesan and KiruthigaSivaprasath, Modern Physics, S.Chand&Co.Pvt.Ltd, 2016.
5. Mohan SundaraRajan, Space Today, National Book Trust of India, 2000.

E-Materials

1. <http://www.phy.olemiss.edu/~perera/astr325/Lec23.pdf>
2. https://en.wikipedia.org/wiki/List_of_astronomical_instruments
3. <https://www.youtube.com/watch?v=O0HyEEkckR0>
4. <https://www.youtube.com/watch?v=5bYNIY7m03w>
5. https://en.wikipedia.org/wiki/The_Big_Bang_Theory
6. <https://en.wikipedia.org/wiki/Galaxy>
7. <https://www.youtube.com/watch?v=BcjmoEspoRI>
8. <https://www.youtube.com/watch?v=ZrS3Ye8p61Y>
9. <https://en.wikipedia.org/wiki/Star>
10. https://en.wikipedia.org/wiki/Solar_System
11. https://www.youtube.com/watch?v=KsF_hdjWJjo
12. <https://www.youtube.com/watch?v=1Toya19H12w>
13. https://en.wikipedia.org/wiki/Celestial_sphere

Course Outcomes

1. After studied unit-1, the student will be able to know the principle and working of astronomical instruments.
2. After studied unit-2, the student will be able to explain big bang theory and galaxies
3. After studied unit-3, the student will be able to demonstrate variety of stars.
4. After studied unit-4, the student will be able to describe the complete details of solar system including comets.
5. After studied unit-5, the student will be able to the units to be used for the measurements celestial distance and coordinates.

**OPEN ELECTIVE
PAPER-4**

C. WEATHER FORECASTING

Course Objectives

1. To learn about the elementary idea of atmosphere, atmospheric pressure etc.
2. To study how to measure wind speed, direction, rain fall etc.
3. To teach the different weather systems and hurricanes
4. To explain the climate and environmental issues related to climate
5. To give an idea about weather forecasting

UNIT-1: Introduction to atmosphere

Elementary idea of atmosphere: physical structure and composition; compositional layering of the atmosphere; variation of pressure and temperature with height; air temperature; requirements to measure air temperature; temperature sensors: types; atmospheric pressure: its measurement; cyclones and anticyclones: its characteristics.

UNIT-2: Measuring the weather

Wind; forces acting to produce wind; wind speed direction: units, its direction; measuring wind speed and direction; humidity, clouds and rainfall, radiation: absorption, emission and scattering in atmosphere; radiation laws.

UNIT-3: Weather systems

Global wind systems; air masses and fronts: classifications; jetstreams; local thunderstorms; tropical cyclones: classification; tornadoes; hurricanes.

UNIT-4: Climate and Climate Change

Climate: its classification; causes of climate change; global warming and its outcomes; air pollution; aerosols, ozone depletion, acid rain, environmental issues related to climate.

UNIT-5: Basics of weather forecasting

Weather forecasting: analysis and its historical background; need of measuring weather; types of weather forecasting; weather forecasting methods; criteria of choosing weather station; basics of choosing site and exposure; satellites observations in weather forecasting; weather maps; uncertainty and predictability; probability forecasts.

Text Books

Unit 1 to Unit 5

1. Chandrasekar, Basics of Atmospheric Science, PHI Learning Pvt Ltd, New Delhi, 2010
2. Howard J Critchfield, General Climatology, Prentice Hall of India, Pvt Ltd, New Delhi, 1975

Reference Books

1. I.C. Joshi , Aviation Meteorology, Himalayan Books, 2014
2. Stephen Burt, The weather Observers Hand book, Cambridge University Press, 2012
3. S.R. Ghadekar ,Meteorology,Agromet Publishers, Nagpur, 2001.
4. S.R. Ghadekar ,Text Book of Agrometeorology,AgrometPublishers,Nagpur, 2005
5. Charls Franklin Brooks Why the weather, Chpraman& Hall, London. 1924
6. John G. Harvey,Atmosphere and Ocean, The Artemis Press, 1995.

E-Materials

1. <https://en.wikipedia.org/wiki/Atmosphere>
2. <https://www.youtube.com/watch?v=6LkmD6B2ncs>
3. <https://www.youtube.com/watch?v=jTWwnUIygc8>
4. <https://weatherstationguide.com/measure-wind-speed/>
5. <https://en.wikipedia.org/wiki/Thunderstorm>
6. <https://en.wikipedia.org/wiki/Cyclone>
7. <https://www.toppr.com/guides/science/winds-storms-and-cyclones/thunderstorms-and-cyclones/>
8. <https://climatekids.nasa.gov/weather-climate/>
9. <https://en.wikipedia.org/wiki/Climate>
10. https://en.wikipedia.org/wiki/Weather_forecasting
11. <https://www.skymetweather.com/15-days-rainfall-forecast-for-india/>

Course Outcomes

1. After studied unit-1, the student will be able to study the atmosphere and its physical structure and also to know the variation of pressure and temperature with height
2. After studied unit-2, the student will be able to describe the measurement of wind speed, direction humidity, rainfall and can state the radiation laws
3. After studied unit-3, the student will be able to explain the global wind systems and able to know thunderstorms and cyclones
4. After studied unit-4, the student will be able to conceptualize the classification of climate, ozone depletion, acid rain and environmental hazards due to climate change
5. After studied unit-5, the student will be able to understand the analysis and historical background of weather forecasting and know the predictability, probability of forecasts

CORE PRACTICAL-3

Semester: III& IV

ADVANCED GENERAL EXPERIMENTS

List of Experiments(Any 10 Experiments only)

1. Determination of the velocity and compressibility of the given liquid using ultrasonic interferometer.
2. Determination of the wavelength of given monochromatic source and the difference in wavelength of the two spectral lines D1 and D2 of Sodium source using Michelson Interferometer.
3. Magnetic susceptibility of a paramagnetic solution using Quincke's tube Method.
4. Determination of magnetic susceptibility of liquid by Guoy method.
5. Determination of the coercivity, retentivity and saturation magnetization of the given material using hysteresis loop tracer equipment.
6. Determination of numerical aperture of an optical fiber by using He-Ne Laser.
7. Determination of diameter of the given thin wire by diffraction method using He-Ne-Laser.
8. Determination of focal length of a given lens using He-Ne laser.
9. Determination of diameter of the given pinhole using He-Ne laser.
10. Determination of Planck's constant.
11. To measure the ionizing radiation from the given source using GM counter experiment
12. Determination of Hall coefficient, mobility, Hall angle and number of charge carriers by using Hall setup
13. Analysis of XRD spectrum - Determination of lattice parameters of a crystal
14. Analysis of FTIR spectrum – Vibrational assignments of a given sample
15. UV-Vis spectrometer - Analysis of UV- Vis spectrum - Determination of absorption coefficient and band gap

CORE PRACTICAL-4

Semester: III& IV

PROGRAMMING & PROBLEM SOLVING SKILLS

List of Experiments (Any 15 out of the given 20)

I Microprocessor 8085 programs

(Choose maximum of six programs)

1. Number conversion - 8 bit and 16 bit: BCD to Binary, Binary to BCD
2. Square and square root of BCD and HEX numbers (both 8 and 16 bit).
3. Largest and smallest numbers in a data set
4. Sum of simple series
5. Interfacing (i) Op-amp 8 bit DAC R-2R network (ii) Switching an array of LEDs.
6. ADC and interfacing IC 0809 with MPU
7. Analog to digital conversion using a DAC Comparator and MPU system.
8. Interfacing a DC stepper motor to the MPU system - clockwise and anticlockwise – full Stepping and half stepping
9. Interfacing and programming IC 0800 with MPU – Unipolar and Bipolar.
10. Interfacing a HEX keyboard to the MPU system through I/O ports.

II Microcontroller 8051 Programs

(Choose maximum of 4 programs)

1. Addition, Subtraction
2. Multiplication and Division.
3. BCD to Binary conversion and binary to BCD
4. Sorting in ascending and descending order.
5. Stepper motor interface.

III Problem Solving Skills

(Solve minimum five problems and one problem from each topic)

Topics from NET-Physical Sciences-PART “A “CORE Syllabus

1. Mathematical Physics
2. Classical Mechanics
3. Electromagnetic theory
4. Quantum mechanics
5. Thermodynamics and statistical physics

CORE PAPER-COMPULSORY

Project with viva voce

Preamble

The concept of introducing the project will help the student community to learn and apply the principles of Physics and explore the new research avenues.

In the course of the project the student will refer books, Journals or collect literature / data by the way of visiting research institutes/ industries. He/she may even do experimental /theoretical work in his/her college and submit a dissertation report with a minimum of 40 pages not exceeding 50 pages.

Format for Preparation of Dissertation

The sequence in which the dissertation should be arranged and bound should be as follows

1. Cover Page and title Page
2. Declaration
3. Certificate
4. Abstract (not exceeding one page)
5. Acknowledgement (not exceeding one page)
6. Contents (12 Font size, Times new Roman with double line spacing)
7. List of Figures/ Exhibits/Charts
8. List of tables
9. Symbols and notations
10. Chapters
11. References

Distribution of marks for Dissertation : (25+75 = 100 Marks)

Internal : 25 Marks

External : 75 Marks

- | | |
|---|------------|
| (a) For Organization and presentation of Thesis | - 40 marks |
| (b) For the novelty /Social relevance | -10 marks |
| (c) Presentation of work /Participation in state/
(d) national level Seminar/publication | - 5 marks |
| (e) Viva voce (Preparation, Presentation of
work and Response to questions) | - 20 marks |

Massive Open Online Courses (MOOCs)

Students can choose any two courses which are available on SWAYAM- NPTEL

1. A Brief Course On Superconductivity
2. Electromagnetism
3. Electronic Theory Of Solids
4. Experimental Physics - II
5. Experimental Physics III
6. Fiber Optics
7. Group Theory Methods In Physics
8. Introduction To Atmospheric And Space Sciences
9. Optical Sensors
10. Physics Of Biological Systems
11. Physics Through Computational Thinking
12. Quantum Mechanics I


ANNAMALAI UNIVERSITY
204 - B. Sc. Chemistry

Programme Structure and Scheme of Examination (under CBCS)
(Applicable to the candidates admitted in Affiliated Colleges from the academic year
2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours/Week	Credit	Maximum Marks		
					CIA	ESE	Total
SEMESTER - I							
22UTAML11	I	Language Course - I : Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I : Communicative English I	5	3	25	75	100
22UCHEC13	III	Core Course - I :General Chemistry-I	4	4	25	75	100
22UCHEC14		Core Course - II :General Chemistry-II	4	4	25	75	100
		Core Practical – I: Volumetric analysis and Inorganic Preparations	3	-	-	-	-
		Allied - I: Paper – 1: Mathematics-I/ Physics-I/ Botany-I/ Zoology-I/ Biochemistry-I	4	3	25	75	100
		Allied Practical -I: Mathematics-I/ Physics-I/ Botany-I/ Zoology-I/ Biochemistry-I	3	-	-	-	-
22UENVS18	IV	Environmental Studies	2	2	25	75	100
Total			30	19			600
SEMESTER - II							
22UTAML21	I	Language Course - II : Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course - II : Communicative English II	5	3	25	75	100
22UCHEC23	III	Core Course – III :General Chemistry-III	4	4	25	75	100
22UCHEP24		Core Practical – I : Volumetric analysis and Inorganic Preparations	3	4	40	60	100
		Allied – I: Paper -2: Mathematics-II/Physics-II/ Botany-II /Zoology-II / Biochemistry-II	3	3	25	75	100
		Allied Practical – I: Mathematics-II/Physics-II/ Botany-II /Zoology-II / Biochemistry-II	3	3	40	60	100
22UCHEE26		Internal Elective – I	3	3	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28		Soft Skill	2	1	25	75	100
Total			30	25			900

Internal Elective Courses

22UCHEE26-1	Internal Elective - I	Health Chemistry
22UCHEE26-2		Pharmaceutical Chemistry
22UCHEE26-3		Textile Chemistry

Allied Courses offered by the Department of Chemistry

22UCHEA01	Theory	Chemistry-I
22UCHEA02	Theory	Chemistry-II
22UCHEP02	Practical	Chemistry I

SEMESTER- I	22UCHEC13: GENERAL CHEMISTRY – I	CREDITS: 4
PART- III		HOURS: 60

COURSE OBJECTIVES

- 1) To provide basic idea about regarding atomic structure
- 2) To impart knowledge about Periodic Properties, Bonding Concepts, Ionic Bond, VSEPR and MO Theories.
- 3) To acquire in-depth knowledge about Nomenclature of Organic Compounds, Hybridisation, Reaction Intermediates.
- 4) To inculcate interest in Gaseous State, Kinds of velocities, Virial equation of state.
- 5) Make the students to understand about Liquid state, Liquid crystals, Solid state, X-ray diffraction.

Unit: 1 ATOMIC STRUCTURE

HOURS: 12

Quantum numbers n , l , m and s – Pauli's exclusion principle – Energy distribution and orbitals - Hund's rule of maximum multiplicity - Aufbau's principle – Electronic Configuration of elements - Stability of Half-filled and completely filled orbitals. Shapes of s , p , d and f orbitals.

Classification of elements – General characteristics of s , p , d and f - Block elements – Periodicity of properties- Definition and Periodicity of the following properties – Atomic radii and Ionic radii - Factors affecting the Atomic radii and Ionic radii.

Ionisation potential, Electron affinity and Electronegativity - Factors affecting the Ionisation potential, Electron affinity and Electronegativity – Pauling scale – Mulliken electronegativity scale – Applications of Electronegativity regarding the Bonding nature. Trends in periodic table and applications in predicting and explaining the chemical behavior.

Unit: 2 CHEMICAL BONDING

HOURS: 12

Ionic bond - Conditions for the formation of ionic bond - General properties – Energetics of formation of NaCl from Na^+ and Cl^- - Hydration energy, Lattice energy and their applications – Born-Haber cycle - Polarisation of ions- Fajan's rule - Transition from ionic to covalent character.

Covalent bond - Conditions for the formation of covalent bond - General properties -Polarity of bonds - Orbital overlap - Bond lengths and Bond energies - Hybridisation -Sigma and Pi bonds - VSEPR theory - Geometries of BeCl_2 , BF_3 , NH_3 , CH_4 , SF_4 , ICl_2^- , H_2O , PCl_5 , ClF_3 , XeF_6 , SF_6 and IF_7 molecules - Partial ionic character of covalent bond - Percentage of ionic character from dipole moment and electronegativity difference.

Molecular Orbital theory – Bonding and Anti-bonding orbitals - Relative order of Energies of molecular orbitals - MO diagram of H_2 , He_2 , O_2 , O_2^+ , O_2^- , N_2 , F_2 , HF and CO - Bond Order - Stability and Magnetic properties of the molecules - Comparison of VB and MO theories. Hydrogen bonding-types, examples and effect on properties.

Unit: 3 BASIC CONCEPTS OF ORGANIC CHEMISTRY

HOURS: 12

Classification of Organic Compounds – Nomenclature of Organic Compounds – Functional Groups - Homologous Series - IUPAC Recommendations for Naming Simple Aliphatic and Alicyclic Compounds.

Basic concepts of bonding in organic chemistry - Hybridisation – Definition – Geometry of Molecules - Methane, Ethane, Ethylene, Acetylene and Benzene - Electron displacement effects - Inductive - Inductomeric - Electromeric – Mesomeric Effect - Resonance - Hyperconjugation and Steric Effects.

Cleavage of bonds - Homolytic and Heterolytic fission of carbon-carbon bond – Methods to determine the Reaction Mechanism - Reaction intermediates - Structure and Stability of Carbocations, Carbanions and Free radicals.

Unit: 4 STATES OF MATTER-I

HOURS: 12

Gaseous state - Kinetic gas equation - Postulates and Derivation - Gas laws from the kinetic gas equation.

Kinds of velocities - Mean, RMS, Most Probable Velocities - Calculation of molecular velocities - Maxwell's distribution of Molecular Velocities.

Effect of Temperature on velocity distribution - Equipartition of energy - Heat capacity on molecular basis - Virial equation of state - Boyle temperature - Coefficient of Compressibility and Thermal expansion.

Unit: 5 STATES OF MATTER-II

HOURS: 12

Liquid state - Density – Diffusion - Viscosity – Evaporation - Surface tension Determination using Stalagmometer - Effect of temperature on surface tension - Parachor - Definition and Applications only - Coefficient of Viscosity- determination using Oswald's Viscometer- Effect of Temperature and Pressure.

Liquid crystals - Classification and Applications.

Solid State - Crystal lattices - Symmetry elements in crystals - Unit cell- Seven crystal systems - Space lattice - Bravais lattices - Laws of Crystallography-law of constancy of inter facial angles and Rational Indices- Miller indices, X-ray diffraction by crystals.

COURSE OUTCOMES

- 1) Recollect the Chemistry of Quantum Numbers.
- 2) Discuss various types of bonding through VB & MO theories.
- 3) Name simple Aliphatic and Aromatic Compounds and Illustrate and apply electron displacement effects and reaction mechanisms.
- 4) Understand Gaseous state, kinds velocities.
- 5) Elaborate the basic concepts of solid and liquid states.

Text Books

- 1) P.L. Soni, 2000, "Text book of Inorganic Chemistry", 20th revised edition, Sultan Chand & Sons, New Delhi.
- 2) Bahl, B.S. and Bahl, A., 2010, Advanced Organic Chemistry, (12th edition), Sultan Chand & Co., 12th Edition, New Delhi.
- 3) Puri B.R., Sharma L.R. and Pathania M.S. 2013, Principles of Physical Chemistry, Shoban Lal Nagin chand and Co., 35th Edition, New Delhi.

Supplementary Readings

- 1) J.D. Lee, 2000 'Concise Inorganic Chemistry', Sultan Chand & Sons, 20th revised Edition, New Delhi.
- 2) Morrison, R.T. and Boyd, R.N., Bhattacharjee, 2011, S. K. Organic Chemistry, Pearson, India, 7th Edition, New Delhi.
- 3) Glasstone S. and Lewis D., 1963, Elements of Physical Chemistry, London, Mac Millan & Co Ltd; 1st Edition, New Delhi.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	3	3	2	2	3
CO3	3	2	3	3	3
CO4	2	3	2	3	3
CO5	3	2	3	2	3

(1-Low, 2-Moderate, 3-High)

SEMESTER: I PART: III	22UCHEC14: GENERAL CHEMISTRY – II	CREDIT: 4 HOURS: 60
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COURSE OBJECTIVES

- 1) Lab safety and Nature of chemicals.
- 2) Types of titrations and Concentration terms.
- 3) Semimicro analysis and precipitation techniques.
- 4) Organic analysis
- 5) Logarithm, drawing graph, rules of differentiation and integration.

Unit: 1 LAB SAFETY, CHEMICALS AND GLASSWARE**HOURS: 12**

Philosophy of lab safety – first-aid techniques – general work culture inside the chemistry lab– importance of wearing lab coat, eye glasses. Personal protection.

Nature of chemicals – toxic, corrosive, explosive, inflammable, carcinogenic, other hazardous chemicals – safe storing and handling of chemicals – disposal of chemical wastes – glassware – handling of glassware – handling of different types of equipment's like Bunsen burner, centrifuger, Kipp's apparatus, etc. – ventilation facilities.

Heating methods, stirring methods filtration techniques. Calibration of pipette, standard measuring flask and burette. Weighing principle in chemical balance and single pan balance.

Unit: 2 TITRIMETRIC METHODS OF ANALYSIS**HOURS: 12**

General Introduction General principle: Types of titrations. Requirements for titrimetric analysis. Concentration systems: Molarity, formality, normality, wt% ppm, milli equivalence and millimoles-problems. Primary and secondary standards, criteria for primary standards, preparation of standard solutions, standardization of solutions. Limitation of volumetric analysis, end point and equivalence point.

Acid-base Equilibria pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers. Relative strength of acids and bases from K_a and K_b values. Neutralisation titration curve, theory of indicators, choice of indicators. Use of phenolphthalein and methyl orange.

Complexometric titrations Stability of complexes, titration involving EDTA. Metal ion indicators and characteristics. Precipitation titrations Argentometric titrations, indicators for precipitation titrations involving silver. Determination of chloride by Volhard's method. Adsorption indicators.

Unit: 3 SEMIMICRO METHODS AND GRAVIMETRIC METHODS**HOURS: 12**

Laboratory methods in semi-micro qualitative analysis – Filtration of precipitates – washing of precipitates – heating and evaporation – transferring residue – methods of precipitating sulphides – types of reactions involved in qualitative analysis – spot test analysis – removal of interfering ions.

General Separation Techniques Solubility and solubility products, expressions for solubility products. Determination of solubility from solubility products.

Methods of obtaining the precipitate – conditions for precipitation – choice of precipitants – advantages and disadvantages of using organic precipitants – types of organic precipitants – specific and selective precipitants – sequestering agents.

Unit: 4 BASICS OF ORGANIC ANALYSIS

HOURS: 12

Principle of distillation – Detection of elements – Lassaigne's test - nitrogen, sulphur, halogens.

Estimation of nitrogen by Kjeldahl method – estimation of halogens by Carius method.

Qualitative tests to identify organic functional groups – aliphatic and aromatic, test for unsaturation, phenols, aldehydes, ketones, esters, carbohydrates, amines, amides, carboxylic acids (any one test for each).

Unit: 5 CHEMICAL MATHEMATICS

HOURS: 12

Logarithm: Rules of logarithm, Characteristic and mantissa, change of sign and base, Problems based on pH and pOH.

Graphical representation of equations: Rules for drawing graph co-ordinates etc., Equation of straight line, slope and intercept, plotting the graph from the data of chemical properties and problems.

Derivative: Rules of differentiation and partial differentiation, Algebraic, logarithmic and exponential functions and problems. Rules of integration, Algebraic and exponential functions and problems.

COURSE OUTCOMES

After completion of the course students will be able to understand

- 1) How to be safe in chemistry laboratory and handle chemicals carefully.
- 2) Concentration terms, handling burette, pipette etc and various types of titrations.
- 3) How qualitative methods are useful in finding inorganic radicals.
- 4) Organic analysis.
- 5) Taking logarithm, drawing graphs.

Text Books

- 1) U.N. Dash, 2005, Analytical Chemistry: Theory and Practice, Sultan Chand and sons. Educational Publishers, 2nd Edition, New Delhi,
- 2) J.Bassett, R.C.Denney, G.H.Jerrey and J.Mendham, 1994, Vogel's Text Book Of Inorganic Quantitative Analysis, ELBS, 5th Edition, London.

Supplementary Readings

- 1) Svehla, 2012, Vogel's Qualitative Analysis, Pearson Education, 7th Edition, New Delhi.
- 2) Venkateswaran V, Veeraswamy R, Kulandaivelu A R, 1997, Basic Principles Of Practical Chemistry, Sultan Chand and Sons, 2nd Edition, New Delhi.
- 3) D.A. Skoog, D.M. West and F. J.Holler, 1990, Analytical chemistry, Saunders college publishing, 5th Edition, Philadelphia.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	3	3
CO2	3	3	3	2	2
CO3	3	2	3	3	3
CO4	2	3	2	2	2
CO5	3	3	2	3	3

(1-Low, 2-Moderate, 3-High)

SEMESTER: II PART: III	22UCHEP24: VOLUMETRIC ANALYSIS AND INORGANIC PREPARATIONS	CREDITS: 4 HOURS: 45
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COURSE OBJECTIVES

- 1) To enhance the knowledge and principles behind volumetric analysis.
- 2) To impart skills in weighing.
- 3) To understand the principles of standardizing the solution using the analytical technique known as titration.
- 4) To know about the uses of various indicators.
- 5) To invoke the basic knowledge of various primary standard salts and their significance.

A. VOLUMETRIC PRACTICALS

- 1) Calibration of volumetric kits: burette, pipettes and standard flasks.
- 2) Acid - Base titrations:
 - I. Estimation of HCl - Standard Oxalic acid
 - II. Estimation of Borax - Standard sodium carbonate.
- 3) Redox titrations:
 - a. Permanganometry:
 - I. Estimation of Ferrous sulphate - Standard:FAS
 - II. Estimation of Oxalic acid - Standard Oxalic acid
 - b. Iodometry;
 - I. Estimation of $K_2Cr_2O_7$ - Standard $K_2Cr_2O_7$
 - II. Estimation of Copper - Standard Copper Sulphate
 - c. Dichrometry:

Estimation of Fe^{2+} using diphenyl amine as indicator.
- 4) Complexometric titrations:
 - I. Estimation of calcium using EDTA.
 - II. Estimation of magnesium using EDTA.
- 5) Precipitation Titration

Estimation of Chloride in neutral medium (Demonstration Experiment).

B. INORGANIC PREPARATIONS

- 1) Preparation of FAS.
- 2) Preparation of tetraamminecopper (II) sulphate.
- 3) Preparation of potassium trioxalatoaluminate.
- 4) Preparation of potassium trioxalatoferrate.
- 5) Preparation of micro cosmic salt
- 6) Preparation of Tris(thiourea) copper (II) Chloride.

COURSE OUTCOMES

- 1) Analyse the given unknown solution and assess its normality.
- 2) Evaluate the amount of substance from normality.
- 3) Able to plan experimental projects and execute them.
- 4) Orient towards the important concepts of redox and precipitation titrations.
- 5) Understand the laboratory techniques behind inorganic preparations.

Text Books

- 1) Sundaram, Krishnan, Raghavan, 1996, Practical Chemistry (Part III), S.Viswanathan Co. Pvt., Ltd;, Chennai.
- 2) B.S.Furniss, A.J.Hannaford, P.W.G.Smith, A.R.Tatchell, 2005, Vogel's Text Book of Practical Chemistry, Pearson Education, 5th Edition, New Delhi.
- 3) N.S.Gnanapragasam and G.Ramamurthy, 1998, Organic Chemistry - Lab manual, S.Viswanathan Co. Pvt., Chennai.
- 4) Anbusrinivasan.P, 2021, Volumetry and Inorganic Chemistry Practicals, Principles and Procedures Shri Publications, 1st edition, Chidambaram, Tamil Nadu.

Supplementary Readings

- 1) Vogel, A.I., Vogel's Text Book of Quantitative Chemical Analysis, Prentice Hall, New Jersey.
- 2) Mendhan. J., 2009, Vogel's Text Book of Quantitative Chemical Analysis, Pearson Education, New Delhi.

SCHEME OF EVALUATION

Internal assessment:	40 Marks
External assessment:	60 Marks
Total:	100 Marks
Record:	10 Marks
Preparation:	5 Marks(Quantity:10, Quality: 5)
Short Procedure:	5 Marks
Error upto 2 %	: 30 Marks
2.1 – 3 %	: 25 Marks
3.1 – 4 %	: 20 Marks
4.1 – 5 %	: 15 Marks
>5 %	: 10 Marks

For incomplete or wrong calculation deduct 20 % of total marks scored.

For no calculation deduct 40 % of total marks scored.

For each arithmetic error deduct 1 mark.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	3	3
CO2	3	3	2	3	3
CO3	3	3	3	2	2
CO4	3	2	3	2	2
CO5	2	3	2	3	3

(1-Low, 2-Moderate, 3-High)

SEMESTER: II PART: III	22UCHEC23: GENERAL CHEMISTRY-III	CREDIT: 4 HOURS: 60
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COURSE OBJECTIVES

- 1) To obtain a comprehensive overview on s and p block elements.
- 2) To understand the properties and reactions of alkanes, alkenes and alkynes.
- 3) To impart knowledge regarding the basics of dienes and cycloalkanes.
- 4) To understand the various terminologies and reactions related to Quantum Chemistry and Thermodynamics.
- 5) To understand the laws and reactions related to Thermochemistry.

Unit:1 NIT-I s- AND p- BLOCK ELEMENTS**HOURS: 12**

Alkali metals - Li, Na, K, Rb and Cs - Occurrence - Comparative study of Elements with respect to Oxides, Halides, Hydroxides and Carbonates - Exceptional property of Lithium - Diagonal Relationship of Li with Mg.

Alkaline earth metals - Be, Mg, Ca, Sr and Ba - Occurrence - Comparative study of the elements with respect to Oxides, Hydroxides, Halides, Sulphates and Carbonates - Exceptional property of Beryllium - Diagonal relationship of Be with Al - Comparison of Alkaline Earth Metals with Alkali Metals - Magnesium acting as bridge element between II A and II B groups - Magnesium resembles Zinc.

p- Block elements - Boron family - Group discussion - Anomalous behaviour of Boron - Diagonal Relationship between Boron and Silicon - Electron deficiency and Electron acceptor behaviour of Boron trihalides - Bonding in Diborane (Hydrogenbridge structure) - Preparation, Properties, structure and Uses of Borazine, NaBH_4 , LiAlH_4 and boron nitride.

Unit: 2 HYDROCARBONS**HOURS: 12**

Alkanes - Methods of preparation of alkanes - Wurtz method, Kolbe's method and Reduction of alkyl halides - Physical and Chemical Properties of alkanes - Mechanism of Free Radical Substitution in alkanes - Halogenation and Reactivity.

Alkenes - Properties of alkenes - Electrophilic and Free radical addition - Addition reactions of Alkenes with mechanism - Addition of Hydrogen, Halogens, Hydrogen Halide (Markownikoff's rule) - Hydrogen bromide (Peroxide effect) - Sulphuric Acid, Water, BH_3 , Ozonolysis, Hydroxylation with KMnO_4 - Allylic substitution by NBS.

Alkynes - Acidity of alkynes - Addition of hydrogen - Hydroboration - Hydrohalogenation - Addition of hypohalous acid, Hydration - Addition of water with HgSO_4 catalyst - Oxidation with KMnO_4 - Ozonolysis - Formation of Acetylides.

Unit: 3 DIENES AND CYCLOALKANES**HOURS: 12**

Dienes - Classification - Conjugated, Isolated and Cumulative Dienes - Stability of Dienes - 1, 2- and 1, 4- Addition reactions of H_2 and HX with mechanisms - Synthesis of dienes - 1, 3 - Butadiene, Isoprene and Chloroprene - Diels-Alder reaction.

Cycloalkanes - Preparation using Wurtz's reaction, Dieckmann's ring closure and Reduction of aromatic hydrocarbons - Substitution and Ring opening reactions.

Stability of Alkanes, Alkenes and Cycloalkanes - Bayer's strain theory - Theory of Strainless rings.

Unit: 4 QUANTUM CHEMISTRY AND THERMODYNAMICS**HOURS: 12**

Planck's Quantum theory of radiation - Photoelectric Effect - Compton Effect - Wave mechanical concept of the atom - de Broglie's relationship - Davisson and Germer experiment - Wave nature of electron - Heisenberg's Uncertainty Principle.

Schrodinger wave equation (Without derivation) - Significance of wave functions ψ and ψ^2 - Shapes of s, p and d- orbitals.

Thermodynamics - Definition and Explanation of terms - System, Boundary, Surroundings - Homogeneous and Heterogeneous systems - Open, Closed and Isolated systems - Intensive and Extensive properties - State of a system - Independent state variables - Dependent state variables - Thermodynamic functions - State and Path functions.

Unit: 5 THERMODYNAMICS AND THERMOCHEMISTRY**HOURS: 12**

Thermodynamic processes - Types of processes - Cyclic - Reversible - Irreversible - Isothermal - Adiabatic Process - Exact and Inexact Differentials - Concept of Heat and Work - Zeroth Law of Thermodynamics.

First law of Thermodynamics - Statement and Equation - C_p and C_v Relationship - Calculation of w , q , ΔE and ΔH for the Expansion of Ideal Gases under Reversible, Isothermal and Adiabatic Conditions.

Thermochemistry - Heat of a reaction - Exothermic and Endothermic reactions - Calculation of ΔH from ΔE and vice versa - Thermochemical equations - Bond dissociation energy - Calculation from thermochemical data - Variation of Heat of a reaction with temperature - Kirchoff's Equation and Its significance.

COURSE OUTCOMES

- 1) Compare basic properties of elements and their Compounds of s & p block elements.
- 2) Explain the reaction mechanisms of alkanes, alkenes and alkynes and predict the products.
- 3) Classify dienes and analyze the stability of alkanes, alkenes and cycloalkanes.
- 4) Recollect the basic concepts of Quantum Theory and Thermodynamics.
- 5) Calculate thermodynamic parameters using thermochemical equations and data.

Text Books

- 1) P.L. Soni, 2000, Text book of Inorganic Chemistry, Sultan Chand & Sons, 20th revised edition, New Delhi.
- 2) Bahl, B.S. and Bahl, A., 2010, Advanced Organic Chemistry, Sultan Chand & Co., 12th Edition, New Delhi.
- 3) Puri B.R., Sharma L.R. and Pathania M.S., 2013, Principles of Physical Chemistry, Shoban Lal Nagin Chand and Co., 35th edition, New Delhi.

Supplementary Readings

- 1) J.D. Lee, 2000, Concise Inorganic Chemistry, Sultan Chand & Sons, 20th Revised Edition, New Delhi.
- 2) Morrison R.T. and Boyd R.N., Bhattacharjee, S. K., 2011, Organic Chemistry, Pearson India, 7th Edition, New Delhi.
- 3) Glasstone S. and Lewis D., 1963, Elements of Physical Chemistry, London, Mac Millan & Co Ltd; 1st Edition, New Delhi.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	3	3	2	3	3
CO3	3	2	2	2	2
CO4	2	2	3	2	3
CO5	3	3	2	2	2

(1-Low, 2-Moderate, 3-High)

SEMESTER: II PART: III INTERNAL ELECTIVE- I	22UCHEE26-1: HEALTH CHEMISTRY	CREDIT: 3 HOURS: 45
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COURSE OBJECTIVES

- 1) 1. To recognize the causes of common diseases, their control and treatment
- 2) 2. To understand the first aid for accidents
- 3) 3. To study the organic pharmaceutical aids
- 4) 4. To know about organic diagnostic agents
- 5) 5. To have an idea about diabetes and cancer.

Unit: 1 CAUSES, CONTROL AND TREATMENT OF COMMON DISEASES HOURS: 9

Insect borne diseases- Malaria, Filariasis, Plague.

Air-borne diseases-Diphtheria, whooping cough, influenza, measles, mumps, tuberculosis (TB), and common cold,

Water borne diseases- cholera, typhoid, dysentery. Some other common diseases-Jaundice, Asthma, Epilepsy, Piles, Leprosy.

Unit: 2 FIRST AID FOR ACCIDENTS HOURS: 9

Important rules of First Aid – Cuts and Wounds, Abrasions, Bruises, Bleeding, Fractures, Burns, Fainting Poisonous bites. First Aid Box.

Detection of Hallucinogens and poisons-Antidotes for Poisoning-Some common Poisons-Symptoms and their antidotes-Acid poisoning, Alkali poisoning, Disinfectant poisoning, Alcohol poisoning, Mercury poisoning and Salicylate poisoning.

Unit: 3 ORGANIC PHARMACEUTICAL AIDS HOURS: 9

Preservatives, Antioxidants, Emulsifying agent, Sequestrants, Colouring, Flavouring and Sweetening agent, Ointment bases, Solvents, Stabilizing and Suspending agents

Unit: 4 ORGANIC DIAGNOSTIC AGENTS HOURS: 9

Drug used as X-rays contrast media, Drugs used to test organ functions, Drugs used to determine blood volume, Hemopoietic functions, Drugs used for miscellaneous diagnostic tests.

Unit: 5 DIABETES AND CANCER HOURS: 9

Diabetes and hypoglycemic drugs: Blood sugar level –Diabetes –causes, symptoms and control- Preliminary ideas about the structure and sources of insulin- oral hypoglycemic drugs- sulphonyl ureas and biguanides (synthesis not expected)

Antineoplastic drugs: Causes of cancer- treatment methods-alkylating or cytotoxic agent- antimetabolite drugs

COURSE OUTCOMES

- 1) Describe the causes, control and treatment of common diseases.
- 2) Understand the concepts of first aid for accidents.
- 3) Classify different organic pharmaceutical aids.
- 4) Explain organic diagnostic agents.
- 5) Describe diabetes, cancer and their control and treatment.

Textbooks

- 1) Jayashree Ghosh, 2003, A Text Book of Pharmaceutical Chemistry, S.Chand & Company Ltd, 3rd revised Edition, New Delhi.
- 2) Lakshmi S, 1995, Pharmaceutical Chemistry, S.Chand & Company Ltd, 1st edition, New Delhi.
- 3) A. L. Leninger, 1998, Biochemistry, Kalyani Publishers, 2nd Edition, Ludhiana

Supplementary Readings

- 1) Chatwal G.R, 1991, Pharmaceutical Chemistry-Organic-Volume II, Himalaya Publishing House, New Delhi.
- 2) Ashutoshkar and Mehta S.C, 2018, Essentials of Pharmacology, New Age International Publishers, New Delhi.
- 3) Gurdeep Chatwal, 2012 , Medicinal Chemistry, Himalaya Publishing house private Ltd., Mumbai.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	2	3	2	3	2
CO3	3	3	3	2	3
CO4	3	2	3	3	3
CO5	2	3	2	2	2

(1-Low, 2-Moderate, 3-High)

SEMESTER: II PART: III INTERNAL ELECTIVE-I	22UCHEE26-2: PHARMACEUTICAL CHEMISTRY	CREDIT: 3 HOURS: 45
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COURSE OBJECTIVES

- 1) To know the basics of pharmaceutical chemistry
- 2) To realize the role of Indian medicinal plants and blood
- 3) To have an idea about alkaloids and sulphonamides
- 4) To distinguish about antibiotics and analgesics
- 5) To learn anaesthetics, antiseptics and disinfectants

Unit: 1 INTRODUCTION, HETEROCYCLICS AND QUINOLINES HOURS: 9

Definition of the following terms - Drug, Pharmacophore, Pharmacology, Pharmacopoeia, Bacteria, Virus, Chemotherapy and Vaccine.

Chemistry of Heterocyclics: A brief introduction - drugs derived from pyridine derivatives, Tripeleennamine and mepyramine. Quinoline derivatives: Chloroquine, amodiaquine and primaquine, Pyrimidines – Ureides and barbiturates.

UNIT: 2 STUDY OF INDIAN MEDICINAL PLANTS AND BLOOD HOURS: 9

Indian Medicinal Plants and Their Uses - Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothuvelai.

Composition of blood plasma: Analysis of serum proteins, Functions of plasma, Osmotic regulation, function of hemoglobin. Transport of Oxygen and maintenance of pH of blood. Analysis of hemoglobin in blood. Rh factor. Blood pressure- normal, high and low Blood pressure and their control. Causes, Detection and Control of Anaemia and Diabetes Diagnostic test for sugar, salt and cholesterol in serum and urine.

Unit: 3 ALKALOIDS AND CHEMISTRY OF SULPHONAMIDES HOURS: 9

Alkaloids: General methods of extraction from a plant source, colour reactions and detection. Morphine and Quinine with special reference to structure relationship (SAR) and uses.

Chemistry of sulphonamides: Mode of action of Sulpha drugs - Sulphadiazine, Sulphapyridine, phthalyl sulphathiazole, sulpha furazole, and prontosil – Preparation and uses.

Unit: 4 ANTIBIOTICS AND ANALGESICS HOURS: 9

Antibiotics - Definition – Gram positive and Gram-negative bacteria. Pharmacological action – structural elucidation synthesis, assay and uses of chloramphenicol, Streptomycin and penicillin.

Analgesics: Classification, Narcotic analgesic– Morphine and derivatives. synthetic analgesics – pethidine and methadones. Antipyretic analgesics. Salicylic acid derivatives, indolyl derivatives and p-aminopheno derivatives, synthesis, action and uses.

Unit: 5 ANAESTHETICS, ANTISEPTICS AND DISINFECTANTS**HOURS: 9**

Anaesthetics – Definition – Classification - Local and General – Volatile – Uses of volatile liquids as Inhalation Anaesthetics – Chloroform, halothane, trichloroethylene - Gaseous Anaesthetics - Nitrous Oxide, Ether and Cyclopropane - Uses and Disadvantages – Intravenous Anaesthetic Agents – Thiopental sodium, Methohexitol and Propanidid. Local anaesthetics – cocaine and its derivatives. Drugs affecting CNS - Definition, Distinction and Examples for Tranquilizers, Sedatives (Phenobarbital, Diazepam) - Hypnotics, Psychedelic Drugs.

Antiseptics and disinfectants: phenols and related compounds, Organic mercurials. Dyes, cationic surface active agents, miscellaneous agents like chloramines – T, Chlorhexidine, dequalinium chloride, formaldehyde and nitrofurazone.

COURSE OUTCOMES

- 1) Realize the role of pharmaceutical chemistry
- 2) Understand the role of Indian medicinal plants and blood
- 3) Describe alkaloids and sulphonamides
- 4) Explain antibiotics and analgesics
- 5) Describe anaesthetics, antiseptics and disinfectants

Textbooks

- 1) Jayashree Ghosh.S, 2003, A Text Book of Pharmaceutical Chemistry -S. Chand Company Ltd, 3rd revised Edition, New Delhi.
- 2) S. Lakshmi, 1995, Pharmaceutical Chemistry , S.Chand & Company Ltd;, 1st Edition, New Delhi.
- 3) A. L. Leninger, 1998, Biochemistry, Kalyani Publishers,2nd Edition, Ludhiana.

Supplementary Readings

- 1) Asuthosh Kar, 2013, Medicinal Chemistry, New Age International Publishers, 5th Edition, New Delhi.
- 2) O. D. Tyagi, A Text Book Of Synthetic Drugs, Ammol Publications.
- 3) Gurdeep Chatwal, 2012, Medicinal Chemistry, Himalaya Publishing house private Ltd., Revised Edition, Mumbai.
- 4) Ahluwalia, 2012, Medicinal Chemistry, Ane Books Pvt. Ltd;, 2nd Edition, New Delhi.
- 5) Rasheeduz Zafar, 2000, Medicinal Plants of India, CBS Publishers and Distributors.

OUTCOME MAPPING

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CO1	3	3	3	3	3
CO2	2	2	3	3	2
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CO4	3	3	2	3	3
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(1-Low, 2-Moderate, 3-High)

SEMESTER: II PART: III INTERNAL ELECTIVE-I	22UCHEE26-3: TEXTILE CHEMISTRY	CREDIT: 3 HOURS: 45
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COURSE OBJECTIVES

- 1) To know the basics of fibres.
- 2) To realize the properties of fibres.
- 3) To learn processing of fibres.
- 4) To understand dye chemistry.
- 5) To learn dyeing process.

Unit:1 INTRODUCTION TO FIBRES

HOURS: 9

General Classification of Fibers – Chemical structure – Production – Properties – Count, Denier, Tex, Staple Length, Spinning Properties, Strength, Elasticity and Creep. Applications of the following Natural Cellulose Fibres (Cotton and Jute).

Natural Protein Fibres (Wool and Silk) – General characteristics.

Unit: 2 PROPERTIES OF FIBRES

HOURS: 9

Chemical Structure, Production and properties of the following Synthetic Fibres – Man-made Cellulose Fibres (Rayon and Modified cellulose fibres).

Polyamide Fibres (Different types of Nylons) - Preparation – Nylon degradation – Polyester Fibres – Preparation - Degradation – Polyacrylonitrile fibre - Preparation and Properties – Viscose fibre - Preparation and Properties. Identification tests for Cellulose, Cotton, Wool, Silk, Rayon, Acrylic, Viscose, Polyamide and Polyester Fibres.

Unit: 3 PROCESSING OF FIBERS

HOURS: 9

Impurities in Raw Cotton and Grey Cloth, Wool and Silk. General principles of the Removal, Scouring - Purpose, Alkali Scouring and Acid Scouring – Bleaching (Methods - Hypochlorite, Peroxide and Bleaching Powder) - Desizing (Hydrolytic and Enzymatic), Kier Boiling and Chemicking.

Dyeing of Polyester and Blends – Functions of Dispersing agents - Fibre swelling – Carrier dyeing - High temperature dyeing - Selection of dyestuff.

Unit: 4 DYE CHEMISTRY

HOURS: 9

Colour and Constitution – A general treatment – Chromophores – Auxochromes - Bathochromes and Hypso-chromes.

Classification of dyes – Acidic, Basic, Direct, Mordant, Azoic, Ingrain, Vat and Reactive Dyes - Classification as per Chemical constitution – Azo dyes – Triphenyl Methane Dyes, Phthalein Dyes, Indigo and Anthraquinone Dyes.

Structure, Preparation and Uses – Methyl Orange, Phenolphthalein and Malachite Green.

Unit: 5 DYEING PROCESS

HOURS: 9

Dyeing - Dyeing of Wool and Silk – Fastness properties of dyed materials.

Dyeing of Nylon, Terylene and other Synthetic Fibres – Finishing – Finishes given to Fabrics – Mechanical finishes on Cotton, Wool and Silk.

Method used in process of Mercerizing – Anticrease and Antishrink finishes – Water Proofing.

COURSE OUTCOMES

- 1) Understand the basics of fibers
- 2) Realize the properties of fibers
- 3) Describe processing of Fibers
- 4) Explain dye chemistry
- 5) Describe dyeing process

Textbooks

- 1) F. Sadv, M. Horchagin and A. Matetshy, 1973, Chemical Technology Of Fibrous Materials, Mir Publishers, 1st edition, Moscow.
- 2) R. H. Peters, 1963, Textile Chemistry-Vol-II, Elsevier, 1st Edition, New York.

Supplementary Readings

- 1) E.R.Trotman, Dyeing and Chemical Technology of Textile Fibres , Charles Griffin &Co Ltd, London.
- 2) V.A.Shenai, Chemistry of dyes & Principles of Dyeing, Sevak Publications, Chennai.
- 3) E. R. Trotman, Scouring and Bleaching, Charles Griffin & Co Ltd., London.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	3	3
CO2	2	3	3	2	3
CO3	3	2	3	3	2
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(1-Low, 2-Moderate, 3-High)

ANNAMALAI UNIVERSITY
BACHELOR OF SCIENCE
B.Sc. CHEMISTRY DEGREE COURSE
(With effect from 2021 - 2022)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER III									
16.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	4	4	General Chemistry - III	25	75	100
	III	Core Practical	Practical-2	3	0	Inorganic Qualitative Analysis & Preparations	0	0	0
19.	III	ALLIED-2	Paper-3	4	3	Any one from 1. Physics -I 2. Botany -I 3. Zoology -I 4. Biochemistry - I 5. Mathematics - I*	25	75	100
	III	Allied Practical	Practical-2	3	0	Allied practical-II	0	0	0
20.	IV	Skill Based Subject	Paper-1	2	2	Water Treatment and Analysis	25	75	100
21.	IV	Non-Major Elective	Paper-1	2	2	Medicinal Chemistry	25	75	100
				30	19		150	450	600
SEMESTER IV									
22.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
23.	II	English	Paper-4	6	4	English	25	75	100
24.	III	Core Theory	Paper-4	4	4	General Chemistry - IV	25	75	100
25.	III	Core Practical	Practical-2	3	3	Inorganic Qualitative Analysis & Preparations	25	75	100
26.	III	Allied-2	Paper-4	4	3	Any one from 1. Physics -II 2. Botany -II 3. Zoology -II 4. Biochemistry - II 5. Mathematics - II*	25	75	100
27.	III	Allied Practical	Practical-2	3	2	Allied practical-II	25	75	100
28.	IV	Skill Based Subject	Paper-2	2	2	Food Chemistry	25	75	100
29.	IV	Non-Major Elective	Paper-2	2	2	Chemistry in Every Day Life	25	75	100
				30	24		200	600	800

SEMESTER - III
CORE PAPER - 3
GENERAL CHEMISTRY - III

OBJECTIVE:

Basic concepts regarding the Principles of Inorganic Analysis and Applications of Qualitative Analysis, Types of Solvents, p- Block Elements, Group Study, Aromaticity, Electrophilic and Nucleophilic Substitution Reactions, Elimination Reactions, Reaction Mechanism, Second Law of Thermodynamics, Derivation of Equations, Related Problems and Applications wherever necessary are to be taught for III semester.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Explain the basic principles of Inorganic Qualitative Analysis.
- 2) Compare the properties of Carbon, Nitrogen and Oxygen elements and their compounds.
- 3) Apply Huckel's rule and predict the Aromaticity of compounds.
- 4) Discuss the mechanism of substitution and elimination reactions of Aliphatic and Aromatic compounds.
- 5) Explain the Thermodynamic second law and predict the spontaneity of a process.

UNIT - I

Semimicro Techniques - Principles of Acid-Base Equilibria - Common ion effect - Solubility Product and its Applications in Qualitative Analysis - Principles of Inorganic Analysis - Reactions involved in the Separation and Identification of Cations and Anions in Qualitative analysis - Spot test reagents - Aluminon, Cupferon, DMG, Thiourea, Magneson, Alizarin and Nessler's reagent - Types of solvents - Protic and Aprotic solvents - Amphiprotic / Amphoteric solvents - Aqueous and Non-aqueous solvents- Reactions in non-aqueous solvents with reference to - Liquid Ammonia and liquid SO₂. Acids and bases-Arrhenius, Bronsted-Lowry, Lewis and Lux-Flood concept .

UNIT - II

Carbon family - Group study - Comparative study of Elements with respect to Valency, Oxides, Halides, Hydrides and Oxyacids - Catenation - Comparison of Properties of Carbon and Silicon - Silicates - Classification and Structure - Silicones- Preparation, Properties and Uses - Nitrogen family - Group study - Comparative study of N, P, As, Sb and Bi with respect to Oxides, Oxyacids, Halides and Hydrides - Hydrazine and Hydroxylamine - Hydrazoic acid - Preparation and uses of NaBiO₃ - Oxygen family - Group study - Comparative study of O, S, Se and Te with respect to Catenation, Oxides, Halides, Hydrides and Oxyacids - Anomalous Behaviour of Oxygen - Oxyacids of Sulphur (Structure only) - Peracids of Sulphur - Preparation, Properties and Structure - Differences Between Permonosulphuric Acid and Perdisulphuric Acid.

UNIT - III

Aromaticity - Modern Theory of Aromaticity - Huckel's ($4n + 2$) Rule and Its Simple Applications to Benzenoid and Non- benzenoid Compounds - Electrophilic substitution reactions in Aromatic Compounds - Mechanisms of Nitration, Halogenations, Sulphonation, Friedel-Crafts Acylation and Alkylation - Directive influence - Orientation - Ortho/Para ratio - Nuclear and Side chain Halogenation.

UNIT - IV

Aliphatic Nucleophilic Substitutions - Mechanisms of S_N1 , S_N2 and S_{Ni} Reactions - Effect of Structure of Substrate, Solvent, Nucleophile and Leaving Group - Elimination reactions - Mechanism of E1 and E2 reactions - Hoffmann and Saytzeff's rules - Cis and Trans Eliminations - Aromatic Nucleophilic Substitutions - Unimolecular Nucleophilic Substitution, Bimolecular Nucleophilic Substitution and their Mechanism.

UNIT - V

Second Law of Thermodynamics - Need for the II Law of Thermodynamics - Spontaneous Process - Criteria of Spontaneity - Different Forms of Statements of the Second Law - Cyclic Process - Definition - Heat Engines - Carnot's cycle - Efficiency - Carnot's theorem (Statement only) - Concept of Entropy - Definition and Mathematical Statement - Randomness and Entropy - Standard Entropy -Derivation of Entropy from Carnot Cycle - Entropy change of an Ideal Gas during Isothermal Process - Entropy changes in Cyclic, Reversible and Irreversible Processes - Entropy Changes in Physical Transformations - Calculation of Entropy Changes with Changes in T, V and P - Entropy of Mixing of Ideal Gases - Physical Significance of Entropy.

ALLIED - 2

PAPER - 3

PHYSICS I

Course Objectives

1. To understand the basics of gravitation and to study the properties of matter.
2. To learn the law of thermoelectric circuits and thermoelectric diagrams.
3. To teach the growth and decay of a transient current and magnetometer.
4. To explain production of ultrasonics and reverberation time.
5. To know the basics of laser and fibre optics principles and applications.

UNIT-1: Properties of Matter

Gravitation: Acceleration due to gravity -Determination of 'g' by Simple pendulum - Drawbacks of simple pendulum -Determination of time period of compound pendulum - 'g' by compound pendulum -Centre of Oscillation and Centre of Suspension are interchangeable-Determination of 'g' by Bar/compound pendulum.

Elasticity: Bending of beams -Expression for bending moment - Cantilever Depression at the loaded end of a cantilever Expression for Young's modulus -non-uniform bending-Pin and microscope method.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period - Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid -Viscous force - Co-efficient of viscosity of a liquid – Poiseuille's formula -Experimental method using Burette- Effect of temperature and pressure on viscosity-applications.

Surface Tension: Surface tension of a liquid-Surface Tension and interfacial surface tension by the method of drops-applications.

UNIT-2: Thermo Electricity

Seeback, Peltier and Thomson effects - laws of thermoelectric circuits -Peltier coefficient - Thomson coefficient -application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients -thermo electric power and thermo electric diagrams.

UNIT-3: Transient Current and Magnetism

Growth and decay of current in a circuit containing resistance and inductance- Growth and decay of charge in circuit containing resistance and capacitor - growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

Magnetism -Magnetic moment and pole strength of a magnet – Deflection magnetometer – Tan C Position- Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer and the vibration magnetometer .

UNIT -4: Acoustics

Sound: Transverse vibration of strings -Velocity and frequency of vibrations of a stretched string - laws -Sonometer -A.C. Frequency - Steel wire- Brass wire.

Introduction to Ultrasonics – Piezo electric effect–production by Piezo electric method – properties – applications- Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient-Acoustic aspects of halls and auditoria.

UNIT-5:Lasers and Fibre Optics

Laser: Introduction - Principles of laser -Einstein's explanation for stimulated emission – Differences between stimulated and spontaneous emission - Population inversion –Properties of laser -Types of lasers - He- Ne Laser - Semiconductor Laser-Applications of laser.

Fibre optics: Basic principle of an optical fibre -Total internal reflection -Basic structure of an optical fibre -Numerical aperture –Coherent bundle – Attenuation and dispersion - classification of optical fibres-step index and graded index fibers – single mode and multi mode fibers-Fibre optic communication system block diagram.-applications.

Text Books

Unit 1 and Unit 4

1. R. Murugesan and KiruthigaSivaprasath, Properties of Matter and Acoustics, S. Chand & Co. New Delhi, Kindle edition.

Unit 2 and Unit 3

1. R. Murugesan, Electricity & Magnetism, S. Chand & Co. New Delhi, 2019.

Unit 5

1. N Subrahmanyam, BrijLal and M.N Avadhanulu, A Text Book of Optics, S. Chand &Co. New Delhi, Revised Edition as per UGC model syllabus.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.
2. D.C. Tayal, Electricity and Magnetism, Himalaya Publishing House,Bombay, 2014.
3. BrijLal and N.Subrahmanyam, A Text Book of Sound,Vikas Publications, New Delhi (2 Edition)

4. C.L.Arora, Physics for Degree Students B.Sc First Year, S. Chand Publishing, 2013.
5. K.Thyagarajan and Ajay Ghatak, Introduction to Fibre optics-, Cambridge University.
6. Ajay Ghatak and K.Thyagarajan, Fiber optics and Lasers-The two revolutions, Macmillan, 2006.
7. K.Thyagarajan and Ajay Ghatak, Lasers; Fundamentals and applications, Springer.
8. Modern Physics – R,Murugesan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016.

E-MATERIALS

1. <https://courses.lumenlearning.com/physics/chapter/16-4-the-simple-pendulum/>
2. https://www.youtube.com/watch?v=aw0_seEt4v0
3. https://en.wikipedia.org/wiki/Thermoelectric_effect
4. https://www.youtube.com/watch?v=S0I37M2sx_0
5. <https://physicscatalyst.com/electromagnetism/growth-and-decay-charge-R-C-circuit.php>
6. <https://www.youtube.com/watch?v=PLQQPXot6vE>
7. https://www.youtube.com/watch?v=d0_Eff4MXwM
8. <https://www.techglads.com/cse/sem1/production-of-ultrasonics-by-piezoelectric-methods/>
9. https://thefactfactor.com/facts/pure_science/physics/optical-fibre/5159/
10. <https://www.youtube.com/watch?v=auk1OS0SVWc> (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to find the acceleration due to gravity at a place using simple pendulum and compound pendulum. Also can know the properties of matter like elasticity, viscosity and surface tension.
2. After studied unit-2, the student will be able to learn thermo emf using Seebeck and Peltier effects and hence understand thermoelectric circuits.
3. After studied unit-3, the student will be able to explain growth and decay of a transient current in a circuit containing resistance-inductance, resistance-capacitance and LCR in series. Also will be able to determine the horizontal components of earth's magnetic induction at a place using deflection magnetometer in Tan C position.
4. After studied unit-4, the student will be able to derive the expression for the velocity of a sound in a stretched string and hence they can determine the frequency of A.C mains.
5. After studied unit-5, the student will be able to understanding the principle of laser and can demonstrate the working of He-Ne laser and applications of laser. Also, the student will be able to learn the fibre optics, structure and application in communication

ALLIED - 2

PAPER – 3

2. BOTANY – I

Course Objectives :

1. To knowledge of cell and cell organelles
2. To know classification and structure of tissues
3. To understand characters and reproduction of bacteria and viruses
4. To acquire knowledge of algae and fungi
5. To study the structure and life cycle of some bryophytes, pteridophytes and gymnosperms.

UNIT-I: Cell Biology

Prokaryotic and Eukaryotic cell (plant cell)

Cell organelles - Chloroplast, Mitochondrion and Nucleus.

Cell division – Mitosis.

UNIT-II: Anatomy

Tissues - Meristematic and permanent tissues. Primary and Normal Secondary thickening of Dicot stem.

UNIT-III: Bacteria and Viruses

Bacteria - General characters - shape - flagellation - Structure of E. Coil - reproduction - (Vegetative and asexual), Economic importance. Structure of Tobacco Mosaic Virus, Bacteriophage.

UNIT-IV: Structure and Life History of

a) Chlorella and Gracilaria

b) Albugo, Penicilium and Agaricus

UNIT-V: Structure and Life History of

a) Funaria

b) Lycopodium

c) Cycas

Economic importance of Chlorella, Penicillium and Agaricus.

Course Out Comes :

1. To knowledge of cell and cell organelles
2. To know classification and structure of tissues
3. To understand characters and reproduction of bacteria and viruses
4. To acquire knowledge of algae and fungi
5. To study the structure and life cycle of some bryophytes, pteridophytes and gymnosperms.

ALLIED - 2

PAPER - 3

3. ZOOLOGY I

Objective:

To acquire knowledge about different kinds of animal species.

To study the systematic and functional morphology of invertebrates and chordates.

UNIT - I:

Type study includes life history.

Protozoa - Entamoeba, **Porifera** - Sycon. **Coelenterata** - Obelia geniculata.
Platyhelminthes - Teania solium.

UNIT - II

Annelida - Earthworm, **Arthropoda** - Prawn, **Mollusca** - Fresh water mussel,
Echinodermata - Sea star.

UNIT - III:

Type study includes Morphology, digestive system, respiratory system, circulatory system and urinogenital system of Chordate - **Chordata** - General characters, **Prochordata:** Morphology of Amphioxus - **Vertebrates: Pisces** - Shark.

UNIT - IV

Amphibia: Frog, **Reptiles:** Calotes

UNIT - V

Aves: Pigeon, **Mammalia:** Rabbit.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthkrishnan. 1992. Manual of Zoology. Vol I & II, S. Viswanathan (printers and publishers) Pvt. Ltd., Madras, 891 p.
2. Kotpal series, 1998 - 1992. Rastogi Publications, Meerut.
3. Jordan E.L. and P.S. Verma. 1993. Invertebrate Zoology 12th edition, S. Chand & Co., Ltd., New Delhi.
4. Jordan, E.L., and P.S. Verma. 1995. Chordate Zoology and Elements of Animal Physiology, S. Chand & Co., Ltd., New Delhi.

ALLIED - 2

PAPER - 3

4. BIOCHEMISTRY I

UNIT - I

CHEMISTRY OF CARBOHYDRATES

Definition and Classification of carbohydrate. Monosaccharides - occurrence, structure; physical and chemical properties, linear and ring forms (Haworth formula) for glucose and fructose. Disaccharides - occurrence, structure; physical and chemical properties of sucrose and lactose. Polysaccharides - occurrence, structure, physical and chemical properties of starch.

UNIT - II

CHEMISTRY OF AMINO ACIDS

Definition and classification of amino acids. Reaction with ninhydrin, common properties of amino acids, amphoteric nature, isoelectric point, isoelectric pH and Zwitter ion.

UNIT - III

CHEMISTRY OF PROTEINS

Classification based on solubility, shape and size. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT - IV

CHEMISTRY OF LIPIDS

Definition, classification and functions of lipids. Occurrence, chemistry and biological functions of simple lipids, compound lipids (e.g. phospholipids) and derived lipids: steroids (e.g. cholesterol). Physical property-emulsification. Chemical property-saponification. Functions of bile acids and bile salts.

UNIT - V

CHEMISTRY OF NUCLEIC ACIDS

Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure, types and functions of RNA: tRNA, mRNA and rRNA. Differences between DNA and RNA.

References

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers, Chennai - 5.

ALLIED - 2

PAPER - 3

5. MATHEMATICS - I*

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT - I

ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT - II

THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT - III

MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors - Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT - IV

TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ .

UNIT - V

DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates- Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics*. Vol. I&II. Vikas Publications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) *Allied Mathematics Vol-I, II* S.Chand& company Ltd., New Delhi-55.
5. Isaac, *Allied Mathematics*. New Gamma Publishing House, Palayamkottai.

SKILL BASED SUBJECT

PAPER - 1

WATER TREATMENT AND ANALYSIS

Objective:

To impart knowledge about the various methods of Water Analysis and Treatment of Water.

UNIT - I

Introduction - Characteristics of water - Alkalinity - Hardness - Unit of hardness - Total solids - Oxidation - Transparency - Silica content - Purification of Water for drinking purpose - Potability of water - Clarification - Coagulation - Contact and Electrochemical Coagulation - Sterilisation and Disinfection of water - Precipitation - Aeration - Ozonisation - Chlorination.

UNIT - II

Water Softening Methods - Clark's process - Lime soda process - Modified lime soda process - Permutit or Zeolite process - Ion exchange process - Demineralisation of water - Determination of Hardness of water - Titration method - Complexometric method using EDTA - Expressing Hardness - Equivalents of Calcium Carbonate - Problems to determine Temporary and Permanent Hardness.

UNIT - III

Hard water and Industries - Industrial water treatment - Boiler feed water method of Softening - Prevention of plumbo solvency - Scales in boilers - Consequences - Internal conditioning methods - Desalination of Brackish water - Electrodiagnosis - Reverse osmosis - Removal of Fe, Mn and Silicic acid - Effluent Treatment of Water from Paper Industry, Petrochemicals, Fertilizer industry and Power station.

UNIT - IV

Water analysis - Sampling of Water for analysis - Chemical Substances affecting Potability - Colour, Turbidity, Odour, Taste, Temperature, pH and Electrical Conductivity - Analysis of Solids present in water - Suspended Solids - Dissolved Solids - Total Acidity - Alkalinity - Free CO₂ - Free Chlorine - Ca, Mg, Fe, Mn, Ag and Zn - Water in Industry - Pollution of Water by Fertilisers, Detergents, Pesticides and Industrial wastes.

UNIT - V

Analysis of Chemical Substances Affecting Health - NH₃, Nitrate, Nitrite, Cyanide, Sulphate, Sulphide, Chloride and Fluoride - Measurement of Toxic Chemical Substances - Analysis of Chemical Substances indicative of Pollution - Dissolved oxygen - Biochemical Oxygen Demand (BOD) - Chemical Oxygen Demand (COD) - Bacteriological Examination of Water

- Total Count Test - E. coli test - E. coli index - Most Probable Number method - Biological Examination of Water - Physical Examination of Water - Radioactivity of Water - Methods of removing Radioactivity from Water.

Outcome:

The Students will be able to

- 1) Classify water based on the presence of dissolved salts in it.
- 2) Explain the various methods to make the water potable.
- 3) Discuss the softening methods of hardwater and determine hardness of water.
- 4) Understand electro dialysis and RO methods to desalinate Brackish water.
- 5) Analyse the presence of Chemical substances in water indicative of pollution by measuring BOD and COD.
- 6) Illustrate the methods used for biological examination of water.

Reference Books

1. Industrial Chemistry (Including Chemical - Engineering) - B. K. Sharma - Goel Publishing House, Meerut (1987).
2. Pollution Control in Process Industries - S. P. Mahajan - Tata McGraw Hill Publishing Company Ltd., New Delhi (1991).
3. Water Pollution and Management - C. K. Varshney - Wiley Eastern Ltd., Chennai -20 (1991).

**NON-MAJOR ELECTIVE
PAPER - 1
MEDICINAL CHEMISTRY**

Objectives:

To learn the basic idea of Drugs and Names of Common Drugs, Blood, Blood Pressure, Diabetes, AIDS, Vitamins, Indian Medicinal Plants and First Aid.

UNIT - I

Clinical Health and Biochemical Analysis - Definition of Health - WHO standard - Sterilisation of Surgical Instruments - Biochemical Analysis of Urine and Serum - Blood - Composition of Blood - Blood grouping and Rh factor.

UNIT - II

Common Drugs - Antibiotics, Antipyretics and Analgesics - Examples, Uses and Side effects - Anti-inflammatory agents, Sedatives, Antiseptics and Antihistamines - Examples, Uses and Side effects - Tranquilizers, Hypnotics and Antidepressant drugs - Definition, Examples, Uses and Side effects.

UNIT - III

Vital Ailments and Treatment - Blood pressure - Hypertension and Hypotension - Diabetes, Cancer, AIDS - Causes, Symptoms and Treatment - Vitamins - Classification of Vitamins - Sources and Deficiency diseases caused by Vitamins.

UNIT - IV

Indian Medicinal Plants - Palak, Vallarai, Kizhanelli and Thumbai - Chemical Constituents and Medicinal Uses - Hibiscus, Adadodai, Thoothuvalai - Chemical Constituents and Medicinal Uses - Nochi, Thulasi, Aloe Vera - Chemical Constituents and Medicinal Uses.

UNIT - V

First Aid and Safety - Treatment of Shock, Haemorrhage, Cuts and Wounds - Burns - Classification - First Aid - Asbestos, Silica, Lead Paints, Cement, Welding fumes and Gases - Hazard alert and Precautions for Safety.

Reference Books

1. Applied Chemistry, Jayashree Ghosh - S. Chand and Company Ltd., 2006
2. Biochemistry, S. C. Rastogi - Tata McGraw Hill Publishing Co., 1993.
3. Medicinal Plants of India, Rasheeduz Zafar - CBS Publishers and Distributors, 2000.
4. Hawk's Physiological Chemistry, B. L. Oser - Tata-McGraw Hill Publishing Co. Ltd.
5. Practical Pharmaceutical Chemistry, A. H. Beckett and J. B. Stenlake - Vol. I - CBS Publishers and Distributors, 2000.

Outcome:

The Students will be able to

- 1) Understand the composition of blood and biochemical analysis of Urine and Serum
- 2) Gain knowledge about uses and side effects of Antibiotics, Antipyretics, Analgesics and tranquilizers.
- 3) Explain the causes, symptoms and treatment of Blood pressure, Diabetes, Cancer and AIDS.
- 4) Classify and understand the sources and diseases caused by deficiency of Vitamins.
- 5) Analyse the therapeutic importances of Indian Medicinal plants
- 6) Describe the first Aid and Safety treatment of Shock, Haemorrhage, Cuts and wounds and Burns.

SEMESTER - IV
CORE PAPER - 4
GENERAL CHEMISTRY - IV

OBJECTIVE:

Noble gases, Carboxylic Acids, Amines, Alcohols, Phenols, Naphthols, Important Name Reactions, Mechanism, Thermodynamics, Derivation of Equations, Partial Molar Properties, Chemical Potential, Related Problems and Applications are to be taught for IV semester.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Classify water based on the presence of dissolved salts in it.
- 2) Explain the various methods to make the water potable.
- 3) Determine the hardness of water and discuss the softening methods of hard water.
- 4) Discuss electro dialysis and RO methods to desalinate brackish water.
- 5) Analyze the presence of chemical substances in water indicative of pollution by measuring BOD and COD.
- 6) Illustrate the methods used for biological examination of water.

UNIT - I

Noble gases - Electronic Configurations - Position of Noble Gases in the Periodic Table - Chemical inertness of Noble gases – Reason - Compounds of Xenon - Hybridization and Geometry of XeF_2 , XeF_4 , XeF_6 , XeOF_2 , XeO_3 and XeOF_4 (Preparation, Properties - Not necessary) - Clathrates - Definition and Applications - Uses of Noble gases.

UNIT - II

Monocarboxylic acids - Acetic acid and Benzoic acid - Preparation by Grignard method - Conversion of Acids to their derivatives - Amide, Ester, Anhydride and Acid Chloride - Strength of Carboxylic Acids - Effect of Substituents on the Strength of Acids - Dicarboxylic acids - Oxalic acid, Malonic acid, Succinic acid, Glutaric acid and Adipic acid - Preparation - Properties - Action of Heat on Dicarboxylic acids - Amines - Ethylamine and Aniline - Preparation - Basicity of Amines - Effect of Substituents on Basicity - Reactivity of Amines - Distinction between Primary, Secondary and Tertiary Amines.

UNIT - III

Alcohols - Preparation by Grignard method - Oxidation of alcohols - Difference between Primary, Secondary and Tertiary alcohols - Preparation and Properties of Allyl alcohol - Phenols - Acidic character of phenols - Kolbe's reaction, Reimer-Tiemann reaction, Gattermann ,

Lederer-Manasse, Houben-Hoesh, Friedel-Crafts, Schotten-Baumann and Liebermann's Nitroso Reaction - Preparation, Properties and Uses of Alpha- and Beta- Naphthols.

UNIT - IV

Free energy and Work function - Gibbs free energy - Helmholtz free energy -Relationship between Gibbs free energy and Helmholtz free energy -Their variations with Temperature, Pressure and Volume - Free energy change as criteria for Equilibrium and Spontaneity. Difference between Free Energy and standard Free Energy - Maxwell's Relations - Thermodynamic Equation of State - Gibbs-Helmholtz equation - Derivation and Applications - Clausius-Clapeyron equation - Derivation and Applications.

UNIT - V

Third Law of Thermodynamics - Entropy at Absolute Zero - Nernst Heat Theorem - Statement of III law of thermodynamics - Planck's formulation of III law of thermodynamic - Evaluation of Absolute Entropy from Heat Capacity Measurements - Exceptions to III law - Applications of III law - Partial molar properties - Chemical Potential - Definition - Effect of Temperature and Pressure on Chemical Potential - Gibbs-Duhem equation. Fugacity-Variation with Temperature and Pressure.

CORE PRACTICAL

PAPER - 2

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Analysis of mixture containing two cations and two anions (One will be an interfering anion). Semi micro methods using the conventional scheme are to be adopted.

Cations to be studied

Lead, Copper, Bismuth, Cadmium, Iron, Aluminium, Zinc, Manganese, Cobalt, Nickel, Barium, Calcium, Strontium, Magnesium and Ammonium.

Anions to be studied

Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

Preparation of Inorganic compounds

- Tetraamminecopper(II) Sulphate
- Tris(thiourea)copper(I) Chloride
- Potassium trioxalatoferrate(II)
- Ferrous Ammonium Sulphate
- Microcosmic Salt
- Manganese(II) Sulphate

References

- Vogel's Text Book of Quantitative Chemical Analysis, 5th Edition, ELBS/ Longman, England, 1989.
- Inorganic Semimicro Qualitative Analysis, V. V. Ramanujam.

ALLIED - 2

PAPER - 4

PHYSICS II

Course Objectives

1. To study the concept of special theory of relativity.
2. To expose the structure of atom with different models.
3. To know the definition of binding energy and to study about nuclear models
4. To learn the different number system in digital electronics and logic gates
5. To give an introduction about nanomaterial.

UNIT-1: Special Theory of Relativity

Frames of reference-inertial frames and non-inertial frames -Galilean transformations -Michelson-Morley experiment-interpretation of results - postulates of special theory of relativity Lorentz transformation equations -length contraction - time dilation - transformation of velocities -variation of mass with velocity -Mass-energy equation.

UNIT-2: Atomic Physics

Bohr atom model – Critical Potentials - Experimental determination of critical potentials - Franck and Hertz's experiment -Sommerfield's Relativistic atom model The vector atom model – spatial quantization–spinning of an electron –quantum numbers associated with the vector atom model – coupling schemes –LS and jj coupling – the Pauli's exclusion principle – Stern and Gerlach experiment

UNIT-3: Nuclear Physics

Binding energy-Binding energy per nucleon-Packing fraction-Nuclear models – liquid drop model – semi empirical mass formula – merits and demerits -shell model -evidences for shell model – nuclear radiation detectors –ionization chamber – G.M Counter-Wilson cloud chamber-Particle accelerators-Cyclotron-Betatron.

Unit-4: Digital Electronics

Number systems -Decimal, Binary, Octal and Hexadecimal system – Conversion from one number system to another- Binary Arithmetic -Addition –Subtraction- 1's and 2's complement -Binary codes- BCD code – Excess 3 code, Gray code.

NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates-Half adder and Full adder - Half subtractor and Full subtractor using NAND gate only.

UNIT-5: Nanomaterial

Introduction-Nanomaterial- Properties of nanomaterial (size dependent) -synthesis of nanomaterial- sol gel- hydrothermal method-Scanning Electron Microscope (SEM)- Principle and Instrumentation- Fullerenes- Carbon nanotubes- Fabrication and structure of carbon nanotubes - Properties of carbon nanotubes (Mechanical and Electrical) - Applications of CNT's.

Text Books

Unit 1 to Unit 3

1. Modern Physics – R,Murugesan, Kiruthiga Sivaprasath, S.Chand & Co, New Delhi, 2016

Unit 4

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Unit 5

1. V. Raghavan, *Material Science and Engineering* ,Printice Hall India.,2004.

Reference Book

1. Allied Physics – R. Murugesan S. Chand & Co. New Delhi, 2005.
2. A Text book of Digital electronics – R.S.Sedha, S.Chand&Co, 2013
3. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
4. Dr. M.N. Avadhanulu, *Material science*, S.Chand& Company, New Delhi, 2014.
5. M.Arumugam, *Material science*, Anuradhapuplishers, 1990.
6. V. Rajendran, *Material Science*, Tata McGraw Hill Ltd, New Delhi,2001.
7. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

E-MATERIALS

1. https://en.wikipedia.org/wiki/Galilean_transformation
2. https://www.youtube.com/watch?v=NH3_IkSB9s
3. <https://www.youtube.com/watch?v=EEWuUst2GK4>
4. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
5. <https://www.tutorialspoint.com/what-is-a-geiger-muller-counter>
6. <https://www.youtube.com/watch?v=jxY6RC52Cf0>
7. https://www.tutorialspoint.com/digital_circuits/digital_circuits_number_systems.htm
8. <https://www.youtube.com/watch?v=4ae9sJBBkvw>
9. <https://en.wikipedia.org/wiki/Nanomaterials>
10. <https://www.youtube.com/watch?v=mPx0Jz6treE> (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to study the frames of reference, Galilean transformation equations and special theory of relativity.
2. After studied unit-2, the student will be able to describe the different atomic models and Stern and Gerlach Experiment.
3. After studied unit-3, the student will be able to explain binding energy, liquid drop model, G.M counter and particle accelerators.
4. After studied unit-4, the student will be able to know the conversion of number systems from one to other and also will be able to design universal gates using NAND and NOR gates.
5. After studied unit-5, the student will be able to understanding the basics of nanomaterial, synthesis and its applications.

ALLIED - 2

Paper - 4

2. BOTANY – II

Course Objectives :

1. To familiarize range of characters and economic importance of some families.
2. To know structure of mature anther and types of ovules
3. To understand physiology mechanisms of plant.
4. To acquire knowledge of ecosystem and environmental pollution
5. To study the Mendel's test of monohybrid and dihybrid, evolutionary theories.

UNIT-I: Taxonomy

General outline of Bentham and Hooker's system of classification. Study of the range of characters and economic importance of the following families: Annonaceae, cucurbitaceae, Apocynaceae, Euphorbiaceae and Liliaceae.

UNIT-II: Embryology

Structure of mature anther. Structure of mature ovule and its types. Fertilization.

UNIT-III: Plant Physiology & Plant Tissue Culture

Physiological role of micro and macro elements their deficiency symptoms Photosynthesis - light reaction - Calvin cycle Respiration - Glycolysis - Krebs's cycle - electron transport system. Growth hormones – Auxins. Tissue culture and its principles.

UNIT-IV: Ecology

Ecosystem - fresh water ecosystem. Environmental pollution. Major pollutants - types of pollution - Air pollution, water pollution, soil pollution - control measures.

UNIT-V: Genetics & Evolution

Mendelism - Monohybrid and dihybrid crosses. Theories of evolution - Lamarckism, Darwinism.

Course Out Comes

1. To familiarize range of characters and economic importance of some families.
2. To know structure of mature anther and types of ovules
3. To understand physiology mechanisms of plant.
4. To acquire knowledge of ecosystem and environmental pollution
5. To study the Mendel's test of monohybrid and dihybrid, evolutionary theories.

Books Suggested:

1. Sharma, O.P (2011). Algae, Tata McGraw Hill Education Private limited, New Delhi.
2. Sharma, PD (2003). The Fungi. Rastogi Publications, Meerut
3. H.C.Dube (2007) A Text Book of fungi, bacteria and viruses, Student Edition, New Delhi.
4. Pandey, B.P. (2001). College Botany Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd., New Delhi.
5. Vashishta, P.C, Sinha and Anilkumar (2010). Pteridophytes, S.Chand & company Ltd, New Delhi.
6. Johri, RM, Lata S, Tyagi K (2005), A text book of Gymnosperms, Dominate Pub and Distributer, New Delhi.
7. Verma.P.S and Agarwal, V.K. 2007. Cytology. S. Chand & Co. Chennai.
Lawrence, GHM. (1995). The Taxonomy of vascular Plants (Vol I-IV), Central Book, Dept., Allahabad.
8. Gupta, P.K, 2000. Genetics. Rasatogi publications, Meerut.
9. Gupta, N.K and Gupta, S. 2005. Plant Physiology. Oxford & IBH Publishing Co. Ltd., New Delhi.
10. Shukla, R.S. & P.S. Chandel (1991) : Plant Ecology & Soil Science S.Chand & Co., New Delhi.
11. Pandey, B.P. 2007 Botany for Degree Students. S. Chand & Co. New Delhi

ALLIED - 2

Paper - 4

3. ZOOLOGY II

Objective:

To study the principles of cell biology, genetics, developmental biology, physiology, ecology and evolution.

UNIT - I

Cell Biology - structure of animal cell, **Genetics:** molecular structure of gene - gene function, sex linked inheritance. Genetic Engineering and its application.

UNIT - II

Embryology - cleavage and gastrulation of Amphioxus - **Human Physiology:** Digestion, Circulation - blood components, structure of heart, heart function.

UNIT - III

Diseases of Circulatory system - blood pressure, heart disease - Ischemia, Myocardial Infarction, Rheumatic heart disease, stroke - **Excretion** - structure of kidney and mechanism of urine formation.

UNIT - IV

Environmental Biology - Biotic factors and Abiotic factors, food chain and food web. Pollution - Environmental degradation, (Air, Water and Land) - Green house effect - Bioremediation, Biodegradation - Global warming - acid rain.

UNIT - V

Evolution: Theories of Lamarkism & Darwinism.

REFERENCES:

1. Ekambaranatha Ayyar, and Ananthakrishnan, T.N. 1993. Outlines of Zoology, Vol I & II, Viswanathan and Co, Madras.
2. Sambasiviah, I, Kamalakara Rao, A.P., Augustine Chellappa, S. 1983. Text book of Animal Physiology, S. Chand & Co., New Delhi.
3. Verma and Agarwal. 1983. Text book of animal Ecology, S. Chand & Co., New Delhi.
4. Verma and Agarwal and Tyagi. 1991. Chordate Embryology, S. Chand & Co., New Delhi.
5. Rastogi and Jayaraj. 2000. Text book of Genetics. Rastogi publications, Meerut.
6. Verma and Agarwal. 2000. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Co., New Delhi.

ALLIED - 2

Paper - 4

4. BIOCHEMISTRY II

UNIT - I

METABOLISM

Glycolysis, TCA cycle and its energetics, HMP shunt pathway. Deamination, transamination reaction, transaminase enzymes, Urea cycle.

UNIT - II

METABOLIC DISORDERS

Diabetes mellitus, Glycogen storage diseases, Glycosuria, Ketosis, Jaundice, Phenyl ketonuria, Alkaptonuria. Dehydration: definition, causes, symptom and prevention.

UNIT - III

ENZYMES

Definition, classification of enzymes with one example. Mechanism of enzyme action - Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes.

UNIT - IV

MOLECULAR BIOLOGY

Central dogma of molecular biology. DNA and RNA act as genetic material. Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code.

UNIT - V

VITAMINS

A brief outline of source, requirement, biological function and deficiency of Vitamins (fat soluble and water soluble vitamins).

References:

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan worth Publishers.
2. Harper's Biochemistry-Robert K. Murray, Daryl K. Grammer, McGraw Hill, and Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.

5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan, MJP Publishers, Chennai-5.

ALLIED - 2

Paper - 4

5. MATHEMATICS - II*

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT - I

APPLICATION OF INTEGRATION

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in $(0, 2\pi)$ and $-\pi < x < \pi$

UNIT - II

PARTIAL DIFFERENTIAL EQUATIONS

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT - III

LAPLACE TRANSFORMS

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT - IV

VECTOR ANALYSIS

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT - V

VECTOR ANALYSIS (CONTINUED)

Line and surface integrals - Gauss, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.

4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

ALLIED PRACTICAL - 2

1. PHYSICS

(Any 15 Experiments)

1. Determination of 'g' using Compound pendulum.
2. Young's modulus-Non-Uniform bending-Pin & microscope
3. Rigidity Modulus – Torsional oscillation method (without masses).
4. Rigidity Modulus – Static Torsion method using Scale and Telescope.
5. Surface tension and Interfacial Surface tension by Drop Weight method.
6. Sonometer – Frequency of a Tuning fork.
7. Sonometer –Determination of A.C. frequency- using steel and brass wire
8. Air Wedge – Determination of thickness of a thin wire
9. Newton's Rings – Radius of Curvature of a convex lens.
10. Spectrometer – Refractive index of a liquid – Hollow prism.
11. Spectrometer grating – Minimum Deviation- Wavelength of Mercury lines.
12. Potentiometer – Calibration of Low range voltmeter.
13. Deflection magnetometer and Vibration magnetometer-Tan C Position-Determination of m and B_H .
14. Figure of merit- Table galvanometer.
15. Construction of AND, OR gates using diodes and NOT gate using a transistor.
16. NAND/NOR as universal gate.
17. Half adder and Full adder using NAND gate.
18. Half subtractor and Full subtractor using NAND gate.
19. Lasers: Study of laser beam parameters.
20. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
21. Fiber attenuation of a given optical fiber.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2018.
2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Dr. S. Somasundaram, Practical Physics, Apsarapublications, Tiruchirapalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

ALLIED PRACTICAL

2. BOTANY – I & II

Description of plants in technical terms belonging to the families mentioned in the theory part.

To study the internal structure of Anatomy material, Pteridophytes and Gymnosperms.

Identification and Description of Micro Preparation materials mentioned in the theory part.

Description of experimental setup of plant physiology.

BOOKS SUGGESTED

Ashok Bendre, A.K. and Pandey P.C. (1975) Introductory Botany. Rastogi Publication Meerut.

Ganguly, A.K. and Kumar. N.C. (1971) General Botany Vol. I & Vol. II, Emkay Publication, Delhi.

Rev. Fr. Ignacimuthu, S.J. (1975) Basic Biotechnology – Tata Mcraw till publication co., New Delhi.

Rao, K.N. Krishnamoorthy, K.V. and Rao. G. (1975) Ancillary Botany. S. Viswanathan Private. Ltd., Chennai.

ALLIED PRACTICAL 3. ZOOLOGY

I - MAJOR PRACTICAL

DISSECTIONS

Cockroach: Digestive and nervous system

Prawn: Nervous system

II - MINOR PRACTICAL

MOUNTING

1. Mouth parts of **Mosquito** and **Honey bee**
2. **Earthworm** - Body setae
3. Placoid scales of **shark**

III - SPOTTERS

Entamoeba, Sycon, Obelia, Taenia solium (entire, scolex) earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, Sea star, Amphioxus - Entire, Amphioxus - T.S. through pharynx, Shark, Frog, Calotes, Pigeon, feathers of pigeon and Rabbit.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES:

1. Verma. P.S. 2011. A manual of practical Zoology - INVERTEBRATES. Chand & Co., Ltd., Ram Nagar, New Delhi.
2. Verma. P.S. 2011. A manual of practical Zoology - CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

ALLIED PRACTICAL

4. BIOCHEMISTRY I & II

PRACTICAL I

Volumetric Estimation

1. Estimation of HCl using Na_2CO_3 as link and NaOH as primary standard.
2. Estimation of Iron in Ferrous Ammonium Sulphate using potassium permanganate as link solution and oxalic acid as primary standard.
3. Estimation of Glucose by Benedict's method.
4. Estimation of Glycine by formal titration.
5. Estimation of Ascorbic acid.

SKILL BASED SUBJECT

PAPER - 2

FOOD CHEMISTRY

Objective:

- To impart knowledge about Different Foods, Their Nutritive Values and Food Preservation.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Describe the structures and nutritive values of cereals, Pulses and sugar and their medicinal values.
- 2) Illustrate the composition and nutritive values of Vegetables, Fruits, Milk, Egg and soya beans.
- 3) Define and classify Beverages and functions of appetizers.
- 4) Explain the methods of preservation of foods.
- 5) Discuss about Food Additives and their functions.

UNIT - I

Cereals - Definition - Classification - Processing - Structure of Cereals - Composition and Nutritive value - Pulses - Definition - Classification - Processing - Structure of Pulses - Composition and Nutritive Value - Toxic Constituents in Pulses - Medicinal value of Cereals and Pulses - Sugar - Structure and Properties - Nutritive value - Sugar composition in different food items - Sugar related products - Classification and Nutritive value - Artificial sweeteners - Examples - Saccharin and Cyclamate - Advantages and Disadvantages.

UNIT - II

Vegetables and Fruits - Classification - Composition and Nutritive values - Fungi and Algae as food - Enzymatic Browning and Non- enzymatic Browning - Nutritive value of some common foods - Milk, Egg and Soybeans.

UNIT-III

Beverages - Definition - Examples - Classification - Fruit Beverages - Milk Based Beverages - Malted Beverages - Examples - Alcoholic and Non-Alcoholic Beverages - Examples - Appetizers - Definition - Classification - Examples - Water - Functions and Deficiency.

UNIT-IV

Food Preservatives - Definition - Classification - Food Spoilage - Definition – Prevention - Methods of Preservation - Classification - Low and High temperature - Preservatives – Examples - Dehydration - Osmotic pressure - Food irradiation.

UNIT-V

Food Additives - Definition - Artificial sweeteners - Saccharin and Cyclamate - Classification - Their functions - Chemical substances - Packaging of Foods - Classification - Materials used for Packaging - Food Colours - Restricted use - Spurious Colours - Taste Enhancers - MSG - Vinegar.

Reference Books

- Food Science - B. Srilakshmi, III Edition, New Age International Publishers, 2005.
- Food Chemistry - Lilian Hoagland Meyer, CBS Publishers & Distributors, 2004.
- Food Science, Nutrition and Health - Brian A. Fox, Allan G. Cameron, Edward Arnold, London.
- Fundamentals of Foods and Nutrition - Mudambi R. Sumathi, and Rajagopal, M. V., - Wiley Eastern Ltd., Madras.
- Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd., Bangalore.

NON - MAJOR ELECTIVE

PAPER - 2

CHEMISTRY IN EVERY DAY LIFE

Objectives:

- To know the basics of Chemistry in our life
- To know about the Food Colours, Plastics, Drugs etc.,

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Explain the preparations of cosmetics, soaps and detergents and the Hazards of Cosmetics used in everyday life.
- 2) Identify Adulterants in various food items.
- 3) Define and classify Vitamins and understand their physiological importance.
- 4) Describe Food preservative methods.
- 5) Define Antipyretics, Analgesics, Anesthetics and Sedatives.
- 6) Discuss the preparation and applications of plastics, Resins, Rubbers.
- 7) Classify fertilizers and describe their uses and Hazards.
- 8) Explain advantages and disadvantages of natural and artificial sweetening agents.

UNIT - I

General Survey of Chemicals used in everyday life - Cosmetics - Talcum Powder, Tooth pastes, Shampoos, Nail Polish and Perfumes - General formulation - Preparation - Hazards of Cosmetic use - Soaps and Detergents - Types - Preparation and Uses.

UNIT - II

Food and Nutrition - Carbohydrates, Proteins, Fats and Minerals - Examples - Vitamins Definitions - Classification - Sources and their Physiological importance - Balanced diet. Adulterants in Milk, Ghee, Oil, Coffee Powder, Tea, Asafoetida, Chilli Powder, Pulses and Turmeric Powder - Identification.

UNIT - III

Food colours used in food - Soft drinks and its Health hazards - Food Preservatives - Definition - Examples - Methods of preservation - Low and High temperature - Dehydration - Osmotic pressure - Food irradiation.

UNIT - IV

Plastics, Polythene, PVC, Bakelite, Polyesters, Resins and their Applications - Natural Rubber - Synthetic rubbers - Vulcanisation - Preparation and its Applications - Antipyretics, Analgesics, Anaesthetics, Sedatives - Definition - Examples and Uses.

UNIT - V

Gobar gas - Production - Feasibility and Importance of Biogas with special reference to Rural India - Fertilizers - Definition - Classification - Urea, NPK and Super phosphates - Need - Uses and Hazards - Sweetening agents - Sucrose and Glucose - Artificial Sweetening agents - Saccharin - Cyclamate - Advantages and Disadvantages.

Reference Books

1. Chemical Process Industries - Norris Shreve Joseph A. Brine .Jr.
2. Perfumes, Cosmetics and Soaps - W. A. Poucher (Vol 3).
3. Environmental Chemistry - A. K. DE.
4. Industrial Chemistry, B. K. Sharma- Goel publishing house Meerut.
5. Food Science - B. Srilakshmi - III Edition - New Age International Publishers, 2005.
6. Food Chemistry, Lillian Hoagland Meyer - CBS publishers & distributors, 2004.
7. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh, S. Chand & Co Ltd., New Delhi - 2010.
8. Applied chemistry - K. Bagavathi Sundari - MJP Publishers (2006).

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
B.Sc. CHEMISTRY PROGRAMME – 2022-2023 Onwards

PROGRAMME OBJECTIVES:

1. To impart knowledge of Chemistry and related sciences.
2. To develop scientific attitude to make the students open minded, critical and curious.
3. To develop skill in practical work, experiments, laboratory materials and equipment along with the collection and interpretation of scientific data to contribute to science.
4. To credit a skilled workforce to match the requirements of the society.
5. To enable the students to take up higher learning programmes.

PROGRAMME EDUCATIONAL OBJECTIVES:

1. To enable the students to apply the knowledge of Chemistry and related sciences in a broad spectrum of interdisciplinary and multidisciplinary fields.
2. To develop soft skills, problem solving skills, computational skills, experimental skills and scientific thinking of students for professional excellence.
3. To make the students to recognize the need for and possess the ability to engage in independent and lifelong learning.
4. To empower the students to exercise their abilities with great concern for the environment and society with moral and ethical values and contribute towards the development of the nation.

PROGRAMME SPECIFIC OUTCOMES:

1. Demonstrate systematic and coherent understanding of the fundamental concepts in Physical Chemistry, Organic Chemistry, Inorganic Chemistry and all other related allied chemistry subjects.
2. Identify chemical formulae and acquire ability and skill to become expertise over solving both theoretical and applied chemistry problems.
3. Apply laboratory skills, carry out experiments, record observations and inferences and analyze the results.
4. Know and follow the correct procedures and regulations for safe handling and usage of chemicals.

5. Communicate effectively various aspects of Chemistry using examples and their geometrical visualizations.
6. Discuss and evaluate scientific information from different sources (internet, newspaper articles, television, scientific texts and publications) and assess its credibility.
7. Describe and discuss ways in which science is applied and used to solve local and global problems.
8. Discuss how science and its applications interact with social, economic, political, environmental, cultural and ethical factors.
9. Find employability in core chemistry and other related fields.
10. Start their own industries / business in core-chemistry fields.

PROGEAMME OUTCOMES:

On completion of the UG Programme in Chemistry, the students will be able to:

1. Describe the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in day-to-day life.
2. Employ critical thinking for solving problems using basic chemistry knowledge and concepts.
3. Acquire skills in handling scientific instruments, planning and performing laboratory experiments and drawing logical inferences from the chemical experiments.
4. Analyze the given scientific data critically and systematically to draw a logical conclusion.
5. Develop various communication skills such as reading, listening, speaking, etc., to express ideas and views clearly and effectively.
6. Create an intellectual curiosity and ability to think in a scientific manner and get sensitized to social and environmental realities.
7. Develop an interest in pursuing higher studies in Chemistry and related subjects which are relevant to employment and entrepreneurship.
8. Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling.
9. Demonstrate the knowledge of professional and ethical practices.
10. Integrate the knowledge and skills developed in multidisciplinary environments and function effectively as an individual or a leader and contribute towards the needs of the society.

THIRUVALLUVAR UNIVERSITY
BACHELOR OF SCIENCE
B.Sc. CHEMISTRY DEGREE COURSE
(With effect from 2022 - 2023)
The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER V									
30.	III	Core Theory	Paper-5	5	5	Inorganic Chemistry - I	25	75	100
	III	Core Practical	Practical-3	3	0	Gravimetric Estimation	0	0	0
31.	III	Core Theory	Paper-6	5	5	Organic Chemistry - I	25	75	100
	III	Core Practical	Practical-4	3	0	Organic Analysis and Preparations	0	0	0
32.	III	Core Theory	Paper-7	5	4	Physical Chemistry - I	25	75	100
33.	III	Internal Elective	Paper-1	3	3	Any one from A. Analytical chemistry - I B. Basis of computer programming in C and its applications in Chemistry c. Organic Synthesis	25	75	100
34.		Core Practical	Practical - 5	3	0	Physical Chemistry Practical	0	0	0
35.	IV	Skill Based Subject	Paper-2	3	2	Applied Chemistry	25	75	100
				30	19		150	450	600
SEMESTER VI									
36.	III	Core Theory	Paper-8	5	4	Inorganic Chemistry - II	25	75	100
37.	III	Core Theory	Paper-9	5	4	Organic Chemistry - II	25	75	100
38.	III	Core Theory	Paper-10	5	4	Physical Chemistry - II	25	75	100
39.		Compulsory Project		0	5		25	75	100
40.	III	Core Practical-3	Practical-3	3	2	Gravimetric Estimation	25	75	100
41.	III	Core Practical-4	Practical-4	3	2	Organic Analysis and Preparations	25	75	100
42.	III	Core Practical-5	Practical-5	3	3	Physical Chemistry Experiments	25	75	100
43.	III	Internal Elective	Paper-2	2	3	Any one from A. Analytical Chemistry-II B. Textile Chemistry C. Nano Chemistry	25	75	100
44.	III	Internal Elective	Paper-3	2	3	Any one from A. Pharmaceutical Chemistry B. Polymer Chemistry C. Green Chemistry	25	75	100
						Agriculture and Leather Chemistry			

45.	III	Skill based Subject	Paper-3	2	2		25	75	100
46.	IV	Extension Activities		0	1		100	0	100
47		NMSDC III : Employability Readiness	-	0	0	(choose any one) • Naandi • Unnati • Quest • Izpay • IBM Skills build	0	0	0
		TOTAL		30	33		350	750	1100

*** Allied Mathematics:**

	Ins. Hrs/Week	Credit	CIA	University	Total Marks
Paper-1	7	4	25	75	100
Paper-2	7	6	25	75	100

if Mathematics is one of the Allied Subjects total no. of papers will be 44.

SEMESTER - V

CORE PAPER - 5 INORGANIC CHEMISTRY - I

Objectives:

- To study about the Halogens and Related compounds.
- To give students a firm grounding in Co-ordination chemistry and Solid state Chemistry.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Compare the properties of Halogens and their Compounds.
- 2) Recollect the basic concepts and nomenclature of Co-ordination Compounds.
- 3) Explain the theories of Co-ordination Compounds.
- 4) Compare VBT with MOT and apply Complexes in qualitative and quantitative analyses.
- 5) Calculate the CFSE Values of Octahedral and Tetrahedral Complexes.
- 6) Analyze the bonding and structure of metallic carbonyls.
- 7) Draw the structures of ionic crystals and explain the defects in solids.

Total No. of hours: 75

UNIT - I (15h)

Halogens - Group discussion - Comparative study of F, Cl, Br, I and At - Reactivities, hydracids, and oxides- Oxyacids of Halogens (Structure only) - Classification of Halides - Comparison of Fluorine with Oxygen-Fluorides of oxygen-Exceptional properties of Fluorine - Interhalogen compounds - Preparation, Properties and Geometry of AX, AX₃, AX₅ and AX₇ type of Compounds - Pseudohalogens and pseudohalides - Cyanogen and Thiocyanogen - Comparison of Pseudohalogens and Halogens - Basic Properties of Iodine - Evidences.

UNIT - II (15h)

Coordination compounds - Definition of terms used - Classification of Ligands - Chelation and Effect of Chelation - Applications of Complexes - Coordination Number and Stereochemistry of Complexes - IUPAC Nomenclature of Complexes -

Isomerism in Complexes - Ionisation isomerism, Hydrate Isomerism, Linkage Isomerism, Ligand Isomerism, Coordination Isomerism, Coordination position Isomerism and Polymerisation Isomerism - Geometrical and Optical Isomerism in 4- and 6- Coordinated Complexes.

UNIT - III (15h)

Werner's theory of Coordination Compounds-Sidgwick's Theory - EAN rule - Theory of Bonding - Valence Bond Theory - Postulates of VBT - Hybridisation, Geometry and Magnetic properties - Failure of VBT - Crystal field theory - Spectrochemical series - Splitting of d - orbitals in Octahedral, Tetrahedral and Square Planar Complexes - Factors affecting crystal field splitting energy-Crystal Field Stabilisation Energy - Calculation of CFSE In Octahedral and Tetrahedral Complexes - Low Spin and High Spin Complexes - Explanation of Magnetic Properties, Colour and Geometry Using CFT.

UNIT - IV (15h)

Comparison of VBT and CFT - Applications of Coordination Compounds in Qualitative and Quantitative Analysis - Estimation of Nickel using DMG and Aluminium using Oxine - Detection of Potassium ion, S^{2-} ion, Fe^{2+} ion and Fe^{3+} ion - Separation of Copper and Cadmium ions in the second group-Separation of Pb^{2+} and Ag^+ ions in the first group - Bonding, Hybridization and Structure of Carbonyls of Ni, Cr, Fe, Co, Mn, W and V.

UNIT - V(15h)

The nature of the Solid State - Amorphous and Crystalline - Differences - Close Packing in Crystals - Examples for Cubic, BCC and FCC Lattices - Bragg's law - Application of XRD to Crystal studies - Structure of NaCl, CsCl, CaF_2 and ZnS - Metallic bond-Free electron, Valence bond and Band theory of Solids, Metals, Semiconductors and Insulators - Defects in solids - Scottky Defect and Frenkel Defect - Metal Excess and Metal Deficiency Defects - Conductors in Ionic Solids - Electrical and Magnetic properties.

REFERENCE BOOKS

INORGANIC CHEMISTRY

1. **Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).**
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia - Milestone Publications (2013).
3. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
4. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi - 2006.
5. Concise Inorganic Chemistry - J. D. Lee - III edition - Von Nostrand.
6. Industrial Chemistry - B. K. Sharma - Goel Publications (1983).

7. Industrial Chemistry R. K. Das - Kalyani Publications, New Delhi (1982).
8. Coordination Chemistry - S. F. A. Kettle - ELBS (1973).
9. Coordination Chemistry - K. Burger - Butterworthy (1973).
10. Vogel's Handbook of Quantitative Inorganic Analysis - Longman.
11. Text Book of Qualitative Inorganic Analysis - A. I. Vogel - III edition (1976).
12. Source Book on Atomic Energy - S. Glasstone- East-West Press Pvt. Ltd. (1967).
13. Nuclear and Radiochemistry - John Wiley and Sons (1964).
14. Nuclear Chemistry - H. J. Arnikar - Wiley Eastern Co., - II edition (1987).
15. Advanced Inorganic Chemistry - Cotton and Wilkinson - V Edition - Wiley and Sons (1988)
16. Text Book of Inorganic Chemistry - R. Gopalan - Universities Press - 2012.
17. Modern Inorganic Chemistry - R. D. Madan - S. Chand Publications, Reprint, 2014.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	M	M	S	S	M	S	M
CO2	S	M	M	M	S	S	M	S	M	S
CO3	M	S	S	S	M	S	M	S	M	S
CO4	M	S	M	S	S	M	S	M	S	M
CO5	S	M	S	M	M	M	M	S	M	S

CORE PAPER - 6 ORGANIC CHEMISTRY - I

Objectives:

- To effectively impart knowledge about Carbohydrates, Stereochemistry, Conformational Analysis, Nitroalkanes and Heterocyclic chemistry.
- To make the students more inquisitive in learning the Mechanistic details in Organic Chemistry through the teaching of the named reactions.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Elucidate the structures of saccharides.
- 2) Assign the stereo configuration of Organic Compounds.
- 3) Compare the Conformation and Configuration of cyclohexanes and substituted cyclohexanes.
- 4) Explain the preparation, properties and uses of Nitro alkanes.
- 5) Apply different reagents in studying various Organic reactions.
- 6) Explain the mechanism of Organic named reactions.
- 7) Explain the synthesis and properties of five and six membered heterocyclic compounds and condensed heterocyclic compounds.
- 8) Compare the basicity of heterocyclic Compounds.

Total No. of hours: 75

UNIT - I (15h)

Carbohydrates - Classification - Aldoses and Ketoses, Reducing and Non-reducing Sugars - Reactions of Glucose and Fructose - Osazone formation, Mutarotation and their Mechanism - Structural elucidation of Glucose and Fructose - Pyranose and Furanose forms - Haworth's method - Determination of Ring Size- Haworth Projection Formula - Configuration of Glucose and Fructose - Epimerization - Chain lengthening and chain shortening of Aldoses - Inter conversion of Aldoses and Ketoses - Uses of Glucose - Disaccharides and Polysaccharides -Reactions and Structural elucidation of Sucrose and Maltose - Properties, Structure and Uses of Starch and Cellulose.

UNIT - II (15h)

Stereoisomerism -Definition - Classification into Optical and Geometrical isomerism. Conditions for Optical Activity - Asymmetric centre - Chirality - Achiral molecules - Meaning of (+) and (-) and D- and L- notations - Elements of symmetry - Projection formulae - Fischer, Flying Wedge, Sawhorse and Newmann projection formulae - Notation of optical isomers - Cahn - Ingold - Prelog rules - R, S notation of Optical isomers with one Asymmetric carbon atoms - Erythro and Threo representations -

Optical activities in Compounds not containing Asymmetric Carbon Atoms - Biphenyl, Allenes and Spiranes - Racemisation - Methods of Racemisation (By substitution and Tautomerism) - Resolution - Methods of Resolution (Mechanical, Biochemical and Conversion To Diastereomers) - Asymmetric Synthesis (Partial and Absolute Synthesis) - Walden inversion - Geometrical isomerism - Cis - Trans, Syn - Anti and E-Z Notations - Geometrical Isomerism In Maleic and Fumaric Acids and Unsymmetrical Ketoximes - Methods of Distinguishing Geometrical Isomers using Melting Points, Dipole Moment, Dehydration, Cyclisation, Heat of Hydrogenation and Combustion.

UNIT - III (15h)

Conformational analysis - Introduction of terms - Conformations, Configuration, Dihedral Angle, Torsional Strain - Differences between Conformational isomers and Configurational isomers - Conformational analysis of Ethane and n-Butane including energy diagrams - Conformations of Cyclohexane (Chair, Boat and Twist-Boat forms) - Axial and Equatorial bonds - Ring flipping showing Axial and Equatorial bonds Interconversions - Conformations of Methyl Cyclohexane, Dimethyl Cyclohexane and their stability - 1,2 and 1,3 - Interactions.

UNIT - IV (15h)

Nitroalkanes - Preparation - Properties - Structure - Nitro-Acinitro Tautomerism - Uses of Nitroalkanes - Differences between Primary, Secondary and Tertiary Nitroalkanes. Diazomethane, Diazoacetate, alkylazides - Preparation and synthetic uses - Reagents and their Applications in Organic Chemistry - Anhydrous AlCl_3 , P_2O_5 , H_2 / Pd- BaSO_4 , Zn/ Hg- HCl and Ag_2O - Mechanism of Aldol, Perkin and Benzoin condensations - Knoevenagel, Claisen, Wittig, Cannizzaro, Reformatsky and Michael addition reactions.

UNIT - V (15h)

Heterocyclic compounds - Huckel's rule - Aromaticity of Heterocyclic compounds - Preparation, Properties, Structure and Uses of Furan, Pyrrole and Thiophene - Preparation and properties of Pyridine and Piperidine - Comparative study of Basicity of Pyrrole, Pyridine and Piperidine with Amines - Nucleophilic and Electrophilic substitution reactions of Pyridine - Condensed Five and Six Membered Heterocyclic Compounds - Preparation of Indole, Quinoline and Isoquinoline - Fischer-Indole synthesis, Skraup Quinoline synthesis and Bischler-Napieralski synthesis - Electrophilic substitution reactions.

ORGANIC CHEMISTRY

1. Organic Chemistry - R. T. Morrison and Boyd - Pearson - 2010.
2. Organic Chemistry - I. L. Finar - Volume I and II - Pearson Education.

3. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
4. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. - 2012.
5. Stereochemistry, Conformations and Mechanisms - Kalsi - 2nd Edition, Wiley Eastern Ltd., Chennai - 1993.
6. Organic Chemistry of Natural Products - Volume I and II - O. P. Agarwal - Goel Publishing House
7. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education - 2006.
8. Stereochemistry of Organic Compounds - D. Nasipuri - New Age International Publishers..
9. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.
10. Reactions and Reagents - O. P. Agarwal- Goel Publishing House.
11. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
12. A Text Book of Organic Chemistry, K. S. Tewari, N. K. Vishnoi, S. N. Mehrotra - Vikas Publishing House - 2011.
13. Modern Organic Chemistry- M. K. Jain and S. C. Sharma- Vishnoi Publications, 2014.
14. Reaction, Mechanism and Structure - Jerry March - John Wiley and Sons, NY - 1992.
15. Organic Chemistry - Bruice - Pearson Education.
16. Text Book of Organic Chemistry - C. N. Pillai - Universities Press - 2009.
17. Organic Reaction Mechanisms - Parmar and Chawla - S. Chand & Co.
18. Organic Chemistry - I. L. Finar - 6th Edition, Pearson Education, 2008.
19. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education, 2006
20. Stereochemistry of Carbon Compounds- E. I. Eliel - Tata Mcgrow Hill Education - 2000.
21. Organic Chemistry - T. W. Graham Solomon, C. B. Fryhle - S. A. Snyder - John Wiley & Sons - 2014.
22. Advanced Organic Reaction Mechanism (Problems and Solutions) - N. Tewari - Books and Allied (P) Ltd - 2005.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	S	S	M	S	M
CO2	M	M	S	M	S	S	M	S	M	S
CO3	S	S	M	S	M	S	M	S	S	S
CO4	S	M	M	S	S	M	S	M	S	M
CO5	M	S	S	M	M	M	M	S	M	S

CORE PAPER- 7
PHYSICAL CHEMISTRY - I

Objectives:

- To impart knowledge about the Solutions, Phase Rule and its Applications, Colligative properties, Chemical Equilibrium, Phase Rule and its Applications, Electrochemistry and its Applications.

Course Outcomes:

Upon completion of this course, the students will be able to

- Explain the Thermodynamics of ideal and Non-ideal solutions, Nernst distribution law and its applications.
- Draw and explain phase diagrams of one Component and two Component systems having congruent and incongruent melting points.
- Derive law of Chemical equilibrium and Van't Hoff isotherm.
- Determine molar mass from the colligative properties.
- Explain variation of conductivity with dilution, measurement of conductivity and concept of Transport Number and its determination.
- Explain Debye-Huckel Theory of strong electrolytes.
- Apply conductivity measurements and explain conductometric titrations.
- Explain buffer action and derive Henderson equation and pH of aqueous salt solutions.

Total No. of hours: 75

UNIT - I

SOLUTIONS (15h)

Solutions of liquids in liquids -Ideal Solution and Raoult's law - Vapour pressure of ideal solutions. Vapour Pressure-Composition and Temperature-Composition Curves of Ideal and Non-ideal Solutions. Thermodynamics of Solutions. Gibbs-Duhem-Margules equation - Vapour pressure of Non-ideal solutions - Fractional distillation of Binary liquid solutions - Lever rule- Azeotropic mixtures - Partially miscible liquids. CST and effect of impurity on CST. Phenol - Water, Triethylamine - Water and Nicotine - Water systems - Immiscible Liquids- Steam Distillation. Nernst distribution law - Definition - Thermodynamic derivation - Applications.

UNIT - II

PHASE RULE (15h)

Definition of the terms - Phase, Components and Degrees of freedom - Derivation of Gibbs phase rule - Applications of phase rule - One component system - Water and

Sulphur system - Thermal Analysis and Cooling Curves- Reduced phase rule - Two components system - Simple eutectic system - Lead-silver system. Compound formation with congruent and incongruent melting points. Zn-Mg, Na-K, FeCl₃-H₂O, KI-H₂O systems. Freezing Mixtures.

UNIT - III

COLLIGATIVE PROPERTIES AND CHEMICAL EQUILIBRIUM (15h)

Colligative properties - Lowering of vapour pressure - Osmosis and osmotic pressure - Thermodynamic Derivation of Elevation of boiling point and Depression of freezing point - Determination of molar mass - Van't Hoff factor - Chemical Equilibrium - Law of Chemical Equilibrium - Thermodynamic derivation of Law of Chemical Equilibrium. Relationship between K_p, K_c and K_x for reactions involving Ideal Gases - Van't Hoff Reaction Isotherm - Temperature Dependence of Equilibrium Constant - Van't Hoff Isochore - Le Chatelier's Principle and Its Applications.

UNIT - IV

ELECTROCHEMISTRY - I (15h)

Metallic and Electrolytic Conductors-Faraday's Laws-Electro plating Specific conductance and Equivalent conductance - Measurement of equivalent conductance - Variation of Equivalent Conductance and Specific Conductance with Dilution Kohlrausch Law and its applications - Ostwald's Dilution Law and its Limitations - Debye-Huckel's theory of Strong Electrolytes - Onsager equation (No derivation) - Verification and Limitations Wien effect, Falkenhagen effect. Ionic Strength - Migration of ions - Ionic Mobility - Ionic Conductance - Transport Number and its determination - Hittorff's method and Moving Boundary method. Effect of Temperature and Concentration on Conductance.

UNIT - V

ELECTROCHEMISTRY - II (15h)

Applications of Conductometric Measurements - Determination of Degree of Dissociation of Weak Electrolytes, Ionic Product of water - Solubility Product of sparingly soluble salt - Conductometric Titrations - Concept of pH - Buffer solutions, Buffer action - Henderson equation - Applications of Buffer Solutions - Hydrolysis of Salts - Expressions for Hydrolysis Constant, Degree of Hydrolysis and pH of aqueous salt solutions.

Reference Boks

PHYSICAL CHEMISTRY

1. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania,

Vishnal Publishing Co., - 2013.

2. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., - 2006.
3. Physical Chemistry - Negi and Anand - Eastern Wiley Pvt.Ltd..
4. Physical Chemistry - Negi and Anand - Eastern Wiley Pvt.Ltd..
5. Physical Chemistry - Kundu and Jain - S. Chand & Co.
6. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
7. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
8. Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd.
9. Fundamentals of Physical Chemistry - Maron and Landor - Colier - Macmillan.
10. Physical Chemistry - G. W. Castellan - Narosa publishing house - 2004.
11. Physical Chemistry - Walter J. Moore - Orient Longman - 1972.
12. Numerical Problems on Physical Chemistry, Gashal - Books and Allied (P) Ltd.,
13. Universal General Chemistry, C.N.R. Rao, Macmillan.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
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COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
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CO3	S	S	M	S	S	M	M	M	M	S
CO4	S	M	M	S	S	S	S	M	S	M
CO5	M	S	S	M	M	M	M	S	M	S

INTERNAL ELECTIVE

PAPER - 1

(to choose one out of 3)

A. ANALYTICAL CHEMISTRY - 1

Objective:

- To impart knowledge about Data Analysis, Purification of organic compounds, Different Spectroscopic Techniques and their Application.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Analyze Data and explain the methods of purification of solids.
- 2) Purify solid and liquid Organic Compounds.
- 3) Explain the concept of Gravimetric Analysis.
- 4) Describe the principles, Instrumentation and applications of UV, Visible, Microwave, IR and Raman Spectroscopy.
- 5) Determine the structure of Organic Compounds using various spectral techniques.

Total No. of hours: 45

UNIT – I (9h)

Data analysis - Types of errors - Correction of determinate errors - Idea of Significant Figures and their Importance with examples - Precision and Accuracy - Methods of expressing Accuracy - Error analysis - Minimising errors - Methods of expressing Precision - Average deviation - Standard Deviation and Confidence Limit - Purification of Solid Organic Compounds - Solvent extraction - Recrystallisation - Use of immiscible solvents - Soxhlet extraction - Crystallisation - Use of miscible solvents - Fractional Crystallisation and Sublimation.

UNIT - II (9h)

Purification of liquids - Experimental Techniques of Distillation - Fractional Distillation - Vacuum Distillation - Steam Distillation - Tests of Purity - Gravimetric Analysis - Characteristics of Precipitating Agents - Condition of Precipitation - Types of Precipitants - Purity of Precipitate - Co-precipitation and Post precipitation - Precipitation from Homogeneous Solution - Digestion and Washing of precipitate - Ignition of precipitate - Uses of Sequestering Agents - Definition of spectrum - Electromagnetic radiation - Quantization of different forms of energies in molecules (Translational, Rotational, Vibrational and Electronic) - Born- Oppenheimer approximation - Condition of energy of absorption of various types of spectra.

UNIT - III (9h)

Microwave Spectroscopy - Theory of Microwave Spectroscopy - Selection Rule Calculation of Moment of Inertia and Bond Lengths of Diatomic molecules - Effect of Isotopic Substitution - UV - Visible Spectroscopy - Absorption laws - Calculations involving Beer- Lambert's law - Instrumentation - Photocalorimeter and Spectrophotometer - Block diagrams with description of components - Theory of Electronic Spectroscopy - Types of Electronic Transitions - Chromophore and Auxochromes - Absorption bands and Intensity - Factors influencing Position and Intensity of Absorption Bands - Frank- Condon Principle - Applications.

UNIT - IV (9h)

IR Spectroscopy - Principle - Theory of IR spectra - Vibrational Degrees of Freedom - Modes of Vibration of Diatomic Molecules -Triatomic linear (CO_2) and Non-linear Molecules (H_2O) - Stretching and Bending vibrations - Symmetric and Asymmetric Stretching vibrations - Selection rules - Expression for Vibrational Frequency (Derivation not needed) - Calculation of Force constant - Factors influencing Vibrational Frequencies - IR Spectrophotometer - Instrumentation - Source, Monochromator, Cell, Detectors, Recorders and Sampling Techniques - Applications of IR Spectroscopy - Identification of Functional Groups - Interpretation of the spectra of Alcohols, Aldehydes, Ketones and Esters (Aliphatic and Aromatic) - Hydrogen bonding.

UNIT - V (9h)

Raman Spectroscopy - Rayleigh and Raman scattering - Selection rule - Raman shift - Stokes and Anti-stokes lines - Differences between Raman and IR Spectroscopy - Raman Spectrophotometer - Instrumentation - Block diagram - Components and their Functions - Advantages of using Laser in Raman Spectroscopy - Applications - Structural elucidation in the study of Inorganic and Organic Compounds - Rotational-Raman spectra of Non - Centrosymmetric molecules - Mutual exclusion principle (CO_2 and N_2O) - Applications - Structural diagnosis.

Reference Books

- Elements of Analytical Chemistry - R. Gopalan, P. S. Subramanian, K. Rengarajan - S. Chand and sons (1997).
- Fundamentals of Analytical Chemistry - D. A. Skoog and D. M. West, Holt Reinhard and Winston Publications - IV Edition (1982).
- Principles of Instrumental Methods of Analysis - D. A. Skoog and Saunders, College Publications, III Edition (1985).
- Analytical Chemistry - S. M. Khopkar - New age International Publishers.

- Instrumental Methods of Chemical Analysis - Chatwal - Anand, Himalaya Publishing House (2000).
- Analytical Chemistry - R. Gopalan, Sultan Chand.
- Analytical Chemistry - S. Usharani, Macmillan.
- Instrumental Methods of Analysis - 7th Edition - H. H. Willard, L. L. Merit. J. Dean and F. A. Settle - Wadsworth Publishing Company Limited, Belmont, California, USA, 1988.
- Physico- Chemical Techniques of Analysis - P. B. Janarthanan - Vol. I & II - Asian Publishing.
- Instrumental Methods of Chemical Analysis - B. K. Sharma - Goel Publications.
- Applications of Absorption Spectroscopy of Organic Compounds - Prentice Hall, John R. Dyer.
- Spectroscopic Identification of Organic Compounds - R. M. Silverstein, G. C. Bassler and T. C. Morill - John Wiley and Sons.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	v Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

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CO2	S	M	S	M	S	S	M	S	M	M
CO3	S	S	M	S	M	S	M	M	S	S
CO4	S	M	S	S	S	M	S	M	S	M
CO5	M	S	M	M	M	M	M	S	M	M

INTERNAL ELECTIVE

PAPER - 1

B. BASICS OF COMPUTER PROGRAMMING IN C AND ITS APPLICATIONS IN CHEMISTRY

Total No. of hours: 45

UNIT – I(9h)

Basic Computer Organisation, Processor and Memory - Main Memory, Secondary Storage Devices and Storage Hierarchy - Software - Relationship between Hardware and Software - Types of Software - Planning the Computer Program - Algorithm and Flowcharts - Basics of Operating Systems.

UNIT - II(9h)

Computer Languages - Machine Language, Assembly Language, Assembler, Compiler, Interpreter and Programming Languages - C language - Introduction - C Compiler - Operating Systems and Preprocessor Directives - Variables, Constants, Operators, Input and Output Functions.

UNIT – III(9h)

Control Structures - Conditional, Looping, Goto, Break, Switch and Continue Statements, Functions, Arrays And Pointers.

UNIT – IV(9h)

Applications in Chemistry - Calculation of the Radius of the first Bohr orbit for an Electron.

Calculation of Half-life Time for an integral order reaction - Calculation of Molarity, Molality and Normality of a solution - Calculation of Pressure of Ideal Gases and Van der Waal's gases - Calculation of Electronegativity of an Element using Pauling's relation.

UNIT – V(9h)

Applications in Chemistry - Calculation of Empirical Formulae of Hydrocarbons - Calculation of Reduced Mass of a few Diatomic Molecules - Determination of the Wave Numbers of Spectral lines of Hydrogen atom - Calculation of Work of Expansion in Adiabatic Process - Calculation of pH, Solubility Product and Bond Energy using Born-Landé equation - Calculation of Standard Deviation and Correlation Coefficient.

Reference Books

- Computers in Chemistry, K. V. Raman, 8th Edition, Tata McGraw Hill Publishers,

2005.

- Programming with C, Venugopal and Prasad, 11th Edition, 1971. .
- Programming in C, E. Balaguruswamy, 2nd Edition, 1989.

INTERNAL ELECTIVE
PAPER - 1
C. ORGANIC SYNTHESIS

Objectives

- To know the Basics of Retrosynthesis.
- To impart knowledge about the Ring Synthesis.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Analyze the importance of Organic synthesis.
- 2) Explain various disconnection approaches in Organic synthesis.
- 3) Explain the role of protecting groups in Organic synthesis.
- 4) Apply Ring synthesis in the synthesis of Camphor, Longifolene, Cortisone and Reserpine.

Total No. of hours: 45

UNIT - I

DISCONNECTION APPROACH (9h)

An introduction to Synthons and Synthetic Equivalent - Disconnection Approach - Functional Group Interconversions - The importance of the Order of Events in Organic Synthesis - One group C-X and Two group C-X disconnections - Chemoselectivity - Reversal of Polarity.

UNIT - II

PROTECTING GROUPS (9h)

Principle of Protection of Alcoholic group and Amino group - Principle of Protection of Carbonyl group and Carboxyl group - Activation of Functional Groups.

UNIT - III

ONE GROUP C-C DISCONNECTIONS (9h)

Alcohols and Carbonyl Compounds - Regioselectivity and Alkene Synthesis - Uses of Acetylenes and Aliphatic Nitro Compounds in Organic Synthesis.

UNIT - IV

TWO GROUP C-C DISCONNECTIONS(9h)

Diels-Alder Reaction - 1, 3 - Difunctionalised Compounds - α , β - Unsaturated Carbonyl Compounds - Control in Carbonyl Condensations - 1,5-Difunctionalised Compounds - Michael Addition and Robinson Annulation reactions.

UNIT - V

RING SYNTHESIS(9h)

Saturated Heterocyclic Compounds - Synthesis of 3-, 4- and 6- Membered Rings
Aromatic Heterocycles in Organic Synthesis - Application of the above in the Synthesis of Camphor, Longifoline, Cortisone and Reserpine.

Reference Books

- Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge University Press, UK.
- Advanced Organic Chemistry, F. A. Carey and R. J. Sundberg, Part- B, Plenum Press.
- Modern Synthetic Reactions. H. O. House and W. A. Benjamin,

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

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CO3	S	S	S	M	M	S	M	S	S	M
CO4	S	M	M	S	S	M	S	M	S	S
CO5	M	M	S	M	M	M	M	S	M	M

SKILL BASED SUBJECT

PAPER - 3

APPLIED CHEMISTRY

Objective:

- To impart Knowledge about Petrochemicals, Paper Technology, Sugar Industry, Explosives, Photography and Dairy Chemistry,

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Explain the refining process of petroleum and differentiate between Thermal and Catalytic Cracking.
- 2) Explain the various processes involved in paper technology.
- 3) Recover glucose from molasses and estimate sugar.
- 4) Prepare alcohol from molasses.
- 5) Explain the Proximate and Ultimate analysis of Coal.
- 6) Describe Chemical changes occurring in Milk during processing.
- 7) Define the principle involved in photography.
- 8) Explain the need for making milk powder and principle involved in drying process.

Total No. of hours: 45

UNIT – I (9h)

Petroleum - Origin - Composition of Petroleum - Inorganic, Engler and Modern theories - Classification - Refining (Simple Refinery) - Cracking - Thermal and Catalytic - Knocking - Octane Rating - Antiknock Compounds - Cetane Rating - Synthetic Petrol - LPG - Gobar Gas - Production - Feasibility and Importance of Biogas with special reference to Rural India - Petrochemicals - Elementary study - Definition - Chemicals from Natural Gas, Petroleum, Light naphtha and Kerosene - Origin - Composition - Synthetic Gasoline.

UNIT - II (9h)

Paper technology - Introduction - Manufacture of pulp - Various raw materials used for the preparation of pulp - Preparation of Sulphite pulp, Soda pulp and Rag pulp - Various processes - Beating, Refining, Filling, Sizing and Colouring - Manufacture of Paper - Calendering - Uses.

UNIT - III (9h)

Sugar industry - Sugar industries in India - Sugarcane and sugar beet - Manufacture of cane sugar - Extraction of juice - Concentration - Separation of crystals - Recovery of Glucose from Molasses - Defection - Sulphitation - Carbonation - Testing and Estimation of Sugar - Double Sulphitation Process - Preparation of Bagasse - Use of

Bagasse for Manufacture of Paper and Electricity - Preparation of Alcohol from Molasses - Preparation of Absolute Alcohol - Manufacture of Wine, Beer, Methylated Spirit and Power Alcohol.

UNIT - IV (9h)

Explosives - Primary, Low and High Explosives - Single compound explosives - Binary explosives - Plastic explosives - Dynamites - Blasting explosives - Preparation and Uses of Lead Azide, Nitroglycerine, Nitrocellulose, TNT, Cordite, Picric Acid and Gun Powder - Introduction to Rocket Propellants - Photography - Chemical Principle - Preparation of Sensitive Emulsion - Exposure - Developing - Fixing and Printing - Colour photography - Xerographic copying - Coal - Classification by rank - Proximate and Ultimate analysis - Low and High Temperature Carbonisation - Otto-Hoffmann's by-product - Distillation of Coal Tar.

UNIT - V (9h)

Milk - Definition - Physico-Chemical properties of milk - Constituents of milk and Their Physico-chemical Properties - Chemical change taking place in Milk due to Processing Parameters - Boiling, Pasteurisation, Sterilisation and Homogenisation - Definition and Composition of Creams, Butter, Ghee and Ice Creams - Milk Powder - Definition, Need for making powder - Principles involved in Drying process - Spray drying and Drum drying.

Reference Books

1. Fundamental Concepts of Applied Chemistry - Jayashree Ghosh - 1st Edition, S. Chand & Co. Ltd, New Delhi, 2006.
2. Milk and Milk Products - Clarence Henry Eckles, Willes Barnes Combs, Harold Macy - 4th Edition, Tata McGraw Hill Publishing Company Ltd, Reprint 2002.
3. Industrial Chemistry - B. K. Sharma - 13th Edition, Goel Publishing House, 2008.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
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4	YES	YES	YES	YES	YES	YES
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CO3	S	M	S	M	M	M	M	S	S	M
CO4	S	M	M	S	S	S	S	M	S	M
CO5	M	M	S	M	M	M	M	S	M	S

SEMESTER - VI

CORE PAPER - 8

INORGANIC CHEMISTRY - II

Objectives:

To impart knowledge about Nuclear chemistry, Radioactivity, Metallurgy, Chemistry of f- Block Elements, Organometallic Compounds and Bio-inorganic Chemistry.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Explain the stability of nuclides in terms of N/P ratio, mass defect, binding energy and packing fraction.
- 2) Describe natural and artificial radioactivity and compare high energy nuclear reactions.
- 3) Describe the various processes involved in Metallurgy.
- 4) Compare the properties of d-block elements.
- 5) Compare the properties of lanthanides and actinides.
- 6) Classify Organometallic Compounds and discuss the biological importance of Fe, Cu and Zn.

Total No. of hours: 75

UNIT - I

NUCLEAR CHEMISTRY (15h)

Introduction - Composition of Nucleus - Fundamental Particles of Nucleus - Nuclear Forces operating between the Nucleons - N/P ratio - Nuclear Stability - The whole number rule and Packing fraction - Isotopes, Isobars, Isotones, mirror nuclei and Nuclear isomers - Detection and Separation of isotopes - Nuclear Binding Energy - Mass defect - Simple calculations involving Mass Defect and Binding Energy per Nucleon - Magic Numbers - Liquid drop model - Shell model.

UNIT - II

RADIOACTIVITY (15h)

Natural Radioactivity - Properties of Alpha, Beta and Gamma rays - Detection and measurement of Radioactivity - Radioactive series including Neptunium series - Soddy's Group Displacement Law - Rate of disintegration and Half - Life period - Derivation - Average life period - Artificial Radioactivity - Induced Radioactivity - Q-value of nuclear reactions - Uses of Radioisotopes - Hazards of radiations - Nuclear fission - Nuclear energy - Nuclear reactors, Breeder reactors - Nuclear fusion - Thermonuclear reactions - Energy source of the Sun and Stars - Atom bomb and Hydrogen bomb - Comparison of Nuclear Fission and Nuclear Fusion.

UNIT - III

METALLURGY (15h)

General metallurgy and Metallurgical processes - Methods of Concentration - Gravity separation, Froth floatation process, Magnetic separation, Roasting - Reduction methods - Smelting, Calcination, Goldschmidt Aluminothermic process, Reduction by active metals, Electrolytic reduction - Purification methods - Liquation, Zone refining, Van Arkel method, Carbonyl process and Electrolytic refining - Characteristic properties of d-block elements- Comparative study of Ti, V, Cr, Mn and Fe group elements with special reference to Occurrence, Oxidation States, Magnetic Properties, complexes, coordination number and Colour - Occurrence and Extraction of Ti, Mo, W and Co - Preparation and Uses of Ammonium Molybdate and V_2O_5 .

UNIT - IV

INNER TRANSITION ELEMENTS (15h)

General Characteristics of f- Block elements - Position of Lanthanides in the periodic table - Separation of Lanthanides (Ion exchange method) - Comparative study of Lanthanides and Actinides - Occurrence, Oxidation states, Magnetic properties, Colour and Spectra and complex formation - Lanthanide Contraction - Causes and Consequences - Comparison between Lanthanides and Actinides - Position of Actinides in the periodic table - Extraction of Thorium and Uranium

UNIT - V (15h)

ORGANOMETALLIC COMPOUNDS AND BIOINORGANIC CHEMISTRY

Organometallic Compounds - Definition - Nomenclature - Classification - Organo-Lithium and Organo-Boron Compounds - Preparation, Properties, Structure and Uses. - Biological Functions of Iron, Copper and Zinc - Biologically Important Compounds - Myoglobin, Cytochrome, Haemoglobin and Ferritin - Binary Metallic Compounds - Hydrides, Borides, Carbides and Nitrides - Classification - Preparation, Properties, Structure and Uses.

REFERENCE BOOKS

- 1. Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).**
2. Principles of Inorganic Chemistry - B. R. Puri, L. R. Sharma and K. C. Kallia - Milestone Publications (2013).
4. Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
5. Inorganic Chemistry: Principles of Structure and Reactivity - J. E. Huheey, E. A. Keiter, R. I. Keiter and O. K. Medhi - 2006.
6. Concise Inorganic Chemistry - J. D. Lee - III edition - Von Nostrand.

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8. Industrial Chemistry R. K. Das - Kalyani Publications, New Delhi (1982).
9. Coordination Chemistry - S. F. A. Kettle - ELBS (1973).
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11. Vogel's Handbook of Quantitative Inorganic Analysis - Longman.
12. Text Book of Qualitative Inorganic Analysis - A. I. Vogel - III edition (1976).
13. Source Book on Atomic Energy - S. Glasstone- East-West Press Pvt. Ltd. (1967).
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16. Advanced Inorganic Chemistry - Cotton and Wilkinson - V Edition - Wiley and Sons (1988)
16. Text Book of Inorganic Chemistry - R. Gopalan - Universities Press - 2012.
17. Modern Inorganic Chemistry - R. D. Madan - S. Chand Publications, Reprint, 2014.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	S	S	M	S	M
CO2	M	S	M	M	S	S	M	S	M	S
CO3	S	M	S	M	M	S	M	M	S	M
CO4	M	M	M	S	S	M	S	M	M	S
CO5	M	S	S	M	M	M	M	S	M	M

CORE PRACTICAL
PAPER - 3
GRAVIMETRIC ESTIMATION

Total No. of hours: 45

1. Estimation of Sulphate as Barium Sulphate.
2. Estimation of Barium as Barium Sulphate.
3. Estimation of Barium as Barium Chromate.
4. Estimation of Lead as Lead Chromate.
5. Estimation of Calcium as Calcium Oxalate Monohydrate.

References

- Qualitative Inorganic Analysis, A.I. Vogel - 7th Edition, Prentice Hall.
- Quantitative Chemical Analysis, A.I. Vogel - 6th Edition, Prentice Hall.

CORE PAPER - 9
ORGANIC CHEMISTRY - II

Objectives:

- To kindle interest in students in learning Bio-organic chemistry through the introduction of topics such as Proteins, Nucleic acids, Terpenes, Alkaloids etc.
- To generate Keen Interest and Thinking in Understanding the Mechanisms of Molecular Rearrangements and Synthetic Applications of Acetoacetic Ester, Benzene Diazonium Chloride, Grignard Reagents and Diazomethane.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Explain the mechanisms of inter and intra molecular rearrangements.
- 2) Classify amino acids and explain their preparation and properties and synthesis of Peptides.
- 3) Differentiate between DNA and RNA.
- 4) Explain primary and secondary structures of proteins.
- 5) Elucidate the structures of Antibiotics, Alkaloids and Terpenoids.

Total No. of hours: 75

UNIT - I

MOLECULAR REARRANGEMENTS (15h)

Rearrangements - Classification - Anionotropic, Cationotropic and Free Radical Rearrangements - Intermolecular and Intramolecular Rearrangements - Examples - Cross over experiment - Differences between Intermolecular and Intramolecular rearrangements - Mechanisms, Evidences, Migratory Aptitude, Intermolecular or Intramolecular nature of the following rearrangements - Pinacol-Pinacolone, Benzil-Benzilic acid and Beckmann rearrangement - Mechanism of Hoffmann, Curtius, Baeyer-Villiger, Claisen (Sigmatropic), Fries rearrangement, Cope and Oxy-Cope rearrangements.

UNIT - II

AMINO ACIDS AND POLYPEPTIDES (15h)

Amino acids - Classification - Essential and Non-Essential amino acids - Acidic, Basic and Neutral Amino Acids - Alpha, Beta and Gamma- Amino acids - Preparation of alpha amino acids - Gabriel's Phthalimide synthesis, Strecker synthesis and Erlenmeyer Azlactone synthesis - Glycine, Alanine and Tryptophan - General properties of Amino acids - Reactions of Amino acids due to Amino group and Carboxyl group - Zwitterions - Isoelectric point - Peptides - Synthesis - Bergmann Method - Structural Determination of Polypeptides - End Group Analysis - N-Terminal and C-Terminal Amino Acids Determination.

UNIT - III PROTEINS AND NUCLEIC ACIDS(15h)

Proteins - Definition - Classification based on Physical Properties, Chemical Properties and Physiological Functions - Primary and Secondary Structure of Proteins - Helical and Beta Sheet Structures (Elementary Treatment Only) - Denaturation of Proteins - Nucleic acids - Nucleoproteins - Definition - Types of Nucleic Acids - RNA and DNA - Nucleoside, Nucleotide, Degradation of Nucleotide Chain - Components of RNA and DNA - Differences between DNA and RNA - Structures of Ribose and 2-Deoxyribose - Double Helical Structure of DNA - Biological functions of Nucleic Acids - Elementary ideas on Replication and Protein Synthesis.

UNIT - IV CHEMISTRY OF NATURAL PRODUCTS(15h)

Antibiotics - Definition - Structural elucidation of Penicillin and Chloramphenicol - Uses of Penicillin and Chloramphenicol - Alkaloids - Classification - Isolation of alkaloids - General methods of Determination of structure of Alkaloids - Synthesis and Structural Elucidation of Piperine, Coniine and Nicotine - Terpenoids - Definition - Classification - Isoprene rule - Synthesis and Structural elucidation of Citral, Menthol and Alpha-pinene.

UNIT - V (15h)

ORGANOSULPHUR COMPOUNDS AND AROMATIC SULPHANIC ACIDS.

Thioalcohols-Structure-Nomenclature-methods of preparation-Physical and Chemical properties - Thioethers-Structure-Nomenclature-Physical and Chemical properties - dimethyl sulphoxide - uses.Mustard gas-Preparation-Properties and uses - Aromatic sulphanic acid - structure-Nomenclature-benzene sulphanic acid,benzene sulphonyl chloride, benzene disulphanic acids,Toluene sulphanic acids,Chloramine-T,Saccharin and sulphanilic acid-Chemical properties and uses.

REFERENCE BOOKS

1. Organic Chemistry - R. T. Morrison and Boyd - Pearson - 2010.
2. Organic Chemistry - I. L. Finar - Volume I and II - Pearson Education.
3. Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
4. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand and Co. Ltd. - 2012.
5. Stereochemistry, Conformations and Mechanisms - Kalsi - 2nd Edition, Wiley Eastern Ltd., Chennai - 1993.
6. Organic Chemistry of Natural Products - Volume I and II - O. P. Agarwal - Goel Publishing House
7. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education - 2006.

8. Stereochemistry of Organic Compounds - D. Nasipuri - New Age International Publishers..
23. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.
24. Reactions and Reagents - O. P. Agarwal- Goel Publishing House.
25. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
26. A Text Book of Organic Chemistry, K. S. Tewari, N. K. Vishnoi, S. N. Mehrotra - Vikas Publishing House - 2011.
27. Modern Organic Chemistry- M. K. Jain and S. C. Sharma- Vishnoi Publications, 2014.
28. Reaction, Mechanism and Structure - Jerry March - John Wiley and Sons, NY - 1992.
29. Organic Chemistry - Bruice - Pearson Education.
30. Text Book of Organic Chemistry - C. N. Pillai - Universities Press - 2009.
31. Organic Reaction Mechanisms - Parmar and Chawla - S. Chand & Co.
32. Organic Chemistry - I. L. Finar - 6th Edition, Pearson Education, 2008.
33. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education, 2006
34. Stereochemistry of Carbon Compounds- E. I. Eliel - Tata Mcgrow Hill Education - 2000.
35. Organic Chemistry - T. W. Graham Solomon, C. B. Fryhle - S. A. Dnyder - John Wiley & Sons - 2014.
36. Advanced Organic Reaction Mechanism (Problems and Solutions) - N. Tewari - Books and Allied (P) Ltd - 2005.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	v Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
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3	YES	YES	YES	YES	YES	YES
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CO1	M	S	M	S	M	S	S	M	S	S
CO2	S	S	M	M	S	S	M	S	M	M
CO3	M	M	S	M	M	S	M	M	S	S
CO4	S	M	M	S	S	M	S	M	M	S
CO5	M	S	S	M	M	M	M	S	M	M

CORE PRACTICAL

PAPER - 4

ORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS

Analysis of organic compounds containing one functional group and characterisation with a derivative.

Total No. of hours: 45

Reactions of the following Functional Groups:

Aldehyde, Ketone, Carboxylic Acid (Mono and Di), Ester, Carbohydrate (Reducing and Non-Reducing), Phenol, Aromatic Primary Amine, Amide, Nitro Compounds, Diamide and Anilide.

Organic Preparations

Acylation

1. Acetylation of Salicylic acid or Aniline.
2. Benzoylation of Aniline or Phenol.

Nitration

3. Preparation of m- Dinitrobenzene
4. Preparation of p- Nitroacetanilide

Halogenation

5. Preparation of p- Bromoacetanilide
6. Preparation of 2,4,6-Tribromophenol

Diazotisation /Coupling

7. Preparation of Methyl Orange

Oxidation

8. Preparation of Benzoic Acid from Toluene or Benzaldehyde.

Hydrolysis

9. Hydrolysis of Ethyl Benzoate (Or) Methyl Salicylate (Or) Benzamide.

Reference Books

- ❖ Vogel's Text Book of Chemical Analysis
- ❖ Practical Chemistry - A. O. Thomas - Scientific Book Center, Cannanore.
- ❖ Practical Chemistry - 3 Volumes - S. Sundaram and others.
- ❖ Text Book of Practical Organic Chemistry - A. I. Vogel, A. R. Tatchell, B. S. Furnis, A. J. Hannaford and P.W. G. Smith - 5th Edition - 1996.
- ❖ Comprehensive Practical Organic Chemistry - Preparation and Quantitative Analysis - V. K. Ahluwalia, Renu Agarwal - Universities Press - 2013.

CORE PAPER - 10
PHYSICAL CHEMISTRY - II

Objectives:

- To impart Knowledge about Electrochemistry, Surface Chemistry, Photochemistry, Chemical Kinetics and Theories of reaction rates.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Derive Nernst equation and explain Cell reactions.
- 2) Explain Concentration Cells and polarization.
- 3) Derive rate constant expressions for zero, first, second and third order reactions and determine the order of a reaction.
- 4) Compare Collision theory and ARRT.
- 5) Explain Lindemann's theory of unimolecular reactions.
- 6) Explain Langmuir Theory of Adsorption.
- 7) Derive Michaelis-Menten equation for enzyme catalyzed reactions.
- 8) State laws of photochemistry and explain the kinetics of photo chemical reactions.
- 9) Explain various Photo physical processes and Photosensitized reactions.

Total No. of hours: 75

UNIT - I

ELECTROCHEMISTRY – III (15h)

Galvanic cells - Daniel cell - Reversible and Irreversible Cells - EMF of a Cell and its Measurement - Standard Weston Cadmium Cell - Evaluation of Thermodynamic Quantities- ΔG , ΔH and ΔS from emf data - Derivation of Nernst equation for Electrode Potential and Cell emf -Types of reversible electrodes - Electrode reactions - Electrode potentials - Reference electrodes - Standard Hydrogen Electrode - Standard Electrode Potential - Sign conventions - Electrochemical Series and its Applications.

UNIT - II

ELECTROCHEMISTRY - IV (15h)

Liquid Junction Potential - Concentration cells With Transference and Without Transference - Applications of Concentration cells - Valency of ions, Solubility and Solubility Product - Activity Coefficient of electrolytes - Determination of pH using Hydrogen, Quinhydrone and Glass electrodes - Potentiometric titrations - Polarisation -

Overvoltage - Decomposition potential - Storage Cells- Lead Storage Battery- Mechanism of Charging and Discharging- Fuel Cells (H₂-O₂ Cell).

UNIT - III

CHEMICAL KINETICS (15h)

Definitions of the terms - Order and Molecularity - Rate of the reaction - Derivations of expressions for Zero, First, Second (for equal and unequal concentrations of reactants) and Third order rate equations - Study of kinetics - Methods of Determination of Order of a reaction - Effect of Temperature on reaction rate - Arrhenius equation - Theories of reaction rates - Bimolecular Collision Theory - Lindmann's theory of Unimolecular Reactions - ARRT - Thermodynamic treatment of ARRT - Eyring equation - Comparison of Collision Theory and ARRT.

UNIT - IV

SURFACE CHEMISTRY (15h)

Adsorption - Characteristics of adsorption - Physisorption and Chemisorption - Differences between Physical and Chemical Adsorption - Applications of Adsorption - Adsorption of Gases by Solids - Different Types of Isotherms - Freundlich adsorption isotherm - Langmuir theory of adsorption - Derivation. BET Theory (no derivation) - Catalysis - Definition - General Characteristics of Catalytic Reactions - Acid-Base catalysis - Enzyme catalysis - Michaelis-Menton Equation - Effect of Temperature and pH on Enzyme Catalysis. Enzyme Inhibition - Homogeneous catalysis - Function of a catalyst in terms of Gibb's free energy of activation - Heterogeneous catalysis - Kinetics of Unicellular Surface Reactions.

UNIT - V

PHOTOCHEMISTRY (15h)

Difference between Thermal and Photo chemical reactions - Laws of photochemistry - Grothus-Draper law, Stark-Einstein's law - Primary and Secondary processes - Quantu yield and its determination - Qualitative description of Fluorescence, Phosphorescence-Jabalonski diagram - Photosensitized Reactions. Luminescence, Chemiluminescence and Bioluminescence - Kinetics of Photochemical Reactions - H₂-Cl₂ and H₂-Br₂ reactions - Photodimerisation of Anthracene.

REFERENCE BOOKS

1. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
2. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N Dash - Sultan Chand & Co., - 2006.

3. Physical Chemistry - Negi and Anand - Eastern Wiley Pvt.Ltd..
4. Physical Chemistry - Kundu and Jain - S. Chand & Co.
5. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
6. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
7. Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd.
8. Fundamentals of Physical Chemistry - Maron and Landor - Colier - Macmillan.
9. Physical Chemistry - G. W. Castellan - Narosa publishing house - 2004.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
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3	YES	YES	YES	YES	YES	YES
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CO2	M	S	S	M	M	S	M	S	M	S
CO3	S	M	M	S	M	S	M	M	S	M
CO4	M	S	M	S	S	M	S	M	M	S
CO5	S	S	M	S	M	M	M	S	M	M

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Publishers..

9. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.
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11. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
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21. Organic Chemistry - T. W. Graham Solomon, C. B. Fryhle - S. A. Snyder - John Wiley & Sons - 2014.
22. Advanced Organic Reaction Mechanism (Problems and Solutions) - N. Tewari - Books and Allied (P) Ltd - 2005.
23. Advanced Organic Stereochemistry (Problems and Solutions) - N. Tewari - Books and Allied (P) Ltd - 2010.

PHYSICAL CHEMISTRY

24. Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishnal Publishing Co., - 2013.
25. Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha and U. N. Dash - Sultan Chand & Co., - 2006.
26. Physical Chemistry - Negi and Anand - Eastern Wiley Pvt.Ltd..

27. Physical Chemistry - Kundu and Jain - S. Chand & Co.
28. Physical Chemistry - K. L. Kapoor - Macmillan - 4 volumes.
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30. Text book of Physical Chemistry - S. Glasstone - Macmillan (India) Ltd.
31. Fundamentals of Physical Chemistry - Maron and Landor - Colier - Macmillan.
32. Physical Chemistry - G. W. Castellan - Narosa publishing house - 2004.
33. Physical Chemistry - Walter J. Moore - Orient Longman - 1972.
34. Numerical Problems on Physical Chemistry, Gashal - Books and Allied (P) Ltd.,
35. Universal General Chemistry, C.N.R. Rao, Macmillan.
36. Group Theory and its Chemical Applications - P. K. Bhattacharya - Himalaya Publishing House.
37. Text book of Physical Chemistry - M. V. Sangaranarayanan, V. Mahadevan, Universities Press - 2011.
38. General and Physical Chemistry - Dr. A. Arunabhasan, Books of Allied (P) Ltd., - Ghosal - 2009.

CORE PRACTICAL
PAPER - 5
PHYSICAL CHEMISTRY EXPERIMENTS

Total No. of hours : 45

1. Kinetics

Determination of the Order of the following reactions

- a) Acid catalysed Hydrolysis of an Ester (Methyl or Ethyl acetate)
- b) Saponification of an Ester (Methyl or Ethyl Acetate)
- c) Iodination of Acetone.

2. Molecular weight of a solute - Rast's method using Naphthalene or Diphenyl as Solvents.

3. Heterogeneous equilibria

- a) *Phenol-Water system - CST
- b) Effect of impurity - 2 % NaCl or Succinic acid solutions on Phenol -Water system - Determination of the Concentration of the given solution

4. Determination of the Transition Temperature of the given salt hydrate.
 $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$, $\text{CH}_3\text{COONa} \cdot 3\text{H}_2\text{O}$, $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$, $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$

5. Electrochemistry

Conductivity

- a) Determination of Cell Constant and Equivalent Conductivities of the solutions of two different concentrations.
- b) Conductometric titration of a Strong Acid against a Strong Base.

6. Potentiometric titration of a Strong Acid against a Strong Base.

7. Colorimetry- Determination of unknown concentration using Photoelectric colorimeter.

8. Determination of pKa of acetic acid using pH Meter.

***Need not be given in examination.**

Students must write Short Procedure / Formula with explanation in Ten Minutes for evaluation during the university practical examination.

INTERNAL ELECTIVE

PAPER - 2

(to choose one out of 3)

A. ANALYTICAL CHEMISTRY - II

Objective:

- To impart knowledge about Different Chromatographic and Spectroscopic Techniques.

Outcome:

The Students will be able to

- 1) Explain the principles and techniques of column, paper and thin layer chromatography, ion-exchange, high - pressure liquid and gas chromatography
- 2) Elucidate the structure of organic compounds using NMR, Mass and ESR spectroscopy .
- 3) Discuss the principle and applications of TGA, DTA and thermometric titrations.
- 4) Explain the principle of polarography and amperometric titrations .

Total No. of hours : 30

UNIT – I(6h)

Chromatography - Principles and Techniques of Column, Paper and Thin Layer Chromatography - Column Chromatography - Preparation of Column - Adsorption - Adsorbents - Elution - Recovery of Substances - TLC - Choice of Adsorbent and Solvents - Preparation of Chromatogram and Applications - R_f value - Paper Chromatography - Solvents used - Factors affecting R_f value - Separation of Amino Acid Mixtures - Radial Paper Chromatography - Applications - ion exchange chromatography - Principle - Experimental Techniques - Types of Resins - Requirement of a Good Resin - Action of Ion Exchange Resins - Experimental Techniques and Applications - Separation of Zinc- Magnesium, Cobalt - Nickel and Cadmium - Zinc ions.

UNIT - II (6h)

High Pressure Liquid Chromatography and Gas Chromatography - Principle and Applications - Gas Chromatography - Mass Spectrophotometer (GC-MS) - Liquid Chromatography - Mass Spectrophotometer (LC-MS) - Principle and Applications -

Polarography - Principle - DME - Advantages and Disadvantages - Ilkovic equation and its significance (No Derivation) - Polarography as an Analytical tool in Quantitative and Qualitative Analysis - Amperometric Titrations.

UNIT – III(6h)

NMR Spectroscopy - Principle of Nuclear Magnetic Resonance - Basic Instrumentation - Number of Signals - Chemical Shift - Shielding and Deshielding - Factors influencing Chemical Shift - Spin-Spin Coupling and Coupling constants - TMS as NMR standard - Splitting of Signals - NMR Spectra of simple Organic Molecules - Applications in Structural Elucidation.

UNIT – IV(6h)

Mass Spectroscopy - Basic principles of Mass Spectrum - Instrumentation - Molecular ion peak- Base peak - Metastable peak - Isotopic peak and their Uses - Fragmentation - Factors affecting Cleavage Patterns - Nitrogen rule - Ring rule - McLafferty rearrangement - Determination of Molecular Formulae with examples - Mass spectrum of simple organic compounds - Identification - Alcohols, Aldehydes and Aromatic hydrocarbons.

UNIT – V (6h)

ESR Spectroscopy - Condition - Selection Rule for Transition - Theory of ESR Spectra - Basic Instrumentation - ESR Spectrometer - Components and their Functions - Hyperfine splitting - ESR Spectra of simple radicals - CH₃, CD₃, Naphthalene radical ions only - Applications in structural elucidation - Thermoanalytical methods - Principle involved in Thermogravimetric analysis (TGA) and Differential Thermal Analysis (DTA) - Instrumentation- Discussion of Various Components with Block Diagram - Characteristics of TGA (CaC₂O₄.H₂O, CuSO₄.5H₂O) and DTA curves - Factors Affecting TGA and DTA Curves - Thermometric Titrations - Principle and Applications.

Reference Books

1. Analytical Chemistry - S. M. Khopkar - New Age International Publishers - 1998.
2. Analytical Chemistry - R. Gopalan - Sultan Chand & Sons - 2002.
3. Chemical Analysis: An Instrumental Approach - A. K. Srivastava and P. C. Jain.
4. Spectroscopic Identification of Organic Compounds - R. M. Silverstein, G. C. Basseler & T. C. Morill.
5. Organic Spectroscopy - W. Kemp.
6. Spectroscopic Methods in Organic Chemistry - D. Williams & I. Fleming.
7. Fundamentals of Molecular Spectroscopy - 4th Edition, C. N. Banwell and E. M. McCash - Tata McGraw Hill Publishers, New Delhi - 2006.
8. Applications of Absorption Spectroscopy of Organic Compounds - John R. Dyer.
9. Introduction to Molecular Spectroscopy - Barrow.
10. Spectroscopy of Organic Compounds - P. S. Kalsi.

11. Instrumental Methods of Chemical Analysis - B. K. Sharma - Goel Publications - 2000.
12. Fundamentals of Analytical Chemistry: An introduction - D. A. Skoog, D. M. West - Thomson - 2004.
13. Analytical Chemistry: Theory and Practice - U. N. Dash.
14. Vibrational Spectroscopy - D. N. Sathyanarayanan - New Age International Publishers - 2000.
15. Fundamentals of Spectroscopy - Y. R. Sharma - S. Chand - 2008.
16. Fundamentals of Molecular Spectroscopy - 4th Edition - C. N. Banwell and E. M. McCash - Tata McGraw Hill, New Delhi - 2006.
17. Elementary Organic Spectroscopy - Principles and Chemical Applications - Y. R. Sharma, S. Chand & Company Private Limited, V Revised Edition - 2013.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	S	S	M	S	S
CO2	S	S	M	S	S	S	M	S	M	M
CO3	M	M	S	S	M	S	M	M	S	S
CO4	M	S	M	S	S	M	S	M	M	S
CO5	S	M	S	M	M	M	M	S	M	S

INTERNAL ELECTIVE

PAPER - 2

B. TEXTILE CHEMISTRY

Objective:

- To impart knowledge about the Production, Properties and Applications of Natural and Synthetic Fibres, Colour and Constitution, Classification of Dyes and Concept of Dyeing in Textile Industry.

Outcome:

The Students will be able to

- 1) Understand the chemical structure of fibres.
- 2) Identify natural and synthetic fibres through identification tests.
- 3) Explain Scouring and Bleaching methods used in textile industries .
- 4) Classify dye and explain the concept of dyeing in textile industries.
- 5) Explain the methods used in the process of mercerizing in textile industries.

Total No. of hours: 30

UNIT – I (6h)

General Classification of Fibres - Chemical structure - Production - Properties - Count, Denier, Tex, Staple Length, Spinning Properties, Strength, Elasticity and Creep - Applications of the following Natural Cellulose Fibres (Cotton and Jute) - Natural Protein Fibres (Wool and Silk) - General characteristics.

UNIT – II (6h)

Chemical Structure, Production and properties of the following Synthetic Fibres - Man- made Cellulose Fibres (Rayon and Modified cellulose fibres) - Polyamide Fibres (Different types of Nylons) - Preparation - Nylon degradation - Polyester Fibres - Preparation - Degradation - Polyacrylonitrile fibre - Preparation and Properties - Viscose fibre - Preparation and Properties - Identification tests for Cellulose, Cotton, Wool, Silk, Rayon, Acrylic, Viscose, Polyamide and Polyester Fibres.

UNIT – III (6h)

Impurities in Raw Cotton and Grey Cloth, Wool and Silk - General principles of the Removal, Scouring - Purpose, Alkali Scouring and Acid Scouring - Bleaching (Methods - Hypochlorite, Peroxide and Bleaching Powder) - Desizing (Hydrolytic and Enzymatic), Kier Boiling and Chemicking - Dyeing of Polyester and Blends - Functions of Dispersing agents - Fibre swelling - Carrier dyeing - High temperature dyeing - Selection of dyestuff.

UNIT – IV (6h)

Colour and Constitution - A general treatment - Chromophores - Auxochromes - Bathochromes and Hypsochromes - Classification of dyes - Acidic, Basic, Direct, Mordant, Azoic, Ingrain, Vat and Reactive Dyes - Classification as per Chemical constitution - Azo dyes - Triphenyl Methane Dyes, Phthalein Dyes, Indigo and Anthraquinone Dyes - Structure, Preparation and Uses - Methyl Orange, Phenolphthalein and Malachite Green.

UNIT – V (6h)

Dyeing - Dyeing of Wool and Silk - Fastness properties of dyed materials - Dyeing of Nylon, Terylene and other Synthetic Fibres - Finishing - Finishes given to Fabrics - Mechanical finishes on Cotton, Wool and Silk - Method used in process of Mercerizing - Anticrease and Antishrink finishes - Water Proofing.

References

- Chemical Technology of Fibrous Materials - F. Sadov, M. Horchagin and A. Matetshy, Mir Publishers.
- The Identification of Textile Fibres - Bruno Nuntak.
- Introduction to Textile Science - 3rd edition, Maryory L. Joseph.
- Textile Chemistry - Vol. II, R. H. Peters, Elsevier, Amsterdam.
- Dyeing and Chemical Technology of Textile Fibres - 5th Edition, E. R. Trotman, Charles Griffin & Co Ltd.
- Chemistry of dyes & Principles of Dyeing - V. A. Shenai, Sevak Publications.
- Scouring and Bleaching, E. R. Trotman, Charles Griffin & Co Ltd.
- Text Book of Applied Chemistry - K. Kapur.
- A Students Text Book of Textile Science - A. J. Hall.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	S	M	S	M	S	M
CO2	M	S	M	S	S	M	M	S	M	S
CO3	S	M	S	M	M	S	M	M	S	S
CO4	S	M	M	S	S	M	S	M	M	M
CO5	M	S	S	S	M	M	M	S	M	M

INTERNAL ELECTIVE

PAPER - 2

C. NANO CHEMISTRY

Objectives:

- To introduce the Basics of Nanotechnology.
- To learn the Instrumental Techniques used in Characterisation of Nanomaterials.

Outcome:

The Students will be able to

- 1) Understand the basics of Nanotechnology .
- 2) Explain the preparation ,properties and uses of Nano particles.
- 3) Discuss the techniques used to synthesise Nano particles.
- 4) Understand the role of Electron microscopes- SEM ,TEM,SPM,AFN, and STEN in Nano technology.

Total No of hours : 30

UNIT - I

BASICS OF NANO CHEMISTRY (6h)

Introduction - Definition - Length scales - Importance of Nanoscale and its Technology - Self Assembly of Materials - Self Assembly of Molecules - Porous solids, Nanowires, Nanomachines and Quantum Dots.

UNIT - II(6h)

NANOPARTICLES

Introduction - Types of Nanoparticles - Preparation, Properties and Uses of Gold, Silicon, Silver, Zinc Oxide, Iron Oxide, Alumina and Titania Nanoparticles.

UNIT – III (6h)

SYNTHETIC TECHNIQUES

Techniques to Synthesise Nanoparticles - Top down and Bottom up Approaches - Common Growth Methods - Characterisation of Nanoparticles - Applications and Toxic effects of Nanomaterials.

UNIT - IV

NANOMATERIALS (6h)

Preparation, Properties and Applications of Carbon Nanotubes, Nanorods, Nanofibres and Nanoclays.

UNIT - V

INSTRUMENTAL TECHNIQUES (6h)

Electron Microscopes - Scanning Electron Microscopes (SEM) - Transmission Electron Microscopes (TEM) - Scanning Probe Microscopy - Atomic Force Microscopy (AFM) - Scanning Tunneling Electron Microscope (STEM) - Basic Principles only.

Books for Study

- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).

Books for Reference

- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).
- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hil Publishers, New Delhi (2007).
- Text Book of Nanoscience and NanoTechnology, P. Shankar Baldev Raj, B. B. Rath and James Murday - 2014.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	S	M	S	S
CO2	S	S	M	S	S	M	M	S	M	S
CO3	M	M	S	M	M	S	M	M	S	M
CO4	S	M	M	S	S	M	S	M	M	S
CO5	M	S	M	S	M	M	M	S	M	M

INTERNAL ELECTIVE

PAPER - 3

(to choose one out of 3)

A. PHARMACEUTICAL CHEMISTRY

Objective:

- To effectively impart knowledge about Various Diseases and Their Treatment, Importance of Indian Medicinal Plants and Different Types of Drugs. Preparation, Synthesis and Structural Determination are not required for the Compounds mentioned.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Define the terms involved in pharmaceutical chemistry.
- 2) Explain the causes, symptoms and treatment of common diseases.
- 3) Explain the composition of blood.
- 4) Explain the role of antibacterial, antiseptics, vitamins, analgesics and anesthetics.
- 5) Apply the therapeutic importance of Indian medicinal plants.
- 6) Classify hormones and explain their functions.

Total No of hours : 30

UNIT - I (6h)

Definition of the following terms - Drug, Pharmacophore, Pharmacology, Pharmacopoeia, Bacteria, Virus, Chemotherapy and Vaccine - Causes, Symptoms and Treatment for Jaundice, Cholera, Malaria and Filariasis - First Aid for Accidents - Antidotes for Poisoning - Organic Pharmaceutical Aids - Their Role as Preservatives, Antioxidants, Colouring, Flavouring and Sweetening agents - Examples.

UNIT - II (6h)

Causes, Detection and Control of Anaemia and Diabetes - Diagnostic tests for Sugar, Salt and Cholesterol in Serum and Urine - Blood - Composition of Blood and Blood Plasma - RBC - Structure and Functions - Functions of Haemoglobin - WBC - Structure and Functions - Rh Factor - Blood Coagulation - Identification and Estimation of Cholesterol in Blood - Blood Pressure - Hypertension and Hypotension - Normal, High and Low to Control - Indian Medicinal Plants and Their Uses - Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothuvelai.

UNIT - III (6h)

Antibacterials - Sulpha drugs - Sulphanilamide Derivatives - Mode of action of Sulpha drugs - Examples - Prontosil, Sulphathiazole and Sulphafurazole - Uses - Antibiotics - Definition - Gram positive and Gram negative bacteria - Uses of

Ampicillin, Streptomycin and Tetracyclines - Antiseptics and Disinfectants - Definition and Distinction - Phenolic compounds, Chloro compounds and Cationic surfactants - Vitamins - Definition - Classification of Vitamins - Sources and Uses - Deficiency Diseases caused by Vitamins.

UNIT - IV (6h)

Analgesics - Definition - Classification - Narcotic and Non- narcotic - Antipyretic analgesics - Mechanism of action - Morphine and its derivatives - Pethedine and Methadone - Salicylic acid derivatives - Antipyretics and Antiinflammatory Agents - Definition and Actions - Aspirin, Paracetamol, Ibuprofen - Disadvantages and Uses - Anaesthetics - Definition - Classification - Local and General - Volatile - Uses of volatile liquids as Inhalation Anaesthetics - Chloroform - Gaseous Anaesthetics - Nitrous Oxide, Ether and Cyclopropane - Uses and Disadvantages - Intravenous Anaesthetic Agents - Thiopental sodium, Methohexitol and Propanidid - Drugs affecting CNS - Definition, Distinction and Examples for Tranquilizers, Sedatives (Phenobarbital, Diazepam) - Hypnotics, Psychedelic Drugs - LSD, Hashish- Their effects.

UNIT -V (6h)

Antineoplastic Drugs - Causes and Types of Cancer - Treatment of Cancer - Antineoplastic Agents - Antimetabolites - AIDS - AZT, DDC - Hormones - Definition - Classification - Physiological Functions of Insulin, Adrenaline, Thyroxin and Oxytacin - Sex hormones - Androsterone, Testosterone, Progesterone and Estrogen - Biological functions - Disorders of Hyposecretion and Hypersecretion of Hormones.

Reference Books

1. A Text Book of Pharmaceutical Chemistry - Jayashree Ghosh - S. Chand Company Ltd, 2015.
2. Pharmaceutical Chemistry - S. Lakshmi - Sultan Chand, 2011.
3. Pharmacology and Pharmatherapeutics - R. S. Satoskar - Popular Prakashan - Vol.I and Vol. II.
4. Medicinal Chemistry - Asuthosh Kar - New Age International Publishers, 2007.
5. A Text Book of Synthetic Drugs - O. D. Tyagi - Ammol Publications.
6. Introduction to Biological Chemistry - J. Awapara, Prentice Hall.
7. A Text Book of Biochemistry - Ambika.S.
8. Biochemistry - A. L. Leninger, II Edition, Kalyani Publishers, Ludhiana, 1998.
9. Essentials of Biological Chemistry - James Fanley - East West Press.
10. Medicinal Chemistry - Gurdeep Chatwal - Himalaya Publishers House, 2012.
11. Medicinal Chemistry - Ahluwalia - Ane Books, 2008.
12. A Text Book of Pharmaceutical Chemistry - Viva Books Private Ltd., New Delhi, 2009.
13. Medicinal Plants of India - Rasheeduz Zafar - CBS Publishers and Distributors, 2000.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	S	M	S	M	S	S
CO2	M	M	S	S	S	M	M	S	M	M
CO3	M	M	S	M	M	S	M	M	S	S
CO4	S	S	M	S	S	M	S	M	M	M
CO5	S	S	S	S	M	M	M	S	M	S

INTERNAL ELECTIVE

PAPER - 3

B. POLYMER CHEMISTRY

Objective:

- To impart Knowledge about the Types of Polymers, Polymerization Techniques, Commercial Polymers and their Applications.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Classify polymers and explain the various types of polymerization techniques.
- 2) Explain various methods of determining molecular weights of polymers.
- 3) Describe the chemistry of plastics and resins.
- 4) Explain the preparation of commercial, natural and synthetic polymers.
- 5) Enumerate the importance of Biopolymers, Conducting polymers and Acrylic polymers.

Total No. of hours : 30

UNIT – I (6h)

Introduction to Polymers - Monomers, Oligomers, Polymers and their Characteristics - Classification of Polymers - Addition and Condensation Polymers - Natural and synthetic - Linear, Branched, Cross-Linked and Network - Plastics - Elastomers - Fibres - Homopolymers and Copolymers - Bonding in Polymers - Primary and Secondary bond forces in Polymers - Cohesive energy and Decomposition of Polymers - Chain Growth Polymerisation - Cationic, Anionic and Free radical polymerisation - Stereoregular polymers - Ziegler Natta polymers - Step Growth Polymers.

UNIT - II (6h)

Polymerization Techniques - Bulk, Solution, Suspension and Emulsion Polymerisation - Melt Polycondensation - Polymer Processing - Calendering - Die Casting and Rotational Casting - Molecular weight of polymers - Number average - Weight average - Sedimentation and Viscosity - Average molecular weight - Molecular weight and Degree of Polymerisation - Methods of determination of Molecular Weight - Gel permeation chromatography – Ultracentrifugation - Reactions - Hydrolysis - Hydrogenation - Addition - Substitution - Cross linking - Vulcanisation - Cyclisation.

UNIT - III (6h)

Plastics and Resins - Definitions - Thermoplastic and Thermosetting Resins - Constituents of Plastic Fibres - Dyes, Pigments, Plasticisers, Lubricants and Catalysts - Important Thermoplastic Resins - Acrylics, Polyvinyl and Cellulose Derivatives -

Important Thermosetting Resins - Phenolic resins - Epoxy resins - Adhesives - Shellac resins - Vegetable glues and Animal glues.

UNIT –IV (6h)

Chemistry of Commercial Polymers - General methods of Preparation and Uses of the following - Teflon, Polyethylene, PTFE, Polystyrene, Polycarbonates and PVC - Textile fibres - Definition and Polymer requirement for fibres - Polyamides - Nylon 66 -Nylon 6 - Polyesters - Terylene - Cellulose acetate - Viscose rayon - Natural and Synthetic Rubber - Constitution of Natural rubber - Natural Rubber - Isoprene - Synthetic Rubber - Butyl, Buna, Buna- S, SBR, Thiocol, Neoprene, Polyurethane and Silicone Rubber - Ebonite.

UNIT - V (6h)

Advances in Polymers - Biopolymers, Biomaterials, Polymers in Medical Field, High temperature and Fire Resistant Polymers - Applications of Silicones - Conducting Polymers - Elementary idea - Examples - Polysulphur Nitriles, Polyparaphenylene, Polypyrrole, Polythiophene, Polyaniline and Polyacetylene - Acrylic polymers - Polymers of Acrylic Acid, Methacrylic Acid and Polyacrylates.

Reference Books

1. Text Book of Polymer Science, F. W. Bill Meyer, Jr. John, Wiley & Sons - 1984.
2. Polymer Science - V, R. Gowarikar, N. V. Viswanathan, Jayadev Sreedhar - Wiley Eastern Ltd., New Delhi - 2005
3. Polymer Chemistry, B. K. Sharma - Goel Publishing House, Meerut - 1989.
5. Polymer Chemistry - M. G. Arora, M. S. Vadar - Anmol Publications (p) Ltd., New Delhi -1998.
6. Polymer Chemistry - An introduction - M. P. Stevens, Oxford - 2002.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	M	S	M
CO2	S	S	M	S	M	M	M	S	M	S
CO3	M	M	S	M	M	S	M	M	S	M
CO4	S	M	M	M	S	M	S	M	M	S
CO5	M	S	M	S	M	M	M	S	M	M

INTERNAL ELECTIVE

PAPER - 3

C. GREEN CHEMISTRY

Objective:

- To impart knowledge about Green Solvents, Green Techniques, Green Catalysts and Green Reactions.

Course Outcomes:

Upon completion of this course, the students will be able to

- 1) Summarize the importance of green chemistry.
- 2) Select green solvents for various synthetic processes.
- 3) Describe the various techniques to prepare nanoparticles.
- 4) Explain the importance of green catalysis.
- 5) Explain the rearrangement and aromatic substitution reactions with the help of green chemistry.

Total No. of hours: 30

UNIT - I

GREEN CHEMISTRY – INTRODUCTION (6h)

Need for Green Chemistry - Principles of Green Chemistry - Atom economy - Definition with example (Ibuprofen synthesis) - Green oxidants - Hydrogen peroxide - Green synthesis - Evaluation of the type of the reaction - Rearrangements (100 % Atom economic) - Addition reaction (100 % Atom economic) - Organic reactions by Sonication method - Apparatus required - Examples of Sonochemical Reactions (Heck, Hunsdiecker and Wittig reactions).

UNIT - II

GREEN SOLVENTS (6h)

Selection of Solvents - Aqueous Phase Reactions - Diels-Alder reaction in water - Catalysis in water (Aerobic Oxidation of Alcohols catalysed by Pd (II) / Bathophenanthroline) - Reactions in ionic liquids - Simple preparation - Types - Properties and Applications - Ionic liquids in Organic Reactions (Heck reaction, Suzuki reactions, Epoxidation), Industrial (Battery) and Analytical Chemistry (Matrices for MALDI-TOF MS, Gas Chromatography Stationary Phases) - Advantages and Disadvantages - Solid Supported Synthesis - Supercritical CO₂ - Preparation, Properties and Applications (Decaffeination, Dry cleaning) - Environmental impact.

UNIT - III (6h)

GREEN TECHNIQUES

Microwave and Ultrasound Assisted Green Synthesis - Apparatus required - Examples

of MAOS (Synthesis of Fused Anthroquinones, Leukart reductive Amination of Ketones) - Advantages and Disadvantages of MAOS - Aldol condensation - Cannizzaro condensation - Diel's-Alder reaction - Strecker's synthesis - Photochemical reactions using Sunlight - Photoreduction of Benzophenone to Benzopinacol using Sunlight - Photochemical alternative to Friedel- Crafts reaction - Nanoparticles - Introduction - Types of Nanoparticles - Techniques to prepare Nanoparticles - Top down and Bottom up approaches - Common growth methods.

UNIT - IV

GREEN CATALYSIS (6h)

Green Catalysis - Heterogeneous catalysis - Uses of Zeolites, Silica, Alumina, Clay supported catalysis - Biocatalysis - Enzymes and Microbes - Phase Transfer Catalysis (PTC) - Principles, Catalysts and Lipophilicity of ions - Two phase systems - Solid-Liquid, Liquid-Liquid, Gas-Liquid - Triphase systems - Inverted PTC - Applications in Synthesis - Micellar Catalysis, Surfactants and Synthesis in water - Principles, Materials and Synthetic Applications.

UNIT- V

GREEN REACTIONS(6h)

Acetylation of Primary Amine, Base catalysed Aldol condensation (Synthesis of Dibenzalpropanone), Halogen addition to C = C bond (Bromination of Trans-Stilbene), [4+2] Cycloaddition reaction (Diels-Alder reaction between Furan and Maleic acid) - Rearrangement reaction (Benzil- Benzilic acid rearrangement), Coenzyme catalyzed Benzoin condensation (Thiamine hydrochloride catalysed synthesis of Benzoin), Pechmann condensation for Coumarin synthesis (Clay catalysed Solid State Synthesis of 7- Hydroxy- 4- methylcoumarin) - Electrophilic Aromatic Substitution Reactions (Nitration of phenol, Bromination of Acetanilide) - Green oxidation reactions (Synthesis of adipic acid, Preparation of Manganese (III) acetylacetonate) - Zeolite catalyzed Friedel-Crafts acylation.

Books for Study

- Green Chemistry: Environmental Friendly Alternatives, Rs. Sanghi and M. M. Srinivatava, Narosa Publishing House, New Delhi.
- Green Chemistry, V. Ahluwalia, Narosa, New Delhi (2011).
- Nanotechnology, S. Shanmugam, MJP Publishers, Chennai. (2010).
- A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
- Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).

- Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hill, New Delhi (2007).

Books for Reference

- Methods and Reagents for Green Chemistry, P. Tundo, A. Perosa and F. Zechini, John Wiley & Sons Inc., New Jersey, (2007).
- The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
- Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
- Nanochemistry, G. B. Segreav, Elsevier, Science, New York, (2006)

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	M	S	S
CO2	M	S	M	S	S	M	M	S	M	M
CO3	M	M	S	M	M	S	M	M	S	S
CO4	S	M	M	S	S	M	S	M	M	S
CO5	M	S	S	S	M	M	M	S	M	M

SKILL BASED SUBJECT
PAPER - 4
AGRICULTURE AND LEATHER CHEMISTRY

OBJECTIVE:

- To learn about Soil fertility and Productivity, Soil Chemistry, Insecticides, Leather Industry and Treatment of Tannery Effluents.

Outcome:

The Students will be able to

- 1) Explain the structure Texture and Chemical properties of soil
- 2) Define and classify fertilizers and illustrate the requirements of a good fertilizer.
- 3) Control the pollution caused by fertilizers.
- 4) Define and classify insecticides.
- 5) Discuss leather tanning methods.
- 6) Control pollution caused by tannery effluents.

Total No. of hours: 30

UNIT - I

SOIL CHEMISTRY(6h)

Soil - Introduction - Classification - Properties of Soil - Physical properties - Components - Structure and Texture - Soil-Water, Soil-Air and Soil-Temperature - Chemical properties - Soil Minerals, Soil Colloids, Soil Reaction and Buffering - Analysis of Soil - Soil pH - Determination of Soil pH - Effect of pH on Plants - Buffering of soil - Soil acidity, Soil salinity and Soil alkalinity - Soil Fertility - Carbon and Nitrogen cycle - Acid, Alkaline and Saline soils - Their Formation - Reclamation - Liming agents.

UNIT - II

FERTILISERS AND MANURES(6h)

Fertilisers - Definition - Classification - Requirements of a Good fertiliser - Nitrogen fertiliser - Urea - Preparation and Uses - Potash fertiliser - KCl, K₂SO₄ and KNO₂ - Preparation and Uses - Phosphorus fertiliser - Phosphatic slag, Superphosphate of lime and Triple Superphosphate - Preparation and Uses- NPK fertiliser - Advantages- Role of Micronutrients - Manures - Compost - Composting - Methods of Composting - Farmyard Manure, Vermicompost, Composted Coconut Coir Pith, Press mud and Poultry manure –Applications - Types of pollutions caused by Fertilisers - Ill effects of Fertilisers and their

Control.

UNIT - III

INSECTICIDES AND FUNGICIDES(6h)

Insecticides - Definition - Classification of Insecticides - Stomach poisons - Contact poisons and Fumigants - Insecticides - Organic Insecticides - DDT - Gammexane - Malathion - Parathion - Fungicides - Inorganic Fungicides - Sulphur compounds - Copper compounds - Mercuric compounds - Organic Fungicides - Dithiocarbamates - Dithane M - Bordeaux mixture - Herbicides - Rodenticides - Pesticides in India - Adverse Environmental Effects of Pesticides.

UNIT - IV

LEATHER CHEMISTRY (6h)

Introduction - Constituents of Animal Skin - Preparing Skins and Hides - Leather processing - Process before Tannage - Flaying, Curing, Drying, Pickling, Cleaning and Soaking - Liming and Degreasing - Manufacture of Leather - Leather Tanning methods - Vegetable Tanning - Chemistry of Chrome Tanning and Mineral Tanning - Deliming - Dyeing of Leather and Fat Liquoring - Leather Finishing - Oil Tanning - By products.

UNIT - V

TANNERY EFFLUENTS(6h)

Tannery effluents - Pollution and its control - Water pollution and Air pollution - Waste Management - Treatment of Tannery Effluents - Primary, Secondary and Tertiary treatment - Pollution Prevention - Effect of Tannery Effluents on Agriculture - Organic Amendments - Reclamation of Tannery Effluents Affected Soil.

Reference Books

- Industrial Chemistry by B. K. Sharma - Goel Publishing House, Meerut.
- Applied Chemistry by K. Bagavathi Sundari, MJP Publishers, 2006.
- Fundamental Concept of Applied Chemistry by Jayashree Ghosh, S. Chand & Company Ltd.,
- The Nature and Properties of Soils - IX Edition - Nyle. C. Bready - S. Chand.
- Soils and Soil Fertility - Louis M. Thompson - and Frederick. R. Troch - Tata Mc Graw Hill Publishing Co.
- Text Book of Soil Science - T. D. Biswas and S. K. Mukerjee - II Edition.
- Soil Science - A. Sankara.
- Fundamentals of Leather Science - Wood roffe Publications of CLRI - Chennai.
- Nature and Properties of Soils - Harry, O. Buckman.

Outcome: The Students will be able to

Explain the structure Texture and Chemical properties.

- 7) Define and classify fertilizers and illustrate the requirements of a good fertilizers.
- 8) Control the pollution caused by fertilizers.
- 9) Define and classify insecticides.
- 10) Discuss leather tanning methods.
- 11) Control pollution caused by tanning effluents.

Unit	i. Remembering	ii. Understanding	iii Applying	iv Analyzing	V Evaluating	vi Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	S	M	S	M	S	M
CO2	S	M	M	S	S	M	M	S	M	S
CO3	M	M	S	M	S	S	M	M	S	S
CO4	S	M	M	S	M	M	S	M	M	S
CO5	M	S	S	S	M	M	M	S	M	M

SCHEME OF VALUATION FOR PRACTICAL EXAMINATIONS

PRACTICAL - I

VOLUMETRIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Procedure: 10 Marks

Error upto 2 % : 50

 2.1 - 3 % : 40

 3.1 - 4 % : 30

 4.1 - 5 % : 20

 >5 % : 10

For incomplete or wrong calculation deduct 20 % of total marks scored.

For no calculation deduct 40 % of total marks scored.

For each arithmetic error deduct 1 mark.

CORE PRACTICAL - II

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Preparation: 20 (Quantity- 15 Marks; Quality- 5 marks)

Analysis: 40 Marks.

Each radical with procedure: 10 Marks

(Spotting for each radical - 5 Marks; Fixing the group - 5 Marks)

PRACTICAL - III
GRAVIMETRIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 marks

Record: 15 Marks

Procedure: 10 Marks

Error upto 2 % : 50

 2.1 - 3 % : 40

 3.1 - 4 % : 30

 4.1 - 5 % : 20

 >5 % : 10

- a. Among the duplicate results, the value more favorable to the candidate must be taken.
- b. When no duplicate result is given deduct 5 marks.
- c. If the two results differ by more than 2 % deduct 5 marks.
- d. For each independent arithmetical error deduct 1 mark.
- e. For incomplete or wrong calculation deduct 20 %.
- f. For no calculation deduct 40 %.
- g. If the experiment is not completed due to an accident, award 5 marks.

PRACTICAL - IV
ORGANIC ANALYSIS

Internal assessment: 25 Marks

External assessment: 75 marks

Total: 100 marks

Record: 15 Marks

Preparation: 15 (quantity: 10 & quality: 5)

Analysis: 45

Preliminary reaction: 4

Aliphatic/ Aromatic: 4

Saturated/ Unsaturated: 4

Tests for elements: 9

Functional groups: 10

Confirmatory tests: 10

Derivative/Coloured reaction: 4

PHYSICAL CHEMISTRY PRACTICALS

Internal assessment: 25 Marks

External assessment: 75 Marks

Total: 100 Marks

Record: 15 Marks

Experiment: 45 Marks

Manipulation, Tabulation and Calculation: 15 Marks

1) Kinetics

Graph : 10 Marks

Below a factor of 10 : 35

By a factor of 10 : 25

More than a factor of 10 : 15

2) Molecular weight

Error upto 10 %: 45

20 %: 35

30 %: 25

> 30 %: 15

3) Effect of electrolyte on CST

Graph: 10

Error upto 10 %: 35

20 %: 25

30 %: 15

> 30: 10

4) Transition temperature

Graph: 10

Error upto 2°C difference: 35

7°C difference: 25

> 7°C difference: 15

5) Conductance

Equivalent conductance: 25 marks

Error upto 10 % : 25

Upto 15 % : 15

>15 % : 10

Cell constant : 20 marks

Error upto 10 % : 20

Upto 15 % : 15

>15 % : 10

6) Conductometric titration

Graph: 10

Upto 2 % : 35

2.1 to 3 % : 30

3.1 to 4 % : 25

4.1 to 5 % : 20

> 5% : 15


ANNAMALAI UNIVERSITY
404 - M.Sc. CHEMISTRY

Programme Structure and Scheme of Examination (under CBCS)
 (Applicable to the candidates admitted from the academic year 2022 -2023 onwards)

Course Code	Study Components & CourseTitle	Hours/Week	Credit	Maximum Marks		
				CIA	ESE	Total
SEMESTER - I						
22PCHEC11	Core Course- I: Organic Chemistry -I	4	3	25	75	100
22PCHEC12	Core Course - II: Inorganic Chemistry -I	4	3	25	75	100
22PCHEC13	Core Course- III: Physical Chemistry - I	4	3	25	75	100
22PCHEP14	Core Practical - I: Organic Chemistry Practical - I	6	3	40	60	100
22PCHEP15	Core Practical - II: Physical Chemistry Practical -I	5	3	40	60	100
22PCHEE16	Core Elective - I	4	3	25	75	100
22PCHEO17	Open Elective - I	3	3	25	75	100
	Total	30	21			700
SEMESTER - II						
22PCHEC21	Core Course-IV: Organic Chemistry -II	4	3	25	75	100
22PCHEC22	Core Course- V: Inorganic Chemistry -II	4	3	25	75	100
22PCHEC23	Core Course- VI: Physical Chemistry - II	4	3	25	75	100
22PCHEP24	Core Practical - III: Organic Chemistry Practical - II	6	3	40	60	100
22PCHEP25	Core Practical - IV: Inorganic Chemistry Practical -I	6	3	40	60	100
22PCHEE26	Core Elective - II	4	3	25	75	100
22PHUMR27	Compulsory Course: Human Rights	2	2	25	75	100
	Total	30	20			700

List of Core Electives (Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22PCHEE16-1	Polymer Chemistry	4	3	25	75	100
	22PCHEE16-2	Materials Chemistry	4	3	25	75	100
	22PCHEE16-3	Pharmaceutical Chemistry	4	3	25	75	100
II	22PCHEE26-1	Green Chemistry	4	3	25	75	100
	22PCHEE26-2	Supra Molecular Chemistry	4	3	25	75	100
	22PCHEE26-3	Nano Chemistry	4	3	25	75	100

List of Open Electives (Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22PCHEO17-1	Food Chemistry	3	3	25	75	100
	22PCHEO17-2	Industrial Chemistry	3	3	25	75	100
	22PCHEO17-3	Medicinal Chemistry	3	3	25	75	100

SEMESTER: I CORE – I	22PCHEC11: ORGANIC CHEMISTRY –I	CREDIT:3 HOURS:60
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COURSE OBJECTIVE

- 1) To learn the basic aspects of stereochemistry
- 2) To gain knowledge about the reactive intermediate and reactions involving free radicals
- 3) To study the mechanisms of Aliphatic Nucleophilic and electrophilic substitutions
- 4) To learn the concepts of Aromaticity, Anti aromaticity and Homo aromaticity of Benzenoid and Non- benzenoid compounds
- 5) To accrue skill of predicting the mechanisms of Aromatic substitution reactions.

UNIT I: Stereochemistry – I**12 hrs**

Optical isomerism - chirality - asymmetry and dissymmetry - enantiotopic and diastereotopic ligands and faces. R, S- notations of molecules with one and two asymmetric centers. Inter conversion of Sawhorse, Newman and Fischer projections. Erythro and threo nomenclature, E and Z nomenclature. Absolute configurations of chiral biphenyls, allenes and spiranes. Asymmetric synthesis - Cram's rule and Felkin- Ahn Modification. Stereospecific and stereoselective reactions.

UNIT II: Reactive intermediates and reactions involving free radicals**12 hrs**

Structure, reactivity, formation, stability and reactions involving carbocations, carbanions, free radicals, carbenes and nitrenes. Long and short-lived free radicals - methods of generation of free radicals - detection of free radicals by ESR - Addition of free radicals to olefinic double bonds – aromatic radical substitutions reactions - decomposition of diazo compounds – phenol coupling - Sandmeyer reaction - Gomberg reaction - Pschorr reaction - Ulmann reaction and Hunsdiecker reaction.

UNIT III: Aliphatic Nucleophilic and Electrophilic Substitutions**12 hrs**

Substitution at saturated reaction center (carbon). SN1, SN2, SNi mechanisms – Reactivity, structural and solvent effects. Neighbouring group participation – substitution in Norbornyl and bridgehead systems – Substitution at carbon doubly bonded to oxygen. Alkylation and acylation of active methylene compounds, hydrolysis of esters. SE₁, SE₂, SE_i mechanisms – reactivity. halogenation of aldehydes and ketones and decarboxylation of aliphatic acids, Hell-Volhard-Zelinsky reaction, Stork – enamine reaction.

UNIT IV: Aromaticity**12hrs**

Aromaticity of benzenoid - non-benzenoid, and heterocyclic compounds - Huckel's rule -Aromatic systems with π electron numbers other than six - non-aromatic (cyclooctatetraene etc,) and anti-aromatic system (cyclobutadiene etc.) - system with more than 10π electrons - Annulenes upto C18 (synthesis of all these compounds is not expected).

UNIT V: Aromatic substitution reactions**12hrs**

Electrophilic substitution reactions: The arenium ion mechanism – Orientation and reactivity – typical reactions – nitration, halogenation, alkylation, acylation and diazonium coupling. Reimer- Tiemann, Vilsmeier- Hack, Gattermann, Kolbe reactions. Electrophilic substitution of furan, pyrrole, thiophene and pyridine- N-oxide. Nucleophilic substitution reactions: Aromatic Nucleophilic Substitution by S_N1 mechanism through Meisenheimer complex and by Elimination - Addition mechanism. Methods of generation and reactions of arylne intermediate. Aromatic nucleophilic substitution of activated aryl halides, Ziegler alkylation and Chichibabin reaction.

COURSE OUTCOMES

At the end of the course, the student will be able to

- 1) Describe the concept of Stereochemistry
- 2) Compare the stabilities of various reactive intermediates.
- 3) Analyse and propose reasonable mechanism for Substitutions in Aliphatic molecules
- 4) Compare the stabilities of molecules based on aromaticity
- 5) Analyze the mechanisms of Aromatic Substitution reactions

Text Books

- 1) Eliel. E. N. (2008). Stereochemistry of Carbon Compounds, Tata McGraw Hill Ed, Reprint, Noida (UP).
- 2) Nasipuri. D. (2005). Stereochemistry of Organic Compounds, New Age International (P) Ltd, New Delhi.
- 3) Kalsi, P. S. (1993). Stereochemistry, Conformation analysis and Mechanism (2nd Edition), Chennai: Wiley Eastern Limited.
- 4) Clayden, J., Greeves, N., & Warren, S. (2012). Organic Chemistry (2nd Ed.). UK: Oxford University Press.
- 5) Norman, R. O. C. & Coxon, J. M. (2003). Principles of Organic Synthesis (3rd Ed.). London (UK): Chapman & Hall.
- 6) Smith, M. B. (2016). March's Advanced Organic Chemistry (7th Ed.). New York: John Wiley & Sons.
- 7) Carey, F. & Sundberg, R. J. (2007). Advanced Organic Chemistry (5th Ed., Part A and B.). Berlin: Springer Science + Business Media.

Supplementary Reading

- 1) Graham Solomons, T.W. Craig, B. Fryhle. (2011). *Organic chemistry* (10th edition.). John Wiley & Sons, Inc.
- 2) Pine, S. H. (1987). *Organic chemistry* (5th edition.). New York: McGraw Hill international edition chemistry series.
- 3) Seyhan, N. Ege. (1998). *Organic chemistry structure and reactivity* (3rd edition.). New Delhi: A.I.T.B.S.
- 4) Kalsi, P. S. (2007). *Organic Reactions: Stereochemistry and Mechanism through solved problems* (4th Ed.). New Delhi: New Age International (P) Ltd.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	2
CO2	2	2	3	3	3
CO3	3	2	2	3	3
CO4	2	3	3	3	3
CO5	2	2	3	3	2

SEMESTER: I CORE – II	22PCHC12: INORGANIC CHEMISTRY - I	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

- 1) To know about the structure and bonding of inorganic compounds and the inorganic polymers.
- 2) To study the concept of coordination chemistry and stability of the complexes
- 3) To gain knowledge of metal-ligand orbital overlap, molecular orbital theory and energy level diagrams etc.,
- 4) To learn about the mechanism of substitution reactions of octahedral complexes.
- 5) To acquire skill of using substitution reactions of square planar complexes and electron transfer reactions for complexes.

UNIT I: Polymeric Inorganic Compounds**12 hrs**

Chains: Isopolyacids and heteropolyacids – Structure and bonding of isopoly and 6- and 12 Heteropolyanions. **Rings:** Phosphazenes, Linear and Cyclic phosphazenes, Phosphazene Polymers. **Polymers:** Silicates – Structure and Properties – Correlation – Distinction between 2D and 3D silicates, Zeolite types and examples, Shape selectivity in zeolites, Silicones and their applications. **Cages:** Structures and classification of higher boranes, carboranes, metallocarboranes – Wade’s rule – Stylx number. **Clusters:** Metal Clusters – Dinuclear, Tetranuclear and hexanuclear clusters – Cubane clusters and Zintl Clusters.

UNIT II: Coordination Chemistry-I**12 hrs**

Stability of complexes, thermodynamic aspects of complex formation, factors affecting stability, HSAB approach. Determination of stability constants by spectrophotometric, polarographic and potentiometric methods. Stereochemical aspects, stereoisomerism in inorganic complexes, isomerism arising out of ligand distribution and ligand conformation, chirality and nomenclature of chiral complexes, optical rotatory dispersion and circular dichroism. Macrocyclic ligands, types, porphyrins, corrins, Schiff bases, crown ethers and cryptates.

UNIT III: Coordination Chemistry – II**12 hrs**

Evidences for metal-ligand orbital overlap, molecular orbital theory and energy level diagrams, concept of weak and strong field ligands, Jahn-Teller distortion, charge - transfer spectra. Russell-Sander’s coupling – L-S coupling and micro states – Ground state terms for $d^1 - d^{10}$ ions – Derivation of terms for p^2 , p^3 , d^1 and d^2 configurations – Hund’s rules in the determination of lowest energy states – Selection rules for electronic transitions – charge transfer transitions - d-d transitions, Orgel and Tanabe - Sugano diagrams, nephelauxetic effect, spectral and magnetic characteristics of transition metal complexes.

Unit – IV: Reaction Mechanism – I**12 hrs**

Substitution reactions of octahedral complexes: Labilities, inertness, stability and instability of coordination compounds- Nature of substitution reactions-Theoretical approach to substitution mechanisms-Mechanism of substitution reactions of complexes of cobalt-acid hydrolysis-base hydrolysis of cobalt (III) complexes. Racemisation and isomerisation: Twist mechanisms for isomerisation – Intramolecular mechanisms for racemisation.

Unit – V: Reaction Mechanism – II**12 hrs**

Substitution reactions of square planar complexes: Reactions of Pt (II) complexes- Trans effect- Theories of trans effect-Mechanism of substitution-kinetics of Pt (II) complexes. Electron transfer reactions-Electron Tunneling hypothesis-Marcus-Hush theory. Atoms transfer reaction-one electron and two electron transfer-inner sphere and outer sphere mechanism.

COURSE OUTCOMES

The student will be able to

- 1) Gain knowledge about the structure and bonding of Inorganic compounds and explain Isopolyacids and heteropolyacids of Vanadium, Chromium, Molybdenum and Tungsten.
- 2) Illustrates the chemistry of metal clusters and discuss polyhedral boranes, carboranes and metallocarboranes
- 3) Explain the stability constant of co-ordination complexes and stereo chemistry for co-ordination complexes
- 4) Apply the molecular orbital theory and energy level diagrams, concept of weak and strong field ligands, Jahn-Teller distortion etc.,
- 5) Illustrate the Substitution reactions of square planar complexes and electron transfer reactions

Text Books

- 1) Huheey, J. E. (1993). *Inorganic Chemistry* (IV Edition.). NY: Harper and Collins.
- 2) Purcell, K. F. & Kotz, J. C. (1977). *Inorganic Chemistry*. USA: WB Saunders Co.
- 3) Gopalan, R. (2001). *Concise Coordination Chemistry*. Vikas Publishing House.
- 4) Lee, J. D. (1991). *Concise Inorganic Chemistry*. US: Springer
- 5) Das, A. K (2016). *Fundamental Concepts of Inorganic Chemistry* (2nd edition., Vol 1, 2 & 3). CBS publisher and Distribution Pvt. Ltd.
- 6) Manku, G.S. (1994) *Theoretical Principles of Inorganic Chemistry*. New Delhi: Tata McGraw Hill Publishing Company Ltd.
- 7) Ray, N. H. *Inorganic Polymers*. Academic Press.

Supplementary Readings

- 1) Cotton, F. A. & Wilkinson, G.W. (1988). Advanced Inorganic Chemistry – A comprehensive Text. John Wiley & Sons
- 2) Shriver, M. C., Atkins, P.W & Langford, CH. (1990). Inorganic Chemistry. Oxford University Press.
- 3) Greenwood, N. N. & Earnshaw. (1984). Chemistry of the Elements. New York: Pergamon Press,
- 4) Kettle, S. F. A. (1973). Coordination Chemistry. ELBS.
- 5) Dogulas, B. E., McDaniel, D. H., & Alexander J. J. (1983). Concepts and Models of Inorganic Chemistry. Oxford IBH.
- 6) Figgis, B. N. (1966). Introduction to Ligand Fields. Interscience.
- 7) Mutterties, E.L. (1975). Polyhedral Boranes. New York: Academic Press.
- 8) Day, M.C. & Selbin, J. (1974). Theoretical Inorganic Chemistry. New York: Van Nostrand Co.
- 9) Mingos, D. M. P. & Wales, D. J. Introduction to Cluster Chemistry. Prentice Hall.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3
CO2	2	2	3	2	3
CO3	3	2	3	3	2
CO4	2	3	2	3	2
CO5	2	3	3	2	2

SEMESTER: I CORE – III	22PCHC13: PHYSICAL CHEMISTRY –I	CREDIT:3 HOURS:60
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COURSE OBJECTIVES

- 1) To understand the theories of chemical kinetics in reaction mechanisms.
- 2) To apply the kinetic concepts in homogenous and heterogeneous catalyzed reactions.
- 3) To study about Surface Chemistry, surface tension and catalysis.
- 4) To identify the symmetry of elements, symmetry operations and apply the fundamentals of group theory in electronic spectroscopy
- 5) To appreciate the principals involved in the Rotational and vibrational spectroscopic techniques.

UNIT I: Chemical Kinetics – I

12 hrs

Theories of reaction rates and factors influencing the reaction rate: ARRT (Eyring's theory), Thermodynamic derivation of ARRT-comparison of ARRT with collision theory (A , ΔS^\ddagger , E_a and ΔH^\ddagger) – kinetic isotope effects, Marcus electron transfer theory-inner and outer electron transfer. Theory of unimolecular reactions-Lindemann's theory – Steady State approximation-chain reactions-photochemical reaction between hydrogen and halogens (Cl_2 and Br_2) – gas phase auto-oxidations, explosions-hydrogen-oxygen reaction.

UNIT II: Chemical Kinetics – II

12 hrs

Application of ARRT to solution kinetics-effects of solvents, double sphere model, effect of ionic strength on ionic reactions – influence of pressure on reaction rates in solution-significance of volume of activation-substituent effects – Hammett and Taft equations. Homogeneous catalysis, acid-base catalysis – types and mechanism, derivation of rate law for protolytic acid catalysis and explanation for Arrhenius and van't Hoff intermediates, Bronsted relations- Hammett-Dearyuk acidity function – enzyme catalysis-mechanism of single substrate reaction-Michaelis-Menton equation - Influence of pH, concentration and temperature, Line Waver plot and Eddi – Hofstee plot. Fast reactions-study of kinetics by stopped flow technique, relaxation methods, T and P- jump methods, flash photolysis and magnetic resonance method.

UNIT III: Surface Chemistry

12 hrs

Adsorption-physisorption and chemisorptions – Langmuir, BET & Gibbs adsorption isotherms- surface area determination – Heat of adsorption, determination. Adsorption from solutions - surface films. Surface tension – effect of electrolytes, non-electrolytes and surface-active agents –micelles and reverse micelles. Solubilisation, micro emulsions Heterogeneous catalysis – semiconductor catalysis, n-and p-type surfaces – kinetics of surface reactions involving adsorbed species – Langmuir - Hinshelwood mechanism. Langmuir – Rideal mechanism and Rideal - Eley mechanisms.

UNIT IV: Group Theory**12 hrs**

Group theory -symmetry of elements and symmetry of operations, point groups of molecules, properties of a group and sub-group, isomorphism, cyclic, abelian, class- similarity transformation and conjugate, matrix representation – product of symmetry operations, group multiplication tables (C_n , C_{nv} and D_{nh} only) - great orthogonality theorem and its consequences, construction of character tables (C_{2v} and C_{3v}). Direct products– reducible and irreducible representation - Wave function as bases for irreducible representation. Transition moment integral – spectroscopic selection rules to IR, Raman (H_2O , NH_3 , trans- N_2F_2) and electronic spectroscopy (HCHO). Hybridization schemes of orbitals – (sp , sp^2 and sp^3 for ethylene and butadiene).

UNIT-V: Rotational and Vibrational Spectroscopy**12 hrs**

Basic aspects of Spectroscopy-characterization of electromagnetic radiation, quantization of energy. Microwave Spectroscopy-Rotation of molecules and selection rules, Diatomic molecules; Rigid and non-rigid rotator, Rotational constant and centrifugal distortion. Techniques and instrumentation. Vibrational spectroscopy-diatomic molecules, Harmonic and a harmonic oscillator, zero-point energy - force constant -fundamental absorption and overtones (hot bands, fermi resonance)- polyatomic molecules-techniques and instrumentation of FTIR.

COURSE OUTCOMES

At the completion of this course, the students will be able to

- 1) derive the rate equation from mechanistic data and calculation
- 2) relate microscopic properties of molecules with macroscopic thermodynamic observables
- 3) gain knowledge about the Surface Chemistry and its mechanisms.
- 4) apply group theory for molecules like water, ethylene, butadiene etc...
- 5) imbibe basic aspects of spectroscopy and apply to poly atomic molecule

Text Books

- 1) Philip Mathews. (2003). *Advanced Physical Chemistry*. New Delhi: Foundation Books.
- 2) Puri, R., Sharma, L.R., & Pathania, M.S. (2017). *Principles of Physical Chemistry*. Jalandar: Vishal Publishing Co.
- 3) Raman, K.V. (2000). *Group Theory and its Application to Chemistry*. New Delhi: Tata McGraw-Hill.
- 4) Aruldas, G. (2002) *Molecular Structure and Spectroscopy*. New Delhi: Prentice Hall.

Supplementary Readings

- 1) Cotton, F.A. (2008). *Chemical Applications to Group Theory*. New York: John Wiley and Sons.
- 2) Carter, R. L (2009). *Molecular symmetry and Group Theory*. New York: John Wiley and Sons.
- 3) Douglas, B. E. & Hollingsworth, C.A. (2012). *Symmetry in Bonding and Spectra- an Introduction*. Academic Press
- 4) Silbey, R. J., & Alberty, R. A. (2006). *Physical Chemistry*. New York: John Wiley and Sons.
- 5) Barrow, G. M. (1964). *Introduction to Molecular Spectroscopy*. New York: McGraw-Hill.
- 6) Banwell, C.N. & McCash, E.M. (2000). *Fundamentals of Molecular Spectroscopy* (4th Edition.). New Delhi: Tata McGraw-Hill.
- 7) Raman, K.V., Gopalan, R. & Raghavan, P.S. (2004). *Molecular Spectroscopy*. Singapore: Thomson and Vijay Nicol.
- 8) Levine, I. N. (1974). *Molecular Spectroscopy*. New York: John Wiley and Sons.
- 9) Rahman, A. (1986). *Nuclear Magnetic resonance- Basic Principles*. New York: Springer-verlag.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	3	3	3	3	2
CO3	2	3	2	2	2
CO4	2	3	2	2	3
CO5	2	2	2	3	3

SEMESTER: I CORE PRACTICAL - I	22PCHC14: ORGANIC CHEMISTRY PRACTICAL - I	CREDIT: 3 HOURS: 70
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COURSE OBJECTIVES

To learn to synthesise Organic molecules with the available substrates.

Any Six preparations from the following:

- 1) p-Nitroacetanilide from Aniline (Acetylation and Nitration)
- 2) Acetylsalicylic acid from methyl salicylate (Hydrolysis and Acetylation)
- 3) 1,3,5-tribromo benzene from aniline (Bromination, Diazotisation and Hydrolysis)
- 4) p-Bromoacetanilide from aniline (Acetylation and Bromination)
- 5) p-Bromoaniline from acetanilide (Bromination and Hydrolysis)
- 6) m-Nitrobenzoic acid from methyl benzoate. (Nitration and Hydrolysis)
- 7) p-Nitroaniline from acetanilide (Nitration and Hydrolysis)
- 8) Bezanilide from benzophenone (Rearrangement)
- 9) m-Nitrobenzoic acid from benzaldehyde (Oxidation and Nitration)

Preparations with Green chemistry procedures:

- 10) Synthesis of Salicylic acid from Methyl salicylate
- 11) Bromination of p-Bromoacetanilide from Acetanilide using CAN and KBr.
- 12) Synthesis of Anisalacetophenone from Acetophenone and p-Methoxy benzaldehyde
- 13) Synthesis of 3,5-Dimethylpyrazole from Acetylacetone and Hydrazine hydrate.

(Students are expected to submit recrystallized sample of the final products at the time of practical examination for the evaluation by the examiner).

COURSE OUTCOMES

At the end of the course, the student will be able to

- 1) Acquire basic laboratory skills required to carry out organic reactions.
- 2) Independently perform two step organic preparations.
- 3) Analyse the mechanisms of reactions.
- 4) Gain the expertise to solve specific research problems.
- 5) Synthesise molecules with green chemistry procedures.

Text Books

- 1) Vogel, A. I., Tatchell, A. R., Furnis, B. S., Hannaford, A. J., & Smith, P.W.G. (2005). *Vogel's Textbook of Practical Organic Chemistry* (5th Ed.). Chennai: Pearson.
- 2) Mukherjee, A. (2019). *Organic Chemistry with Green Chemistry*. Chennai: Narosa Publishing House.

Supplementary Readings

- 1) Ahluwalia, V. K., Bhagat, P., & Aggarwal, R. (2005). *Laboratory Techniques in Organic Chemistry*. New Delhi: I.K. Int.
- 2) Gnanaprakasam, N. S., & Ramamurthy, G. (2000). *Organic Chemistry Lab Manual*. Chennai: S.V. Printers.

SCHEME OF VALUATION

Semester Examination	Marks (60)
Preparation	40
Viva - voce	10
Record	10
Total	60

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	3
CO2	3	3	2	2	3
CO3	3	2	2	3	2
CO4	2	2	3	3	2
CO5	3	3	3	3	2

SEMESTER: I CORE PRACTICAL – II	22PCHEC15: PHYSICAL CHEMISTRY PRACTICAL- I	CREDIT: 3 HOURS: 70
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COURSE OBJECTIVES

To learn the operations of instruments for calculating physical parameters.

- 1) To impart skills in evaluation of physical parameters by various methods.
- 2) To adopt different methods for validation of results.

Physical Chemistry Practical-I

- 1) Determination of cell constant-conductometric method
- 2) Conductometry-Dissociation constant of weak electrolyte (verification of Ostwald's dilution law)
- 3) Conductometry-Verification of DHO equation – Equivalent conductance of strong electrolyte
- 4) Conductometric titration of HCl against NaOH.
- 5) Conductometric titration of CH₃COOH against NaOH.
- 6) Conductometric titration of NH₄OH against HCl.
- 7) Neutral salt effect - Kinetics of reaction between iodide and Persulphate - Effect of ionic strength on rate constant.
- 8) Polarimetry -Kinetics of inversion of Cane sugar.
- 9) Kinetics of iodination of acetone.
- 10) Kinetics of hydrolysis of ester - Comparison of acid strengths.
- 11) Determination of Arrhenius parameters - Hydrolysis of methyl acetate by acid.
- 12) Study of the equilibrium constant of the reaction: $KI + I_2 \rightleftharpoons KI_3$.
- 13) Kinetics of decomposition of sodium thiosulphate using 0.5N HCl.

COURSE OUTCOMES

At the end of this course, the students will be able to

- 1) Interpret the experimental data of various physical parameters
- 2) Analyse the physical parameters quantitatively and qualitatively
- 3) Identify the suitable methodology to measure and characterise the physical parameters.

Text Books

- 1) Levitt, B.P. (1985). *Findlay's Practical Physical Chemistry*, (9th Ed.). London: Longman
- 2) Gurtu, J. N., & Kapoor, R. (1987). *Advanced Experimental Chemistry* (Vol.I). New Delhi: S. Chand & Co
- 3) Sundaram, Krishnan, Raghavan, (1996). *Practical Chemistry (Part II)* S. Viswanathan and Co. Pvt. Ltd.

Supplementary Readings

- 1) Shoemaker, D. P., Garland, C. W., & Nibler, J. W. (1989). *Experiments in Physical chemistry* (5th Edition.). McGraw- Hill Book company.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	2	2
CO2	2	3	3	3	2
CO3	3	2	2	2	3
CO4	3	2	2	3	2
CO5	2	3	3	2	2

SCHEME OF EVALUATION:

UNIVERSITY EXAMINATION	Marks
Procedure	10
Manipulation	15
Result	20
Record	05
Viva voce	10
Total	60

INTERNAL ASSESSMENT	Marks
Attendance / Regularity	20
Results accuracy	20
Total	40

SEMESTER: I CORE ELECTIVE – I	22PCHEE16-1: POLYMER CHEMISTRY	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

- 1) To provide a thorough understanding of the basic concept of polymers
- 2) To gain knowledge about the different polymerization mechanisms
- 3) To learn the molecular weight determination and characterization of polymers.
- 4) To exploit the polymer processing techniques for various applications.
- 5) To study the importance of advanced polymers

UNIT I Introduction to polymer science

12 hrs

Classification - Some basic definitions - Addition and condensation polymerizations and copolymerization -. Molecular forces in polymers - functionality- degree of polymerization- polymers tacticity -Polymerization techniques - Emulsion, bulk, suspension and solution polymerization. High-temperature inorganic polymers - Preparation, properties, structure and applications of silicone polymers.

UNIT II: Kinetics and mechanism of polymerization

12 hrs

Polymerization - Definition - Types - Chain and step polymerization. Mechanism of ionic, radical, coordination polymerization (Ziegler-Natta catalyst), polycondensation and polyaddition polymerization. Kinetics of ionic and radical polymerization. Kinetic chain length and degree of polymerization. Copolymers - Block and graft copolymers - Kinetics of copolymerization.

UNIT III: Molecular weight and Characterization of polymers

12 hrs

Molecular weight of polymers - Number average and weight average molecular weight of polymers. Determination of molecular weight of polymers by GPC and Viscometry methods - Thermal analysis of polymers using DSC - Crystalline melting point (T_m) - Glass transition temperature (T_g) - Measurement of T_g - Relation between T_m and T_g - Crystallinity in polymers.

UNIT IV: Polymer processing techniques

12 hrs

Polymer additives - Fillers, plasticizers, stabilizers, colorants and anti-oxidants, lubricants - functions and examples. Compounding - Processing techniques - Calendaring, die casting, rotational casting, film casting, injection moulding, compression moulding, blow moulding, extrusion moulding, foaming, thermos-foaming, reinforcing and fiber spinning.

UNIT V: Advanced polymers

12 hrs

Polyelectrolytes - Conducting polymers - Biodegradable polymers - Heat resistant polymers. - Polymer blends - Polymer nanocomposites. Biomedical polymers - Artificial organs - Artificial heart, kidney, skin and cells- Contact lens - Dental polymers - Polymers for controlled drug delivery. Polymers in separation - Polymeric membranes for Reverse Osmosis, Gas separation and liquid separation.

COURSE OUTCOMES

On completion of the course, students should be able to

- 1) Understand the basic concept of polymers and the chemistry of organic and inorganic polymers
- 2) Understand the kinetics and mechanism of various polymerization techniques.
- 3) Choose an appropriate analytical method to characterize polymers.
- 4) Select an appropriate moulding technique to process a particular polymer.
- 5) Realize the importance of advanced polymers.

Text Books

- 1) Billmeyer, F. W. (2010). *Text Book of Polymer Science* (3rd Ed., Unit I to IV.). New Delhi: Gurukripa Enterprises
- 2) Allock, H. R., Lampe F. W., & Mark J. E. (2005). *Contemporary Polymer Chemistry* (3rd Ed, Unit V.). Pearson Education.
- 3) Misra, G.S. (2008). *Introductory Polymer chemistry*. New Age International Pvt. Ltd.
- 4) Kumar. A., & Gupta, R. K. (2003). *Fundamentals of polymer engineering* (revised and expanded edition.). New Delhi: Tata McGraw Hill Publication Ltd.

Supplementary Readings

- 1) Gowariker, V. R., Viswanathan, N. V. and Sreedhar, J. (2014). *Polymer Science*. New Age International Publishers.
- 2) Fried, & Joel, R. (2000). *Polymer Science and Technology*. New Delhi: Phi Learning Pvt. Ltd.
- 3) Mathur G. N., (2000). *Recent Advances in Polymers and Composites*. New Delhi: Allied Publishers.
- 4) Sinha, R. (2002). *Outlines of Polymer Technology*. New Delhi: Phi Learning Pvt. Ltd.
- 5) Tager, A. (1972). *Physical Chemistry of Polymers*. MIR Publications.
- 6) Seymour, R. H., & Charaher, C. E., (2003). *Polymer Chemistry* (6th Ed.). Marcel Dekker Inc.
- 7) Stuart & Barbara. (2010). *Polymer Analysis*. New Delhi: Wiley India
- 8) Odian, G. (2007). *Principles of Polymerisation* (IV Edition.). New Delhi: Wiley Student Edition.
- 9) Arora, M. G., Singh M., & Yadav, M. S. (2003). *Polymer Chemistry* (II revised Edition.). Anmol Publications Pvt. Ltd.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3
CO2	3	3	2	3	2
CO3	2	3	3	2	3
CO4	2	3	3	2	2
CO5	3	2	2	3	2

SEMESTER: I CORE ELECTIVE – I	22PCHEE16-2: MATERIALS CHEMISTRY	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

- 1) To understand the basics of crystal structures and their defects.
- 2) To learn various crystal growth and thin-film techniques.
- 3) To study the diffusion and electronic properties of nanomaterials
- 4) To gain knowledge about magnetic properties and dielectric properties of Nanomaterials.
- 5) To study Nanocomposites and their functional applications

UNIT I: Crystal structures

12hrs

Crystal geometry: crystal lattices, space lattices, basis and crystal structure, unit cell, lattice parameter of a unit cell - Seven crystal systems - Bravais lattices - Crystal directions and crystal planes (Miller indices) - Coordination number, radius ratio, packing factor - Some special crystal structures - Calculation of lattice constant - Crystallographic nomenclature - Determination of crystal structure by X-ray diffraction - Imperfections/defects in crystalline solids.

UNIT II: Crystal Growth and Thin film techniques

12 hrs

Solution growth method, melt growth method - Bridgeman method – Vapour deposition technique. Production of thin films: Thermal evaporation – Chemical vapour deposition – Spray pyrolysis – Spin coating method. Inert gas condensation, Arc discharge, RF- plasma, Plasma arc technique, Ion sputtering, Laser ablation, Laser pyrolysis, DC & RF Sputtering, Molecular beam epitaxy (MBE).

UNIT III: Diffusion properties

12 hrs

Laws of diffusion, diffusion mechanism, ionic conductivity, relation between ionic conductivity and diffusion coefficient, experimental determination of diffusion coefficient, applications of diffusion. **Electronic Properties:** Concept of energy band diagram for materials: Conductors, semiconductors and insulators - Classification of semiconductors – Electronic conductivity - band gap determination - Hall effect and its determination. **Optical Properties:** Photoluminescence, Jablonski diagram, fluorescence and phosphorescence – Electroluminescence.

UNIT IV: Magnetic properties

12 hrs

Fundamentals of magnetism - Different kinds of magnetism: dia, para, ferro, ferri and anti-ferromagnetic materials - Magnetic hysteresis – Classification of magnetic materials: hard and soft magnetic materials – Super paramagnetism. **Dielectric Properties:** Effect of particles on dielectric properties, Ferro-electrics, piezo-electric, pyro-electric and multi-ferroics. **Mechanical behavior:** Stress-strain behavior, tensile strength, toughness, microhardness, wear resistance of solids materials; **Thermal properties:** Heat capacity of solids, thermal conductivity and thermal expansion of solids.

UNIT-V:Nanocomposites**12 hrs**

Introduction to Nanocomposites, Types of Nanocomposites - Methods for producing Nanocomposites - Properties of Nanocomposites. **Polymer Nanocomposites:** Polymer/ Metal oxide nanocomposites - Polymer/CNTs nanocomposites - Polymer/Nanoclay-based Nanocomposites and their properties and functional applications. **Other Kinds of Nanocomposites: Fractal based Glass- metal nanocomposites - Core-shell structured nanocomposites - Super hard nanocomposites and its designing and improvements in mechanical properties - Self-cleaning nanocomposites - Metal matrix nanocomposites and their mechanical & corrosion resistance properties and functional applications.**

COURSE OUTCOME

On completion of the course the student will be able to

- 1) Understand the basics of crystal structures and their defects.
- 2) Understand the different types of crystal growth and thin film technique.
- 3) Describe the diffusion properties, electronic and optical properties of nanomaterials.
- 4) Describe various physical properties of solid/Nano- Materials.
- 5) identify various types of nano composites

Text Books

- 1) Vijaya, M. S., Rangarajan, G. *Materials Science*. New Delhi: Tata McGraw-Hill publishing company Ltd.,
- 2) Ragavan V., *Materials Science and Engineering*. New Delhi: Prentice-Hall of India(P) Ltd.
- 3) Elliott S. R. (1998). *The Physics and Chemistry of Solids* John. England: Wiley & Sons.
- 4) Mathur, S., & Singh, M. (2008). *Nanostructured Materials and Nanotechnology* (II Eds.). Willey.
- 5) Tilley, Richard J. D., (2004). *Understanding Solids: The Science of Materials*. John Wiley & Sons.
- 6) Koch, C. C. (2002). *Nanostructured Materials*. New York: Noyes Publications.
- 7) Pinnayain, T. J., & Beall, G.W. (2001). *Polymer-Clay Nanocomposites*. New York: Wiley
- 8) Chung, D. D. L. (2002). *Composite Material*. Springer.

Supplementary Readings

- 1) Gersten, J. I., Smith, F. W., & Elliott, S. R. (1998). *The Physics and Chemistry of Materials*. New York: John Wiley & Sons.
- 2) Newnham, R. E. (2005). *Properties of Materials*. Oxford University Press.
- 3) Meyappan, M. (2005). *Carbon Nanotubes Science and Applications*. CRC Press.
- 4) Kittel, C. (2004). *Introduction to solid state physics*. New Delhi: Wiley India Pvt. Ltd.

- 5) Chattopadhyay, K. K., & Banerjee, A. N. (2014). *Introduction to Nanoscience and Nanotechnology*. New Delhi: PHI Learning Private Ltd.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	3
CO2	3	2	2	3	2
CO3	2	2	3	2	3
CO4	3	3	3	3	2
CO5	3	2	3	3	3

SEMESTER: I CORE ELECTIVE – I	22PCHEE16-3: PHARMACEUTICAL CHEMISTRY	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

Enable the student to

- 1) Learn about the drugs and drug targets
- 2) Observe the mechanism of action of drugs and apply it for the drug design and discovery
- 3) Understand the pharmacokinetic and pharmacodynamic parameters in the drug development process
- 4) Gain knowledge about antineoplastic agents
- 5) Acquire the skill of using cardiovascular drugs for further studies.

Unit I: Drugs and drug targets: An overview

12 hrs

Definition of drugs, Classification of drugs, Drug targets- cell structure, at molecular level, Intermolecular bonding forces- Electrostatic ionic forces, hydrogen bonds, Dipole dipole and ion dipole interactions, repulsive interactions, the role of water and hydrophobic interactions, Pharmacokinetic issues and medicine.

Unit II: Drug discovery, Design and Development

12 hrs

Roots of administration of drugs, biotransformation, mechanism of action. Factors prolonging action, excretion & toxicity. Development of new drugs, procedures followed in drug design, concepts of lead compound & lead modification, concepts of prodrugs & soft drugs, Structure Activity Relationship (SAR), factors affecting bioactivity, resonance, inductive effects, isosterism, bio isosterism, and spatial considerations. Theories of drug activity: Occupancy Theory, Rate Theory, induced fit theory. Quantitative Structure Activity Relationship (QSAR) - History & development. Concepts of drug receptors. Elementary treatment of drug receptor interactions.

Unit III: Pharmacokinetics

12 hrs

Introduction to drug absorption, disposition, elimination using pharmacokinetics, important pharmacokinetic parameters in defining drug disposition & in therapeutics. Uses of pharmacokinetics in drug development process. Pharmacodynamics: Introduction, elementary treatment of enzyme stimulation, enzyme inhibition, sulphonamides, membrane active drugs, drug metabolism, xenobiotics, biotransformation, significance of drug metabolism in medicinal chemistry.

Unit IV: Antineoplastic Agents

12 hrs

Introduction, classification, cancer chemotherapy, special problems, role of alkylating agents & anti metabolites in treatment of cancer. Carcinolytic antibiotics & mitotic inhibitors. Synthesis of mechlorethamine, cyclophosphamide, melphalan, uracil, mustards & 6-mercaptopurine. Recent developments in cancer chemotherapy. Hormone & Natural products.

Unit V: Cardiovascular Drugs**12hrs**

Introduction - classification of cardiac glycosides, antiarrhythmic drugs, therapeutic uses. Antihypertensive agents, Vasopressor Drugs – Mechanism of Action. Synthesis of verapamil, methyldopa.

COURSE OUTCOMES

- 1) Identify and extend the applications of drugs and drug target.
- 2) Explain the mechanism of action drug and analyze theories of drug activity.
- 3) Interpret pharmacokinetic parameters and appraise the significance of drug metabolism in medicinal chemistry.
- 4) Classify the antineoplastic agents and integrate the synthesis of drugs to cancer therapy
- 5) Classify and predict the mechanism of action of cardiovascular drugs.

Text Books

- 1) Kar, A. (2007). *Medicinal Chemistry* (4th Edn.). New Age International.
- 2) Satoskar, R. S & Bharkar S. D. (2015). *Pharmacology and Pharmatherapeutics* (24th Edn.). Popular Prakasan.

Supplementary Readings

- 1) Patrick, G. L. (2009). *An Introduction to Medicinal Chemistry* (4th Edn.). Oxford University Press.
- 2) Sriram, D & Yogeewari, P. (2010). *Medicinal Chemistry* (2nd Edn.) Pearson Education.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2
CO2	2	2	3	2	3
CO3	3	2	2	3	3
CO4	2	3	2	2	2
CO5	2	3	3	3	2

SEMESTER: II CORE: IV	22PCHC21: ORGANIC CHEMISTRY – II	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

- 1) To learn about the conformations and reactivity of the substituted six membered ring systems
- 2) To understand the mechanisms of addition and elimination reactions.
- 3) To learn the name reactions with their mechanisms
- 4) To learn the synthetic utilities of various oxidation and reduction reactions.
- 5) To acquire knowledge on the various concepts of reaction kinetics and the HSAB principle.

UNIT I: Stereochemistry– II (Conformational Analysis)**12 hrs**

Conformations of some simple 1,2 – disubstituted ethane derivatives - Gauche effect. Conformational analysis of disubstituted cyclohexane and their stereochemical features (geometrical and optical isomerism (if shown) by these derivatives). Conformation and reactivity of substituted cyclohexanol (oxidation and acylation), cyclohexanone (reduction) and cyclohexane carboxylic acid derivatives (esterification and hydrolysis). Conformation and stereochemistry of cis and trans-decalin and 9 - methyldecalin.

UNIT II: Addition Reactions**12hrs**

Electrophilic, nucleophilic and free radical mechanisms of addition to carbon-carbon multiple bonds – isolated and conjugated multiple bonds. Hydration, hydroxylation, hydroboration. Stereochemical aspects to be studied wherever applicable. Nucleophilic addition reactions of carbonyl compounds: Perkin, Stobbe, Claisen, Dieckmann, Benzoin condensation. Mannich, Reformatsky, Grignard and Robinson Annulation.

UNIT III: Elimination Reactions**12hrs**

E1, E2 and E1cB mechanism - E1, E2 and E1cB spectrum - Orientation of the double bond - Hofmann and Saytzeff rules - Bredt's rule. Competition between elimination and substitution. Typical elimination reactions- dehydration, dehydrohalogenation and dehalogenation. Stereochemistry of E2 eliminations in cyclohexane systems. Mechanism of pyrolytic eliminations. Chugaev and Cope eliminations.

UNIT IV: Oxidation and Reduction**12hrs**

Mechanism – study of the following oxidation reactions–oxidation of alcohols- use of DMSO in combination with DCC and acetic anhydride in oxidising alcohols - oxidation of methylene to carbonyl, oxidation of aryl methanes – Etard reaction – Formation of C = C bonds by dehydrogenation, dehydrogenation by Quinones, Hg(OAc)₂ and Pb(OAc)₄ . Allylic oxidation-SeO₂, Birch reduction, MPV reduction. Catalytic hydrogenation and Sommelet reaction. Selectivity in reduction of 4-t-butylcyclohexanone using selecterides. Reduction with LiAlH₄, NaBH₄, tri tertiary butoxy aluminium hydride, Sodium cyanoborohydride and trialkyl tin hydride.

UNIT V: Quantitative Treatment of Organic Reactions**12 hrs**

Acids and Bases, HSAB, the equilibrium constant, thermodynamic and kinetic control of organic reactions. Hammond postulate, Curtin – Hammett principle. Hammett equation – Application to organic reactions. Methods of determining reaction mechanism –non-kinetic methods- Product of the presence of intermediates-isolation, detection, trapping; cross-over experiments, isotopic labelling and isotope effects, stereo chemical evidences. Kinetic methods - the relation of the rate with the mechanism of the reaction.

COURSE OUTCOMES

At the end of the course the student will be able to,

- 1) Compare the stability and reactivity of different conformers of Cyclohexane derivatives
- 2) Solve problems based on additions to Carbon – Carbon and Carbon – Hetero atom multiple bonds.
- 3) Propose mechanisms and predict the products with proper stereochemistry for various elimination reactions.
- 4) Have a thorough knowledge of using proper reagents for specific Oxidation and Reduction reactions.
- 5) Apply HSAB principle to Organic reactions and have sufficient knowledge on reaction kinetics and mechanism.

Text Books

- 1) Clayden, J., Greeves, N., & Warren, S., (2012). *Organic Chemistry* (2nd Ed.). UK: Oxford University Press.
- 2) Smith, M. B. (2016). *March's Advanced Organic Chemistry* (7th Ed.). New York: John Wiley & Sons.
- 3) Norman, R. O. C., & Coxon, J. M. (2003). *Principles of Organic Synthesis* (3rd Ed.). London (UK): Chapman & Hall.
- 4) Carey, F., & Sundberg, R. J. (2007). *Advanced Organic Chemistry* (5th Ed., Part A & B.). Berlin: Springer Science + Business Media.
- 5) Sykes, P. (2006). *A Guide book to mechanism in organic chemistry*. Pearson Edition.

Supplementary Readings

- 1) Solomons, T. W. G., & Fryhle, C. B. (2011), *Organic chemistry* (10th edition.). John Wiley & Sons, Inc.
- 2) Ingold, C. K. (1994). *Structure and Mechanism in Organic Chemistry* (2nd Ed.). New Delhi: CBS Pub.
- 3) Bansal, R. K. (1980) *Organic Reaction Mechanism* (2nd ed.). McGraw Hill Education India Pvt Ltd.
- 4) Mukherji, S. M., & Singh, S. P. (2016). *Reaction Mechanism in Organic Chemistry* (Revised Ed.). New Delhi: Trinity Press.

- 5) Ahluwalia, V. K., (2012). *Oxidation in Organic Synthesis* (1st Ed.). Florida: CRC Press.
- 6) Ahluwalia, V. K. (2012). *Reduction in Organic Synthesis* (1st Ed.). Florida: CRC Press.
- 7) Bruise, P. Y. (2002). *Organic Chemistry* (3rd edition). New Delhi: Pearson education.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	3
CO2	2	3	2	3	3
CO3	3	3	2	2	3
CO4	2	2	3	3	2
CO5	3	2	2	3	2

SEMESTER: II CORE: V	22PCHC22: INORGANIC CHEMISTRY – II	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVE

- 1) To make the students knowledgeable in solid state chemistry.
- 2) To study about stellar energy, nuclear reactions etc and to equip the students for their future career in nuclear industry.
- 3) To learn the chemistry of lanthanides and actinides
- 4) To understand the inorganic photochemistry.
- 5) To gain knowledge about the bioinorganic complexes.

UNIT I: Solid State Structures and Structural Defects**12hrs**

Ionic bonding, Lattice energy, born equation and its derivation, Limiting radius ratio rules, Radius ratio for trigonal, tetrahedral, octahedral and cubic sites. Structures of some ionic crystals (sodium chloride, caesium chloride, rutile, wurtzite, fluorite). Crystal defects: Stoichiometric defects-Schottky and Frenkel defects – colour centres in alkali halide crystals – Non stoichiometric defects- metal excess and metal deficiency defects – extended defects – line and plane defects.

UNIT II:Nuclear Chemistry**12 hrs**

Nuclear properties: nuclear spin and moments, origin of nuclear forces, nuclear models: liquid drop model and nuclear shell model. Modes of radioactive decay: Orbital electron capture, nuclear isomerism, internal conversion. Detection and determination of activity by cloud chamber, nuclear emulsion, bubble chamber, Geiger-Muller, scintillation and Cherenkov counters. Nuclear reactions: Types, cross section, compound nucleus theory, high energy nuclear, direct nuclear, photonuclear and thermonuclear reactions. Stellar energy: synthesis of elements, hydrogen burning, carbon burning. Nuclear reactors: fast breeder reactors, particle accelerators, linear accelerators, cyclotron and synchrotron. Radio analytical methods: Isotope dilution analysis, radiometric titrations, radio immuno assay. Neutron activation analysis.

UNIT III: Chemistry of Lanthanides and Actinides**12 hrs**

General characteristics of lanthanides-Electronic configuration-Oxidation state - Lanthanide contraction-Lanthanide contraction and its consequences-Term symbols for Lanthanide ions (Derivation not required)-Factors that mitigate against the formation of lanthanide complexes-Electronic spectra and magnetic properties of lanthanide complexes- Lanthanide complexes as shift reagents-Difference between 4f and 5f orbitals-Comparative account of coordination chemistry of lanthanides and actinides with special reference to electronic spectra and magnetic properties.

UNIT IV: Photo Inorganic Chemistry**12 hrs**

Excited states of metal complexes-Energy transfer under conditions of weak interaction and strong interaction-excimer formation. Conditions of the excited states to be useful as redox reactants-photosubstitution, photooxidation and photoreduction- Photochemical reactions involving Ruthenium (II) bipyridyl complex. Application to photovoltaics-water photolysis- carbondioxide reduction.

UNIT V: Bio-inorganic Chemistry**12hrs**

Porphyrin ring system – Metalloporphyrins – hemoglobin and myoglobin – structures and work functions – synthetic oxygen carries – cytochromes – structure and work function in respiration – chlorophyll – structure – photosynthetic sequence – iron-sulphur proteins (non-heme iron protein) – Copper containing proteins – classification – blue copper proteins – structure of blue copper electron transferases – copper proteins as oxidases – Cytochrome.

COURSE OUTCOME

At the end of the course students will be able to

- 1) Explain the solid-state structures and structural defects
- 2) Explain the nuclear models, Categorize the nuclear reactions, radio analytical techniques.
- 3) Describe chemistry of lanthanides and actinides.
- 4) Analyze and interpret the photo inorganic chemistry reactions.
- 5) Describe the chemistry of bioinorganic complexes.

Text Books

- 1) West, A. R. (1991). Basic solid-state chemistry. John Wiley.
- 2) Mallik, W. U., Tuli, G. D., & Madan, R. D. (1992). Selected topics in Inorganic Chemistry. New Delhi: S. Chand and Co.
- 3) Glasstone, S. (1969). Source Book on Atomic Energy, Van Nostrand Co.
- 4) Arnikar, H. J. (2005). Essentials of nuclear chemistry. New Age International (P) Ltd.
- 5) Lee, J. D. (1991) Concise Inorganic Chemistry. US: Springer.
- 6) Pradeep, T. (2007). Nano: The essentials. McGraw Hill Education.
- 7) Adamson. (1975). Concept of Inorganic Photochemistry. New York: Wiley.
- 8) Huheey, J. E. (1993). Inorganic Chemistry (5th Edn.). Harper International.
- 9) Purcell, M. F., & Kotz, C. (1977). Inorganic Chemistry. Saunder.
- 10) Gopalan, R. (2001). Concise Coordination Chemistry. Vikas Publishing House.

Supplementary Readings

- 1) Frielander, G., Kennedy, J. W., & Miller, J. M. (1981). *Nuclear and Radiochemistry*. John Wiley and Sons.
- 2) Cotton, F. A. & Wilkinson, G. W. (1988). *Advanced Inorganic Chemistry – A comprehensive Text*. John Wiley and Sons

- 3) Shriver, M. C., Atkins, P. W., & Langford, C. H. (1990). *Inorganic Chemistry*. Oxford University Press.
- 4) Greenwood, N. N., & Earnshaw. (1984). *Chemistry of the Elements*. New York: Pergamon Press.
- 5) Mathur, N. (2010). *Nanochemistry*. RBSA publishers.
- 6) Sergeev, G. B. (2007). *Nanochemistry*. Elsevier Science and Technology.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	2	2
CO2	2	3	2	2	3
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	2	2	3	3	3

SEMESTER: II CORE: VI	22PCHC23: PHYSICAL CHEMISTRY - II	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

- 1) To know the foundations and the physical and mathematical basis of quantum mechanics and to apply the concepts of quantum mechanics to solve problems in microscopic systems.
- 2) To understand the quantum mechanical approach to the atomic and molecular electronic structure and to know the limitations of quantum chemistry in the evaluation of macroscopic properties
- 3) To know the mechanisms of photo chemical reaction
- 4) To know the construction of phase diagram for one, Two and three component systems
- 5) To understand the catalysis of reactions.

UNIT I: Quantum Chemistry-I**12 hrs**

Mathematical concepts for quantum mechanics – differentiation formula for uv , u/v , $(u+v)$, $\sin x$, $\cos x$, and e^x only – partial differentiation – Euler's reciprocal relation, chain rule (statement only) – Integration methods .Inadequacy of classical mechanics-wave particle dualism – deBroglie's equation – Uncertainty principle – postulates of quantum mechanics -significance of ψ and ψ^2 ; Schrodinger time independent wave equation-Eigen functions and Eigen values - Operators and their properties – linear and Hermitian, angular momentum operators-commutation relations.- orthogonalization and normalization. Applications of wave mechanics to simple systems – Particle in a box - one and three Dimension, Rigid Rotator-Harmonic oscillator - zero-point energy-Hydrogen atom- shapes and nodal properties of orbitals- Bohr's correspondence principle.

UNIT II: Quantum Chemistry – II**12 hrs**

Approximation methods – Variation method-application to one dimensional box, H_2 , H_2^+ and Helium atom -Perturbation method - application to one dimensional box and Helium atom- Born Oppenheimer Approximation-Hartree method and Hartree Fock Self-consistent Field method – many electron atoms-Pauli's principle and Slater determinant. LCAO- MO treatment of hydrogen molecular ion and H_2 -VB treatment of hydrogen molecule - hybridization of orbitals in BeF_2 , BF_3 , CH_4 . Huckel pi-electron theory and its applications to ethylene, butadiene, benzene and allyl system.

UNIT III: Photochemistry**12 hrs**

Differences between photochemical and thermal reactions-Quantum yield-Photophysical processes in electronically excited molecules – Jablonski diagram-energy transfer processes – Radiative and Non-Radiative transitions – Fluorescence-relation to structure- Phosphorescence- conditions for Phosphorescence emission (spin-orbit coupling)- Photosensitization – Stern - Volmer equation derivation for

quenching of luminescence and quenching of chemical reaction and its applications- Chemiluminescence.

UNIT IV: Phase Equilibrium

12 hrs

Phase diagrams for ternary mixtures-Phase rule-methods of reading and rules relating to triangular diagrams-three component system having a pair of partially miscible system-acetic acid-chloroform and water system- three component system having two pairs of partially miscible system-Water-phenol and aniline system-three component system having three pairs of partially miscible system-succinic nitrile-water-ether system- recent applications of ternary phase diagrams in pharmaceuticals.

UNIT-V: Catalysis

12 hrs

Acid - Base catalysis - mechanism of acid - base catalyzed reactions - Bronsted catalysis law. Catalysis by enzymes - Kinetics of enzyme catalyzed reaction - Michaelis - Menten equation and its interpretation. Effect of substrate concentration, pH and temperature on enzyme catalyzed reactions - inhibition of enzyme catalyzed reactions - Competitive, Non-competitive and Uncompetitive inhibition.

COURSE OUTCOMES

At the completion of this course, the students will be able to

- 1) Identify the application of quantum chemistry in MO and VB theories and construct hybridizationschemes.
- 2) Derive the equation for one dimensional and two-dimensional boxes.
- 3) Identify the photo chemical reactions
- 4) Construct the phase diagram for the Three components system.
- 5) Illustrate the use of catalysis in reactions.

Text Books

- 1) Chandra, A. K. (2017). *Introductory Quantum Chemistry*. New Delhi: Tata McGraw-Hill.
- 2) Raman, K.V. (2000). *Group Theory and its Application to Chemistry*. New Delhi: Tata McGraw-Hill.
- 3) Aruldas, G.(2002).*Molecular Structure and Spectroscopy*. New Delhi: Prentice Hall.
- 4) West, D., & Saunders, N. (2017). *Ternary phase diagrams in materials science* (3rd ed.). CRC press.
- 5) Singh, D., Deshwal, B., & Vats, S. (2007). *Comprehensive engineering chemistry*.
- 6) New Delhi: I K International Publishing House.
- 7) Bahl, B., Bhal, A., & Tuli, G. (2008). *Essentials of physical chemistry*. New Delhi: S. Chand & Company Ltd.

Supplementary Readings

- 1) McQuarrie, D. A. (2016). *Quantum Chemistry*. University Science Books.
- 2) Levine, I. N. (2016). *Quantum Chemistry*. Prentice Hall.
- 3) Prasad, R.K.(2010).*Quantum Chemistry*. New Delhi: New Age international (P) Ltd.
- 4) Sen, B. K. (1992). *Quantum Chemistry*. New Delhi: Tata McGraw-Hill.
- 5) Raman, K.V., Gopalan, R., & Raghavan, P. S. (2004). *Molecular Spectroscopy*. Singapore: Thomson and Vijay Nicol.
- 6) Levine, I. N. (1974). *Molecular Spectroscopy*. New York: John Wiley and Sons.
- 7) Rahman, A. (1986). *Nuclear Magnetic resonance- Basic Principles*. New York: Springer-verlag.
- 8) Kuriakose, J. C., & Rajaram, J. C.(1999). *Thermodynamics*. Jalandar Shoban Lal Co.
- 9) Silbey, R. J., & Alberty, A. (2006). *Physical Chemistry*. New York: John Wiley and Sons.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2
CO2	3	3	2	2	3
CO3	2	3	3	3	2
CO4	2	3	2	2	3
CO5	2	3	2	3	2

SEMESTER: II CORE PRACTICAL: III	22PCHC24: ORGANIC CHEMISTRY PRACTICAL - II	CREDIT: 3 HOURS: 75
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COURSE OBJECTIVES

- 1) To learn the methods of separating the components of an organic mixture
- 2) To analyse the organic compounds based on the organic analysis.
- 3) To identify the whether the compound is saturated or unsaturated and aliphatic or aromatic.
- 4) Confirm the particular functional group by confirmatory test.
- 5) To prepare the derivate of that particular functional group.

QUALITATIVE ORGANIC ANALYSIS

Analysis of two component mixture. Separation and systematic analysis of the separated two individual components. Preparation of their derivatives. Determination of b.p. / m.p. for components and m.p. for the derivatives.

COURSE OUTCOMES

At the end of the course, the student will be able to,

- 1) Gain expertise in separating the components of an organic mixture.
- 2) Acquire the necessary practical skills to independently analyse organic compounds.
- 3) Systematically evaluate organic compounds.
- 4) Apply the knowledge in analysing new samples.
- 5) Apply the knowledge in synthesizing new molecules

Text Books

- 1) Vogel, A. I., Tatchell, A. R., Furnis, B. S., Hannaford, A. J., and Smith, P.W.G. (2005). *Vogel's Textbook of Practical Organic Chemistry* (5th Ed.). Prentice Hall. New Delhi.
- 2) Gnanaprakasam, N. S., & Ramamurthy. (2000). *Organic Chemistry Lab Manual*. Chennai: S.V. Printers.

Supplementary Readings

- 1) Mohan, J. (2003). *Organic Analytical Chemistry, Theory and Practice*. New Delhi: Narosa Publishing House.
- 2) Ahluwalia, V. K., Bhagat, P., & Aggarwal, R. (2005). *Laboratory Techniques in Organic Chemistry*. New Delhi: I. K. International.

SCHEME OF VALUATION

Semester Examination	Marks (60)
Separation with suitable Solvent	10
Analysis of compound - 1	15
Analysis of compound - 2	15
Viva - voce	10
Record	10
Total	60

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
C01	3	2	3	2	3
C02	2	3	2	3	2
C03	3	3	3	2	2
C04	2	3	2	3	3
C05	3	2	3	3	3

SEMESTER: II CORE PRACTICAL: IV	22PCHC25: INORGANIC CHEMISTRY PRACTICAL - I	CREDIT: 3 HOURS: 75
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COURSE OBJECTIVES

To get the skill in the identification of cations including rare earth metals and to develop the skill in the preparation of metal complexes.

Semi Micro Qualitative Analysis

Mixture containing two common cations and two of the following less familiar cations.

Se, Te, W, Mo, Be, Ti, Ce, Th, Zr, U, V, Tl and Li.

Preparation of the followings:

- 1) Tris(thiourea)copper (I) chloride
- 2) Potassium trioxalatoferrate
- 3) Tetraamminecopper (II) sulphate
- 4) Microcosmic salt
- 5) Chrome alum
- 6) Trans-Diaquadioxalatochromate (III)

COURSE OUTCOMES

At the end of the course, the student will be able to

- 1) Acquire the necessary practical skills to independently analyze inorganic compounds
- 2) Gain expertise in the systematic analysis of inorganic compounds.
- 3) Apply the knowledge in industries.
- 4) Gain knowledge on the preparation of complexes

Text Books

- 1) Ramanujam, V, (1988), *Inorganic Semi Micro Qualitative Analysis*, National Pubs. Chennai.
- 2) Vogel, A.I. (1989), *Text Book of Quantitative Inorganic Analysis*, 5th Ed., Longman, UK.

SCHEME OF VALUATION

Semester examination	Marks (60)
Qualitative Analysis	30
Preparation	10
Viva	10
Record	10

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	3
CO2	2	3	2	2	2
CO3	2	2	2	2	3
CO4	2	2	2	2	2
CO5	3	2	3	3	3

SEMESTER: II CORE ELECTIVE-II	22PCHEE26 -1: GREEN CHEMISTRY	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

Enable the students to

- 1) Understand the basic principles and importance of green chemistry for industrial applications
- 2) Acquire knowledge about the microwave and ultra sound assisted synthesis
- 3) Understand the concept of phase-transfer catalysis
- 4) Gain knowledge about ionic liquids, green reagents,
- 5) Crown ethers and their applications

Unit I: Green Chemistry**12hrs**

Definition, need for green chemistry, basic principles, Explanation of twelve basic principles -atom efficiency process & atom economy- rearrangement, addition, substitution, elimination. Planning green Synthesis- preventing Waste, use of benign solvent, use of catalyst, minimum energy- use of polymer supported reagents. Green Synthesis in water –Wittig - Horner reaction, Heck reaction, Claisen rearrangement, Electrochemical synthesis, Weiss Cook reaction.

Unit II: Microwave Induced Green Synthesis**12 hrs**

Introduction- microwave assisted reactions in water – Hoffmann elimination, hydrolysis, oxidation, reactions in organic solvents- esterification, Diel's Alder reaction, decarboxylation, Baylis-Hillman reaction, Knoevenagel condensation, ortho ester Claisen rearrangement, Synthesis of β - lactams, benzodiazepin-2 ones, jusminaldehyde, isopropylidene glycol and Fries rearrangement. Green reagents: Dimethylcarbamate, polymer supported reagents, Polymer supported catalysts.

Unit III: Ultrasound Assisted Green Synthesis**12 hrs**

Introduction-Instrumentation, The physical aspects, Types of sonochemical reactions, Homogeneous sonochemical reactions, Heterogeneous liquid- liquid reactions, Heterogeneous liquid- solid reactions. Ionic liquids: Introduction, Types of ionic liquids, preparation of ionic liquids, Selection of suitable ionic liquid for a particular reaction- The Baylis- Hillman reaction in ionic liquids, Knoevenagel condensation, Claisen Schmidt condensation, Horner- Wordsworth- Emmons reaction in ionic liquids, applications in organic synthesis - Alkylation, Oxidation, hydrogenation, carbon - carbon double bond forming reactions. advantages & disadvantages of ionic liquids.

Unit IV: Phase transfer catalysts**12 hrs**

Introduction, definition, mechanism of phase transfer catalysed reaction, types and advantages of phase transfer catalysts, types of phase transfer catalysed reactions, preparation of phase transfer catalysts, applications of phase transfer catalysis in organic synthesis- Nitriles, azides, alcohols from alkyl halides and addition to olefins

Unit V: Green Crown ethers**12 hrs**

Introduction, nomenclature, special features, nature of donor site, general synthesis of Crown ethers -synthesis of [12] Crown- 4, [18] Crown -6 and cryptates. Synthetic applications – esterification, saponification, KMnO_4 oxidation, Elimination reaction, Generation of carbenes, and O, C-Alkylations. **synthesis in industries:** Synthesis of Adipic acid, synthesis of ibuprofen, synthesis of methyl methacrylate, Synthesis of sebacic acid, Synthesis of Prednisolone

COURSE OUTCOMES

- 1) Define green chemistry and explain basic principles
- 2) Discuss and appraise green reagents and microwave assisted green synthesis
- 3) Analyse the synthetic applications of ultra sound assisted green synthesis and ionic liquids.
- 4) Apprise the advantages and applications of phase transfer catalysis in organic synthesis.
- 5) Suggest crown ethers for different reactions in organic synthesis.

Text Books

- 1) Aluwalia, V. K. (2021). *Green Chemistry A Text Book* (6th reprint.). Narosa Publications.
- 2) Ahluwalia, V. K. (2012). *Environmentally Benin reactions* (2nd edn.). Ane Publications.
- 3) Ahluwalia, V. K., & Kidwai, M. (2012). *New trends in Green Chemistry* (Reprint.). Anamaya Publishers.

Supplementary Readings

- 1) Ahluwalia, V. K., & Aggarwal, R. (2012). *Organic Synthesis - Special Techniques* (2nd edn reprint.). Narosa Publishers.
- 2) Sanghi, R. & Srivastava, M. M. (2012). *Green Chemistry: Environmentally Friendly Alternatives* (4th Edn.). Narosa Publishers.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	3
CO2	3	3	3	2	2
CO3	2	2	2	2	2
CO4	2	3	2	3	3
CO5	3	2	2	2	2

SEMESTER: II CORE ELECTIVE-II	22PCHEE26-2: SUPRA MOLECULAR CHEMISTRY	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

- 1) To enable the students to gain knowledge about supramolecular interactions.
- 2) To enable the students to understand about the binding of Host molecules and synthesis various supramolecules.
- 3) To enable the students to visualise the bonding interactions, design, synthesis of crystal engineering of supramolecules.
- 4) To enable the students to learn the mechanism and function of supramolecules as Molecular devices.
- 5) To enable the students to acquire knowledge about biological mimics and supramolecular Catalysis.

UNIT I: Supramolecular Interactions

12 hrs

Definition of supramolecular chemistry. Classification of supra molecular host - guest compounds, Cooperativity and chelate effect, preorganisation and complementarity. Nature of binding interactions in supramolecular structures: ion-ion, ion-dipole, dipole-dipole, H-bonding, cation- π , anion π - π , π - π , van der Waals interactions and Closed Shell interactions.

UNITII: Binding of Hosts and Its Synthesis

12hrs

Binding of cationic, anionic, ion pair and neutral Host molecules. Nomenclature of cation binding macrocycles, selectivity of cation complexation, Synthesis- The template effect and High dilution methods, Synthesis and structure of crown ethers, lariat ethers, podands, cryptands, spherands, calixarenes, cyclodextrins, cyclophanes, cryptophanes, carcerands and hemicarcerands.

UNIT III: Crystal Engineering

12 hrs

Introduction, Tectons and synthons, The role of H-bonding and other weak interactions. Self-assembly in synthetic systems: design, synthesis and properties of the molecules, self-assembling coordination compounds, self-assembling by H-bonding, metal-ligand interactions and other weak interactions, metallomacrocycles, catenanes, rotaxanes, helicates and knots.

UNT IV: Molecular Devices

12hrs

Philosophy of molecular devices, Supramolecular photochemistry- mechanism of energy and electron transfer, Bimetallic systems and mixed Valence, Bipyridine and friends as device components, Bipyridyl type Light harvesting devices, Light conversion devices, Information and signals: Semiochemistry and sensing, molecular electronic devices, molecular wires, molecular rectifiers, molecular switches, molecular logic.

UNIT V: Biological Mimics and Supramolecular Catalysis**12 hrs**

Relevance of supramolecular chemistry to mimic biological systems, Characteristics of Biological models, cyclodextrins as enzyme mimics, ion channel mimics, supramolecular catalysis- Abiotic supramolecular catalysis, dynamic combinatorial libraries, Self-replicating systems, Emergence of life. Examples of recent developments in supramolecular chemistry from current literature.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

- 1) Recognize the various supramolecular interactions.
- 2) Perceive the binding of Host molecules and apply it for the synthesis of various supramolecules.
- 3) Comprehend the bonding interactions, to design the synthesis of crystal engineering of supramolecules.
- 4) Appreciate the role of supramolecular chemistry in the design of molecular device.
- 5) Identify the role biological mimics and the significant applications of supramolecular catalysis in research.

Text Books

- 1) Steed, J. W., & Atwood, J. L. (2000). *Supramolecular Chemistry*. John Wiley and Sons.
- 2) Lehn, J. M. (1995). *Supramolecular Chemistry - Concepts and Perspectives*. Wiley-VCH.
- 3) Beer, P. D., Gale, P. A., & Smith, D. K. (1999). *Supramolecular Chemistry*. Oxford University Press.

Supplementary Readings

- 1) Ariga, K., & Kunitake, T. (2006). *Supramolecular Chemistry - Fundamentals and applications* Advanced text Book. Heidelberg: Springer berlin.
- 2) Kubik, S. (2021). *Supramolecular Chemistry- From concepts to Applications*. De gruyter.
- 3) Das, A. K., & Das. M. (2017). *An introduction to Supramolecular Chemistry*. CBS Publications

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	2	2
CO2	2	2	2	2	3
CO3	2	3	3	3	2
CO4	3	2	2	2	3
CO5	2	3	3	3	2

SEMESTER: II CORE ELECTIVE-II	22PCHEE26-3: NANO CHEMISTRY	CREDIT: 3 HOURS: 60
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COURSE OBJECTIVES

- 1) To understand the scientific background, classification and properties of nanomaterials
- 2) To gain knowledge about special nonmaterial's and to identify the bonding in nanostructure
- 3) To acquire knowledge about various methods of synthesis of nanomaterials
- 4) To learn characterization techniques used for nanosystems
- 5) To study various industrial applications of nanotechnology

UNIT I: Introduction to Nanoscience**12 hrs**

Introduction, length scale of different structures, definition of Nanoscience and nanotechnology - Electronic structure of various nanostructures - Classification of Nanomaterials: Dimensionality and size dependent phenomena; zero-, one- and two-dimension Nano-structures; Top down and bottom-up synthesis methods - Size dependent variation in mechanical, physical and chemical, magnetic, electronic transport, reactivity etc. - Biological nanostructures, polypeptide nanowires and protein nanoparticles.

UNIT II: Special Nanomaterials**12 hrs**

Fullerenes and Carbon nanotubes. Micro and Mesoporous Materials: Core-shell structures; **Bonding in Nanostructures:** Bonding in Graphene – Carbon Nanotubes-Inorganic nanotubes: Silica nanotubes, boron nitride nanotubes, Nanotubes of Chalcogenides, and Nanotubes of several metal oxides – Functionalization of CNTs and Graphene.

UNIT III :Synthesis of Nanomaterials**12 hrs**

Chemical precipitation and co-precipitation, Sol-Gel synthesis; Microemulsions synthesis, Hydrothermal, Solvothermal synthesis methods, Microwave assisted synthesis; Sonochemical assisted synthesis, Quantum dot (QDs) synthesis, Bio-synthesis – Exploitation methods for the preparation of 2D Nano-materials.

UNIT IV: Nanostructured materials Characterization Techniques**12 hrs**

X-ray diffraction (XRD), SEM, EDAX, TEM, FTIR, UV-Visible spectrophotometer, Laser Raman Spectroscopy, Differential Scanning Calorimeter (DSC), Differential Thermal Analyzer (DTA), Thermo gravimetric Analysis (TGA), TEM, X-ray Photoelectron Spectroscopy (XPS), Atomic force microscopy (AFM), BET analyzer.

UNIT V: Industrial Applications of Nanotechnology**12hrs**

Applications of Nano-adsorbents and photocatalysts for water and wastewater treatment – Nanoparticles for degradation of solvents and organic compounds – Nanotechnology in Textiles, Cosmetics, Defence, Agriculture, and Food industry, Bio-Medical Engineering.

COURSE OUTCOMES

At the end of the course, the student will be able to

- 1) Discuss on the scientific background on nanomaterials
- 2) Know various methods of synthesis of nanomaterials
- 3) Know the characterization techniques used for nanosystems
- 4) Understand the properties of nanomaterials in depth
- 5) Acquire knowledge in various industrial applications of nanotechnology

Text Books

- 1) Viswanathan, B. (2014) *Nano Materials*. Narosa Publishing House Pvt Ltd.
- 2) Pradeep, T. (2012). *Nano: The Essentials*. Tata MC Graw-Hill Publishing Company limited.
- 3) Niemeyer, C. M., Mirkin, C. A. (2004). *Nanobiotechnology: Concepts, Applications and Perspectives*. Wiley-VCH Verlag GmbH & Co.
- 4) Charles Poole, Jr., & Owens, F. J. (2003). *Introduction to Nanotechnology*. John Wiley and Sons.
- 5) Cao, G., & Wang, Y. (2011). *Nanostructures and nanomaterials: synthesis, properties and applications* (2nd edition.). World Scientific.
- 6) Kuzma, J., & VerHage, P. (2006). *Nanotechnology in agriculture and food production*. Woodrow Wilson International Centre.
- 7) Brown, P. J. & Stevens, K. (2007). *Nanofibers and Nanotechnology in Textiles*. Cambridge: Wood head Publishing Limited.

Supplementary Readings

- 1) Goser, K., Glosekotter, P., & Dienstuhl, J. (2005). *Nanoelectronics and nanosystems: from transistors to molecular and quantum devices*. Springer.
- 2) Dresselhaus, M. S., & Dresselhaus, G. (1996). *Science of fullerenes and carbon nanotubes*. Academic press.
- 3) Altmann, J., & Routledge. (2006). *Military Nanotechnology: Potential Applications and Preventive Arms Control*. Taylor and Francis Group.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2
CO2	2	2	3	2	3
CO3	2	3	3	2	3
CO4	3	2	2	3	2
CO5	2	3	3	2	2

ANNAMALAI UNIVERSITY
MASTER OF SCIENCE
M.Sc. CHEMISTRY
DEGREE COURSE
UNDER CBCS
With effect from 2020-2021

The Course of Study and the Scheme of Examinations

SEMESTER III						CIA	Uni. Exam	Total
16.	Core Theory	Paper-7	3	3	Organic Chemistry- III	25	75	100
17.	Core Theory	Paper-8	4	4	Inorganic Chemistry- III	25	75	100
18.	Core Theory	Paper-9	4	4	Physical Chemistry- III	25	75	100
	Core Practical	Paper-4	5	0	Organic Chemistry Practical- II	-	-	-
	Core Practical	Paper-5	5	0	Inorganic Chemistry Practical- II	-	-	-
	Core Practical	Paper-6	5	0	Physical Chemistry Practical- II	-	-	-
Internal Elective for same major students								
19.	Core Elective	Paper-3	2	3	(to choose 1 out of 3) A. Scientific Research Methodology B. Advanced Bioinorganic Chemistry C. Advanced analytical techniques	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
20.	Open Elective	Paper-3	2	3	(to choose 1 out of 3) A. Industrial Chemistry-II B. Science of Photography C. Energy Resources	25	75	100
21.	** MOOC Courses		-	-		0	0	100
			30	17		125	375	600
SEMESTER IV						CIA	Uni. Exam	Total
22.	Core Theory	Pape-10	4	4	Organic Chemistry- IV	25	75	100
23.	Core Theory	Paper-11	4	4	Physical Chemistry- IV	25	75	100
24.	Core Practical	Paper-4	5	3	Organic Chemistry Practical- II	25	75	100
25.	Core Practical	Paper-5	5	3	Inorganic Chemistry Practical- II	25	75	100
26.	Core Practical	Paper-6	5	3	Physical Chemistry Practical- II	25	75	100
27.	Core	Project	5	5	Project with viva voce (Compulsory)	100 (75 Project)		100

						+25 viva)		
Internal Elective for same major students								
28.	Core Elective	Paper-4	2	3	(to choose 1 out of 3) A. Inorganic Chemistry-IV B. Environmental Chemistry C. Medicinal Chemistry and Drug Design	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
29.	Open Elective	Paper-4	2	3	(to choose 1 out of 3) A. Polymer and plastics B. Basics of Forensic science C. Health Science	25	75	100
				28		175	525	800
				90				2900

* Field Study

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

- (i). Head of the respective department
- (ii). Mentor
- (iii). One faculty from other department

**Mooc Courses

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

SEMESTER IV

PAPER - 10 ORGANIC CHEMISTRY IV

OBJECTIVE:

To know the methods of synthetic strategies and applications. To apply the knowledge of chemical reactions in organic synthesis. To learn the chemistry of terpenes and alkaloids and their importance. To understand the techniques involved in the rearrangements and their synthetic utility. To understand the different chromatographic techniques and their applications. To know the separation and purification methods.

OUTCOMES:

The student will be able to

- *Develop problem solving skills requiring application of chemical reaction.*
- *Acquire knowledge of terpenes and alkaloids.*
- *Elucidate the structure of proteins and nucleic acids.*
- *Solve problems related to molecular rearrangements*
- *Attain skills on separation and purification of organic compounds.*

UNIT-I: MODERN SYNTHETIC METHODS, REACTIONS AND REAGENTS

Synthesis of simple organic molecules using acetylation and alkylation of enamines, Grignard reactions, Diels - Alder reaction, phosphorus and sulphur ylides, Robinson annulation. Retrosynthetic Analysis: Basic principles and terminology of retrosynthesis, one group and two group C-X disconnections, one group C-C and two group C-C disconnections, amine and alkene synthesis. Protection and deprotection of functional groups

(R-OH, R-CHO, RCO-R, R-NH₂ and R-COOH). Uses of the following reagents: DCC, Trimethylsilyliodide, 1,3-Dithiane (Umpolung), and diisobutylaluminiumhydride (DIBAL).

UNIT-II: TERPENES AND ALKALOIDS

Introduction - classification - isoprene rule - structural determination of terpenoids - Citral, geraniol - linalool - farnesol - α -pinene and camphor.

Introduction - isolation of alkaloids - total synthesis of quinine - morphine and reserpine.

UNIT-III PROTEINS AND NUCLEIC ACIDS

Proteins - peptides and their synthesis - synthesis of tripeptide - Merrifield synthesis - determination of tertiary structure of protein - biosynthesis of proteins - nucleic acids - types - DNA & RNA polynucleotide chain - components - biological functions - structure

and role of (genetic code) DNA and RNA (nucleotides only) - Biosynthesis of Cholesterol

UNIT-IV: MOLECULAR REARRANGEMENTS

A detailed study with suitable examples of the mechanism of the following rearrangements: Wagner - Meerwein, Pinacol - Pinacolone, Demjanov, Dienone - phenol, Favorskii, Baeyer - Villiger, Wolff, Hofmann- Lofler-Freytag – Sommet- Hauser-Stevens and Von Richter rearrangements.

UNIT-V: SEPARATION AND PURIFICATION TECHNIQUES

Thin layer chromatography, Gas Chromatography, HPLC, Ion-exchange chromatography- Basic principles and applications.

Distillation: fractional, steam, azeotropic and vacuum distillations. Recrystallization of organic compounds.

Recommended Books:

1. Eric E.Conn, Paul. R. Stumpf, George Bruening and Roy H. Dole, Outlines of Biochemistry, V Edition, John Wiley and Sons.
2. Stuart Warren, Work book for organic synthesis, The Disconnection Approach, John Wiley & Sons (Asia) Pvt. Ltd.
3. I. L. Finar, Organic Chemistry, Vol. II, V Edition ELBS publication.
4. J.March, Advanced organic reaction mechanism and structure, Tata McGraw Hill.
5. L.Smith, Robert L.Hill I. Robert Lehman, Robert J.Let Rowitz, Philip Handlar and Abraham white, Principles of Biochemistry General Aspects, VII Edition McGraw Hill Int.,
6. Lubert Stryer, Biochemistry, Freeman and Co., New York.
7. O.P. Agarwal, Chemistry of organic Natural Products, Goel Publishing House, Meerut.
8. Parmer and Chawla, Organic reaction mechanisms, S. Chand and Co.,
9. Paul de Mayo, Molecular Rearrangements, Vol. I and II.
10. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th Edition, 2005, Saunders College Publishing, New York.
11. Analytical Chemistry, G.D. Christian, 5th ed., 2001 John Wiley & Sons, Inc, India.
12. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, prentice Hall, Inc. New Delhi.
13. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Inidan Reprint. 2003 Pearson Education Pvt. Ltd., New Delhi.
14. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
15. Introduction to Chromatography Theory and practice, V.K.Srivastava, K.K.Srivastava, Chand & Company Ltd , New Delhi
16. S. M. Mukherji and S.P. Singh, Organic Reaction Mechanism, MacMillan India Ltd., Chennai (1990).

PAPER-11

PHYSICAL CHEMISTRY-IV

OBJECTIVE

To study the principles of photochemical reactions. To study the Experimental methods and kinetics studies of photochemical reactions. Study of electrode - electrolytic interface. To study the fundamental principles of quantum chemistry and its application to chemical bonding. Schrödinger wave equation and its applications. To study statistical thermodynamics, quantum statistics and irreversible thermodynamics.

OUTCOMES:

The student will be able to

- *Explain photophysical processes with the help of Jablonski diagram and analyze stern-volmer equation.*
- *Describe photovoltaic, galvanic cell and solar energy conversion.*
- *Illustrate Schrodinger equation and its applications.*
- *Explain Huckel theory of conjugate molecules and compare LCAO and MO theory for diatomic molecules.*
- *Illustrate Einstein and Debye heat capacity models and Derive Sackur tetrode equation.*

UNIT- I: PHOTOCHEMISTRY - I

Absorption and emission of radiation - Franck - Condon Principle - decay of electronically excited states - Jablonski diagram - radiative and non-radiative processes - fluorescence and phosphorescence - spin forbidden radiative transition - Internal conversion and intersystem crossing - energy transfer process - kinetics of unimolecular and bimolecular photophysical processes - excimers and exciplexes - static and dynamic quenching - Stern-Volmer analysis.

UNIT- II: PHOTOCHEMISTRY - II

Experimental methods - quantum yield and life time measurements - steady state principle - quantum yield and chemical actinometry.

Kinetics of photochemical reactions: hydrogen and halogen reactions,

Brief study about photoredox, photosubstitution, photoisomerization and photosensitized reactions - photovoltaic and photogalvanic cells, photo electrochemical cells, photo-assisted electrolysis of water, aspects of solar energy conversion.

UNIT- III: QUANTUM CHEMISTRY - I

Failure of classical mechanics - Compton effect - wave particle duality - uncertainty principle - waves - wave equation for electrons - quantum mechanical postulates - The concept of operators - Hermitian property. Schrodinger wave equation - application of Schrodinger's equation - the particle in a box (one, and three dimensional cases) - particle in a ring, solution to rigid rotor and harmonic oscillator. Schrodinger equation for hydrogen atom (no derivation is required) and the solutions.

UNIT- IV: QUANTUM CHEMISTRY - II

Approximation methods - Perturbation and Variation methods - application to hydrogen molecule and helium atoms. Born - Oppenheimer approximation - valence bond theory for hydrogen molecule - LCAO - MO theory for diatomic molecules. Concept of hybridization - Huckel theory for conjugated molecules (Ethylene, butadiene and benzene).

UNIT- V: STATISTICAL THERMODYNAMICS - II

Thermodynamic functions in terms of partition functions - application of partition function to heat capacity of ideal gases - nuclear partition function - contribution to heat capacity of ortho and para hydrogen. Heat capacity of solids - Einstein and Debye models, Negative Kelvin temperature. Entropy of monoatomic gases - Sackur-Tetrode equation.

Irreversible thermodynamics - forces and fluxes - linear force - flux relation - phenomenological equations.

TEXT BOOKS

N.J.Turro, Modern Molecular Photochemistry, Benjamin, Cumming, Menlo Park, California (1978).

K.K.Rohatgi, Mukherjee, Fundamentals of Photochemistry, Wiley Eastern Ltd., (1978).

R.K. Prasad, Quantum Chemistry, Wiley Eastern, New Delhi (1992).

D.A. Mcquarrie, Quantum Chemistry, University Science Books, Mil Valley, California (1983).

Quantum Chemistry, Allyn and Bacon, Boston (1983).

R.Anantharaman, Fundamentals of Quantum Chemistry, Mac Millan India Limited (2001).

M.W. Hanna, Quantum Mechanics in Chemistry, W.A. Benjamin Inc. London (1965).

M.C.Gupta, Statistical thermodynamics, Wiley Easter, New Delhi (1990).

R.Hasee, Thermodynamics Of Irreversible Process, Addition Wesley, Reading, Mass (1969).

L.K. Nash, Elements of Chemical Thermodynamics, Addison Wesley (1962).

G.M. Barrow, Physical Chemistry, McGraw Hill (1988).

R.L. De Koch and H.B. Gray, Chemical Structure and Bonding, Benjamin- Cumming, Menlo Park, California. S.Glasstone, Text Book of Physical Chemistry.M.Sc. Chemistry: Syllabus (CBCS)

Suggested References

A.K. Chandra, Introductory Quantum Chemistry, Tata Mc Graw Hill.

D.A. Mc Quarrie, Quantum Chemistry, University Science Books, Mill Valley, California (1983).

P.W. Atkins, Molecular Quantum Mechanics, Oxford University Press, Oxford (1983).

J.G.Clavert and J.N.Pitts, Photochemistry, Wiley, London (1966).

R.P.Wayne, Photochemistry, Butterworths, London (1970).

B.J.Mc Clenlland, Statistical Thermodynamics, Chapman and Hall, London (1973).

Cleyde, Physical Chemistry, Schaum Series, Mc Graw Hill (1976).

Dole, Thermodynamics, Prentice Hall, New York (1954).

Prigogine, Introduction to Thermodynamics of Irreversible Process, Interscience, New York (1961).

N.O.Smith, Elementary Statistical Thermodynamics - A Problem Approach, Plenum Press, NewYork (1961).

G.Clavert and J.N.Pitts, Photochemistry, Wiley, London (1966).

R.P.Wayne, Photochemistry, Butterworths, London (1970).

Francis W Sears and Gerhard L Salinger, Thermodynamics, kinetic theory, and statistical thermodynamics.

**CORE PRACTICAL
PRACTICAL PAPER - 4
ORGANIC CHEMISTRY PRACTICAL - II**

I. ANY SIX PREPARATIONS FROM THE FOLLOWING INVOLVING TWO STAGES

1. sym-Tribromo benzene from aniline (bromination, diazotization and hydrolysis)
2. Benzanilide from benzophenone (addition and Beckmann rearrangement)
3. m-Nitro benzoic acid from methyl benzoate (nitration and hydrolysis)
4. 2, 4.- Dinitrobenzoic acid from p-nitrotoluene (oxidation and nitration)
5. m-Nitro benzoic acid from benzaldehyde (oxidation and nitration)
6. Benzil from benzaldehyde (rearrangement)
7. Anthraquinone from phthalic anhydride (Friedel Crafts reaction)
8. Acetyl salicylic acid from methyl salicylate (hydrolysis and acetylation)
9. 2- Phenyl indole from phenyl hydrazine (Fischer indole reaction)
10. m-nitroaniline from nitrobenzene (nitration and reduction)

II. ANY TWO EXERCISES IN THE EXTRACTION OF NATURAL PRODUCTS

1. Caffeine from tea leaves
2. Lactose from milk
3. Citric acid from lemon
4. Piperine from black pepper

III. CHROMATOGRAPHIC SEPARATIONS

1. Column chromatography - Separation of anthracene and picric acid from anthracene picrate.
2. Thin layer chromatography - Separation of green leaf pigments.
3. Paper chromatography - Identification of amino acid.

IV. ANY FIVE ESTIMATIONS

1. Estimation of aniline
2. Estimation of phenol
3. Estimation of glucose
4. Estimation of ethyl methyl ketone
5. Estimation of amino group
6. Estimation of amide group
7. Saponification of fat or an oil
8. Iodine value of an oil
9. Estimation of sulphur in an organic compound

**V.SPECIAL INTERPRETATION OF ORGANIC COMPOUNDS USING UV, IR,
PMR AND MASS SPECTRA OF THE FOLLOWING 15 COMPOUNDS**

[See ANNEXURE – I]

Recommended Books

Arthur I.Vogel, A text book of Practical Organic Chemistry, ELBS

Raj K. Bansal, Laboratory Manual of Organic Chemistry, Wiley Eastern limited.

UNIVERSITY EXAMINATION MARKS

University Examination	Marks
Estimation	25
Preparation	25
Interpretation of spectra	10
Viva Voce	10
Record	05
Total	75

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)

MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	25

**PRACTICAL
PAPER - 5
INORGANIC CHEMISTRY PRACTICAL - II**

1. ANALYSIS OF ORES

1. Determination of percentage of calcium and magnesium in dolomite.
2. Determination of percentage of MnO_2 in pyrolusite.
3. Determination of percentage of lead in galena.

II. ANALYSIS OF ALLOYS

1. Estimation of tin and lead in solder.
2. Estimation of copper and zinc in brass.
3. Estimation of chromium and nickel in stainless steel.

III. ANALYSIS OF INORGANIC COMPLEX COMPOUNDS

1. Preparation of cis and trans potassium bis (oxalato) diaquochromate(III) and analysis of each of these for chromium.
2. Preparation of potassium tris (oxalato) ferrate (III) and analysis for iron and oxalate.

**IV. QUANTITATIVE ANALYSIS OF THE FOLLOWING MIXTURES
(one by volumetric and one by gravimetric method)**

1. Copper and Nickel
2. Copper and Zinc
3. Iron and Nickel
4. Iron and Magnesium

V. COLORIMETRIC ANALYSIS USING PHOTOELECTRIC METHOD

1. Estimation of iron
2. Estimation of nickel
3. Estimation of manganese
4. Estimation of copper

VI. AMPEROMETRIC TITRATIONS (With dead stop endpoint)

1. Thiosulphate - iodine system
2. Iron (II) - cerium (IV) systems.

Reference book.

N.N. Greenwood and A. Earnshaw, Chemistry of the Elements, Vol.II, Pergamon Press (1997)

VII. SPECTRAL INTERPRETATION OF THE FOLLOWING INORGANIC COMPOUNDS

[See ANNEXURE – II]

UNIVERSITY EXAMINATION MARKS

University Examination	Marks
I. Estimation of mixture containing two metal ions	
procedure	5
Volumetric analysis	15
Gravimetric analysis	10
II. Colorimetric estimation (or) Amperometric titration	
Estimation	15
Procedure	5
III. Interpretation of spectra	10
Viva Voce	10
Record	05
Total	75

CONTINUOUS INTERNAL ASSESSMENT MARKS (CIA MARK)

MAX. MARKS = 25

Evaluation method for practical paper:

Distribution of Marks

Internal assessment	Marks
Two Tests	10
Results accuracy	10
Attendance/ Regularity	5
Total	25

**PRACTICAL
PAPER - 6
PHYSICAL CHEMISTRY PRACTICAL- II**

**EXPERIMENTS IN ELECTROCHEMISTRY:
CONDUCTOMETRY, POTENTIOMETRY, PH METRY AND SPECTROSCOPY.**

I. CONDUCTIVITY MEASUREMENTS

1. Determination of equivalent conductance of a strong electrolyte and verification of Debye - Huckel - Onsager Equation
2. Verification of Debye-Huckel limiting law
3. Verification of Ostwald's Dilution law for a weak electrolyte.
4. Determination of pK_a values of weak acids and weak bases.
5. Conductometric titrations between acid (simple and mixture of strong and weak acids) - base,
6. Precipitation titrations including mixture of halides.

II. E.M.F MEASUREMENTS

1. Determination of standard potentials (Copper, Silver & Zinc)
2. Determination of thermodynamic quantities from EMF measurements –
3. Potentiometric titrations – Neutralization reactions
4. Determination of pH of buffer solution and calculation of pK_a .
5. Determination of stability constant of a complex.
6. Determination of solubility product of a sparingly soluble salt.
7. Potentiometric titrations – Redox titrations.
8. Potentiometric titrations – Precipitation titration of mixture of halides by EMF measurements.

III. SPECTROSCOPY: INTERPRETATION OF SPCTRA [See ANNEXURE – III].

1. Experiments given only to familiarize the interpretation of spectra provided.
2. Interpretation of UV-Visible spectra of simple molecules for the calculation of molecular data
3. Identification of functional groups (5 typical spectra will be provided).
4. IR and NMR spectral calculations of force constant and coupling constants respectively
5. Identification and interpretation of a spectra (5 each in IR and NMR will be provided)

LIST OF EXPERIMENTS SUGGESTED FOR PHYSICAL CHEMISTRY PRACTICAL II

Typical list of possible experiments are given.

Experiments of similar nature and other experiments may also be given.

The list given is only a guideline.

Any 15 experiments have to be performed in a year.

1. Determination of the equivalent conductance of a weak acid at different concentrations and verify Ostwald's dilution law and calculate the dissociation constant of the acid.
2. Determination of equivalent conductance of a strong electrolyte at different concentrations and examine the validity of the Onsager's theory as limiting law at high dilutions.
3. Determination of the activity co-efficient of Zinc ions in the solution of 0.002M Zinc sulphate using Debye-Huckel limiting law.
4. Determination of the solubility product of silver bromate and calculate its solubility in water and in 0.01 M KBrO_3 using Debye-Huckel limiting law.
5. Conductometric titrations of a mixture of HCl, CH_3COOH and CuSO_4 and NaOH.
6. Determination of the dissociation constant of an acid at different dilution.
7. Determination of the solubility of the lead iodide in water , 0.04 M KI and 0.04 M $\text{Pb}(\text{NO}_3)_2$ at 298 K
8. Determination of the solubility product of leadiodide at 298 K and 308 K and calculate the molar heat of solution of lead iodide.
9. Compare the relative strength of acetic acid and mono chloroacetic acid by conductance method.
10. Determine the basicity of organic acids (oxalic /benzoic).
11. Determine the electrode potentials of Zn and Ag electrodes in 0.1M and 0.001M solutions at 298 K and find the standard potentials for these electrodes and test the
12. Determine the activity co-efficient of an electrolyte at different molalities by EMF measurements.
13. Determine the dissociation constant of acetic acid titrating it with sodium hydroxide using quinhydrone as an indicator electrode and calomel as a reference electrode.
14. Study of the electrolytic separation of metals (Ag, Cu, Cd and Zn)
15. Determine the strength of a given solution of KCl using differential potentiometric titration technique.

16. Determine the dissociation constant of acetic acid in DMSO, DMF, acetone and dioxane by titrating it with KOH.
17. Determine the transport number of Ag ions and nitrate ions by Hittorf's method.
18. Determine the transport number of cadmium ions and sulphate ions by measuring emf of concentration cells with and without transference.
19. Determine the dissociation constant of monobasic or dibasic acid by all the Alber-Serjeant method.
20. Determine the pH of the given solution with the help of indicators using buffer solutions and by colorimetric method.
21. Perform acid-base titration in a non aqueous medium.
22. Determine the pH of a given solution by EMF method using glass and calomel electrodes and evaluate pK_a value of an acid.
23. Determine the pH of a given solution by emf methods using hydrogen electrode and quinhydrone electrode.
24. Estimate the concentration of cadmium and lead ions by successive reduction in polarography. Verify Ilkovic equation.
25. Determine lead ion by amperometric titrations with potassium dichromate.
26. Determine ferric ion by amperometric titration.
27. Determine pH value of an acid-base indicator (methyl red) by colorimetry.
28. Determine the composition and instability constant of a complex by mole ratio method.
29. By colorimetry determine simultaneously Mn and Cr.
30. Study the effect of solvent on the conductivity of AgNO₃/acetic acid and determine the degree of dissociation and equilibrium constant in different degree of dissociation and mixtures (DMSO, DMF, dioxane, acetone, water) and test the validity of Debye-Huckel Onsager's equation.
31. Determine the solubility of Ca(TiO₃)₂ in deionised water and in dilute solution of KCl at 298 K. Determine the solubility product graphically.
32. Determine the equivalent conductivity of a Ca electrolyte and dissociation constant of the electrolyte.
33. Determine the equivalent dissociation constant of a polybasic acid.
34. Calculate the thermodynamic parameters for the reaction $\text{Zn} + \text{H}_2\text{SO}_4 \text{ gives } \text{ZnSO}_4 + \text{H}_2$ by emf method.
35. Determine the formation constant of silver-ammonia complex and stoichiometry of the complex potentiometrically.
36. Determine the stability constant of a complex by polarographic method.
37. Determine the g value from a given ESR spectrum.

**CORE ELECTIVE
PAPER- 4
(to choose 1 out of 3)**

A. INORGANIC CHEMISTRY-IV

OBJECTIVE:

To study about the Inorganic Spectroscopy and Nuclear Chemistry.

OUTCOMES:

The students will be able to

- *Explain the different types of inorganic spectra and also interpretation.*
- *Applying and interpreting NMR spectrums of various inorganic compounds.*
- *Applying and interpreting ESR spectrums of various inorganic compounds.*
- *Describe Koopman's theorem, structure, chemical shift and correlation with electronic charges of photo electron spectroscopy.*
- *Illustrate the principle, instrumentation and applications of AAS, AES and AFS.*

UNIT-I: INORGANIC SPECTROSCOPY - I

Applications to inorganic systems of the following: ultra violet, visible, infra-red and Raman spectra of metal complexes, organometallic and simple inorganic compounds with special reference to coordination sites and isomerism.

UNIT-II: INORGANIC SPECTROSCOPY - II

Application to Inorganic systems of the followings
NMR, NQR and Mossebauer spectra - NMR of ^{31}P , ^{19}F , NMR shift reagents. NQR - Nitrosyl compounds. Mossebauer spectra of Fe and Sn systems.

UNIT-III: INORGANIC SPECTROSCOPY - III

ESR Introduction - Zeeman equation, g-value, nuclear hyperfine splitting, interpretation of the spectrum, simple carbon centered free radicals. Anisotropy - g-value and hyperfine splitting constant. McConnell's equation, Kramer's theorem. ESR of transition metal complexes of copper, manganese and vanadyl complexes.

Photoelectron spectroscopy (UV and X-ray) - photo electron spectra - Koopman's theorem, fine structure in PES, chemical shift and correlation with electronic charges.

UNIT-IV: INSTRUMENTAL ANALYSIS - I

AAS, AES and AFS – Principle, instrumentation and applications, advantages of AAS, interferences; GLC and HPLC – Principle, instrumentation and working, types of detectors; Inductively coupled plasma spectroscopy (ICP)- introduction, instrumentation, interferences and applications.

UNIT-V INSTRUMENTAL ANALYSIS - II

Laser Raman spectroscopy - principle, interfaces, advantages and applications.

Magnetic susceptibility and its determination - Guoy method, Faraday method and applications.

Polarography and Amperometry - Principle, instrumentation and applications.

TEXT BOOKS

1. A. Earnshaw, Introduction to Magneto Chemistry, Academic Press, London, (1968).
2. C.N.R. Rao, I.R. Ferraro, Spectroscopy in Inorganic Chemistry, Vol. I and Vol. II, Academic Press, (1970).
3. D. A. Skoog and D.M.West, Principles of Instrumental Methods of Analysis, Saunder's College Publ. III Edition, (1985).
4. E. A. V. Ebsworth, D. W. H. Rankin and S. Cradock, Structural Methods in Inorganic Chemistry, II Edition, Blackwell Scientific Publications, Oxford, London (1991).
5. G.D. Christian and J.E.G. Reily, Instrumental Analysis, Allegen Becon, II Edition, (1986).
6. H.A. Strobel, Chemical Instrumentation, Addison - Wesley Pub. Co., (1976).
7. R. S. Drago, Physical Methods for Chemists, Saunders College Publishing, Philadelphia (1992).
8. Willard Merrit, Dean and Settle, Instrumental methods of analysis, CBS Publ. VI edition, (1986).

Suggested References

1. AI Vogel, Text book of Qualitative Analysis - IV Edition (1985).
2. C. N. Banwell and E.M. Mc Cash, Fundamentals of Molecular Spectroscopy, IV edition, Tata McGraw Hill, New Delhi (1994).
3. D.A. Skoog D.M. West, Holt Reinhert and Winston, Fundamental of Analytical Chemistry, Publication, IV Edition (1982).
4. D.N. Sathyanarayana, Electronic Absorption Spectroscopy and Related Techniques, Universities Press (India) Ltd., Hyderabad (2001).
5. FA Cotton and G Wilkinson, Advanced Inorganic Chemistry, John Wiley and Sons, V Edition (1988).

6. G. Aruldas, Molecular Structure and spectroscopy, Prentice Hall of India Pvt. Ltd., New Delhi (2001).
7. J. Huheey, Inorganic Chemistry, Harper and Collins, NY, IV Edition, (1993).
8. J. M. Hollas, Modern Spectroscopy, IV edition, John Wiley & Sons, Ltd., Chichester (2004).
9. M.C. Shrivvers, P.W Atkins, CH. Langford, Inorganic Chemistry, OUP (1999).
10. Nakamoto, Infrared and Raman Spectra of Inorganic and Coordination Compounds, III Edn., John Wiley and Sons, New York, (1986).
11. O. Khan, Molecular Magnetism, New York, VCH (1993).
12. R.L. Carlin, Magneto chemistry, Springer-Verlag, New York, (1986).
13. S.F.A.Kettle, Physical Inorganic Chemistry: A Coordination Chemistry Approach, Oxford University Press, (1998)

**CORE ELECTIVE
PAPER-4**

B. ENVIRONMENTAL CHEMISTRY

OBJECTIVES:

To understand the concept of different types of pollution. To learn the various techniques involved in the analysis of pollutants. To know the methods for the control of pollution

OUTCOMES:

The students will be able to

Understanding of adverse effect of pollution.

Knowledge on sampling techniques.

Understanding on the adverse effect of air, water, and noise pollution.

Awareness on radioactive pollution.

UNIT-I AIR POLLUTION AND WATER POLLUTION

Classification of air pollution according to origin, chemical composition and state of matter - effects of air pollutants on living and nonliving things - ambient air quality standards - problems of air pollution in India - pollutions in industrial area (cement industry and thermal power plant) - Effect and consequences of air pollution: acid rain, green house effect, global warming and ozone depletion - major air pollution disasters - Bhopal Gas Leak - Chernobyl Nuclear Accident and Three Mile Island disaster.

Classification of water pollutants: DOD, BOD and COD - Effects of water pollutant on life and Environment.

UNIT-II SAMPLING AND ANALYSIS OF WATER AND AIR POLLUTANTS

Methods of sampling of gaseous, liquid and solid pollutant - analysis and effect of sulfur oxides, nitrogen oxides and carbon monoxide - biochemical effects and toxicology of Cd, Cr, As, Pb and Cu. Environmental implications of fertilizers, insecticides, pesticide - effect of pesticide residue on life - analytical techniques for pesticides residue analysis (Neutron Activation Analysis, Anodic Stripping Voltammetry and Atomic Absorption Spectroscopy) .

UNIT-III METHODS OF CONTROL OF AIR AND WATER POLLUTION

Methods of control of air pollution: Electrostatic precipitations - wet and dry scrubber, filters, gravity and cyclonic separation - adsorption, absorption and condensation of gaseous effluent.

Methods of control of water pollution: Water and waste water treatment - aerobic and anaerobic - aeration of water - principle of coagulation, flocculation, softening, disinfection, demineralization and fluoridation.

UNIT – IV NOISE POLLUTION

The decibel scale - effect: physiological, psychological, acute and chronic - Measurement of noise level (Sound level meter, Magnetic tap recorder, noise limit indicator) - noise control in industries: Administrative, engineering and path control - Protection of the personne (ear plugs, ear muffs. Helmets) - acoustic absorptive materials - noise control methods in industrial plants.

UNIT-IV RADIOACTIVE POLLUTION

Classification: Non-ionizing and ionizing radiation - radioactive pollution and their sources - natural and anthropogenic - biological effect of radiation on the human body - radiation doses -preventive measure from nuclear radiation - regulations from safety measure.

Radioactive wastes: Classification - low level and high level - radioactive waste disposal - geological disposal - ocean dumping - sub-sea bed dumping - subductive waste disposal method - transmutation of high - level radioactive waste - radioactive waste management in India.

TEXT BOOKS

1. S.S Dara ,“ A Text Book of Environmental chemistry and Pollution Control “,S.. Chand & company Ltd, New Delhi
2. V. K. Ahluwalia,” Environmental chemistry”, Ane Books India, Chennai.
3. Anu Gopinath and Chandradasan, Environmental Chemistry., Vishal Publishing Co, Delhi.

REFERENCE BOOKS

1. A. K. De. “Environmental Pollution”, New age intenational publishers, New Delhi
2. G. S. Sodhi, “Fundamental Concepts of Environmental Chemistry”, Narosa Publishing House, New Delhi.
3. S.M. Khopkar, Environmental Pollution Analysis,
4. S. P.Mahajan, Pollution control in process industries.

<http://www.nios.ac.in/media/documents/313courseE/L36.pdf>

<http://www.iisc.ernet.in/currsci/dec252001/1534.pdf>

<http://www.sciencelog.net/2014/12/radioactive-pollution-causes-and-effect.html>

http://collegesat.du.ac.in/UG/Envinromental%20Studies_ebook.pd

**CORE ELECTIVE
PAPER - 4
C. MEDICINAL CHEMISTRY AND DRUG DESIGN**

Objectives:

Students should be able to understand concepts of drug design and mechanism of drug action of different drugs. Students will be aware of metabolism and delivery methods of different classes of drugs.

OUTCOMES:

The students will be able to

Have knowledge on principles of drug design and development.

Understanding the mechanism of drug action.

Acquire Knowledge on various types of medicinal compounds.

Gain Knowledge on quantitative analysis of drugs.

UNIT-I: DRUG DESIGN

Development of new drugs, concepts of pro-drugs and soft drugs, Principles of drug design, Quantitative structure activity relationships. History and development of QSAR (Quantitative Structure Activity Relationships) - Concepts of drug parameters. High throughput Screening.

UNIT-II: IMPORTANCE AND MECHANISM OF DRUG ACTION

Antibiotics: Drug action of penicillin, cephalosporin, tetracycline and macrocyclic antibiotics (no synthesis). Antimalerials: Trimethoprim- NSAIDs: Paracetamol, Meperidine, Aminopyrine-Ibuprofen, Oxyphenylbutazone, Diclophenac sodium, Indomethacin-Antitubercular and antileprotic: Ethambutol, Isoniazide and Daspone - Anaesthetics: Lidocaine, - Antihistamines: Phenobarbital, Diphenylhydramine- Tranquilizers: Diazepam, Trimeprazine, Thiopental - Anti AIDS agents: Acyclovir, Ganciclovir.

UNIT-III: PHYSICO-CHEMICAL FACTORS AND BIOLOGICAL ACTIVITIES

Physical properties - Features governing drug action - Structurally specific - nonspecific drugs -Thermodynamic activity - Theories - Cut-off point - Factors governing ability of drugs -Absorption - Distribution - Excretion - Biotransformation - Intramolecular distances -Dissociation constants - Isosterism and Bioisosterism.

UNIT-IV: CLASSIFICATION OF MEDICINAL COMPOUNDS

Central Nervous system acting drugs – (General and Local anaesthetics, Sedatives and Hypnotics, Anticonvulsants, Narcotic and Non-narcotic analgesics, Anti-

Parkinsonian agents, Anti-depressants, Tranquilizers, Psychomimetics) - Pharmacodynamic agents (Anti-arrhythmics, Anti-anginals, Vasodilators, Anti-hypertensives, Diuretics, Antihistamines) - Chemotherapeutic Agents (Antibiotics, Antivirals, Antifungals) - Drugs for metabolic and endocrine disorders (Anti-thyroid drugs, Anti-diabetic drugs, biosynthetic insulin) – Therapeutic Index (Definitions with examples).

UNIT-V: DRUG ANALYSIS

Principles of quantitative analysis of the following drugs in formulations: Aspirin - benzyl penicillin - ascorbic acid - isoniazid - codeine - chloramphenicol - riboflavin and folic acid.

Reference Books

1. Burger's Medicinal Chemistry & Drug discovery, Vol 1-3, 5th Ed, 1995.
2. Wilson, Gisvold & Dorque: Text book of Organic Medical and Pharmaceutical Chemistry, 10th Ed, Lippincott Pover publishers, 1998.
3. David A Williams, William O. Foye & Thomas L. Lemke, Foye's Principles of medicinal Chemistry, 6th Edition, Lippincott Williams & Wilkins, 2002.
4. Zubay G, Biochemistry, Maxwell Macmillan International Editions, second edition, 1987.
5. R. L. Foster, The Nature of Enzymology, Croom Helm, 1980.
6. D. L. Purich, (Ed), Contemporary Enzyme kinetics and Mechanisms, Academic Press, 1983.
7. Dugas H, Bio-organic Chemistry, A chemical approach to enzyme action, Springer 2003.
8. Chemistry of drug design and drug action-. R. B. Silverman (2004) Acad. press
9. Graham Patrick, An Introduction to Medicinal Chemistry- 2nd Edn. Qxford, 2010
10. N. K. Jain, Advances in Controlled and Novel Drug Delivery, CBS, 2001.
11. Lednicher, The Organic Chemistry of Drug Synthesis, Vol. 1, 5th Edition, John Wiley & Sons, 2001.
12. Foye's Principles of Medicinal Chemistry, Sixth Edition, Wolters Kluwer, 2008
13. G.R. Chatwal, Medicinal Chemistry, Himalaya Publishing House.
14. V.K. Ahluwalia and M. Chopra, Medicinal Chemistry, Ane Book Pvt. Ltd., 2008.
15. J. B. Taylor and P. D. Kenewell., Introductory medicinal chemistry.
16. D. C. Garratt., Quantitative analysis of drugs.
17. G. L. Patrick., An introduction to medicinal chemistry.
18. Beckett and Stenlake., Practical pharmaceutical chemistry. Vol 1 and 2.

**OPEN ELECTIVE
PAPER-4
(To choose 1 out of 3)**

A.POLYMER AND PLASTICS

OBJECTIVES:

- *To make the students learn the concept of polymers and plastics.*
- *To understand the classification of polymers.*
- *To understand the methods of molecular weight determination.*
- *To learn the importance of freons and rubber.*
- *To appreciate the applications of plastics*

OUTCOMES:

The student will be able to

- *Classify the different types of polymers.*
- *Illustrate the importance of stereochemistry of polymers*
- *Apply the methods for determination of molecular weight*
- *Acquire knowledge on the various types of rubber*
- *Differentiate thermoplastic and thermosetting plastic*

UNIT-I 1.1. Basic concepts : An introduction to polymers and macro molecules. Natural and synthetic polymers. Classification of Polymers-addition and condensation polymers. 1.2. General methods of preparation of polymers. Polymerization through functional groups, multiple bonds and ring opening. Coordination polymerization.

UNIT-II 2.1. Structure of polymers- linear, branched and cross linked Stereochemistry of polymers-Isotactic, Sydiotactic and Atactic. 2.2. properties of polymers : The crystalline melting point. The glassy state and glass transition temperature.

UNIT-III 3.1. Copolymerisation – Definitions – homo and copolymers. Block copolymers and Graft copolymers. 3.2. Molecular weight of polymers. Number average molecular weight and weight average molecular weight. Determination of molecular weight by Viscosity and Osmometry methods.

UNIT-IV 4.1. Poly olefins-polythene, PTFE, Freons, PVC, polypropylene and polystyrene. 4.2. Natural and synthetic rubbers.-Constitution of natural rubber. Butyl, Buna, Buna-S, Buna-N, Neoprene, SBR, Thiocol, Polyurethane and silicone rubbers. 138

UNIT-V 5.1. Plastics and Resins Definitions. Thermoplastic and thermosetting resins. Constituents of plastic-fillers, dyes, pigments, plasticizers, Lubricants and catalysts.Uses of thermoplastic resins and thermo setting resins.

REFERENCES: 1. V. R. Gowrikar ,N.V.Viswanathan : Polymer Science- Wiley Eastern Limited ,New Delhi. 1986
2. R.B.Seymour, Introduction to Polymer Chemistry, MC Craw Hill, New York 1971.
3. S.S.Dara , A Text Book in Engineering Chemistry, S.Chand & Company Ltd, New Delhi. Third Edition ,1992.

OPEN ELECTIVE PAPER-4

B.BASICS OF FORENSIC SCIENCE

OBJECTIVES:

To define forensic science or criminalistics, and describe the major contributors to the development of forensic science.

To define the physical evidence of a crime scene and explain the difference between the identification and

comparison of physical evidence of crimes

To demonstrate the ability to identify, collect, and preserve a variety of fingerprint types and will demonstrate the ability to analyze components

To explain the various methods for analyzing DNA from a crime scene

OUTCOMES:

Learn the concept and basics of forensic sciences

Gaining the knowledge of microanalysis of DNA

Describing the forensic engineering and finger print analysis

Explaining the legal aspects and trace analysis

UNIT I: CONCEPTS OF FORENSIC SCIENCE

Forensic Science- History and Development of Forensic Science - What Is a Forensic Scientist? - Career Information – Indian and Other Forensic Science Systems - The Organization of Forensic Science Laboratories- The Functions of the Forensic Scientist -Crime Scene Investigation - The Crime Scene as Recent History - Preserving and Recording the Crime Scene - Crime Scene Investigation Process - Recognition of Bloodstain Patterns – other examples.

UNIT II: FORENSIC SCIENCE IN THE LABORATORY

The Forensic Laboratory - Identification and Characterization of Blood and Bloodstains Identification of Biological Fluids and Stains - Techniques of DNA Analysis - Microanalysis and Examination of Trace Evidence – Fingerprints - Forensic Footwear Evidence - Forensic Tire Impression and Tire Track Evidence - Firearm and Tool Mark Examinations - Questioned Documents - Analysis of Controlled Substances.

UNIT III: FORENSIC ENGINEERING AND INVESTIGATION

Forensic Pathology - How to Become a Forensic Pathologist - Investigation of Death: Coroners and Medical Examiners - Death Investigation Process - The Postmortem Interval (PMI)—Time of Death – Exhumations - The Teamwork Approach - The Human Skeleton - Identification of Skeletal Remains - The Significance of Age - The Biological Profile -Individualization of Human Bone - Collection of Bones - Forensic Odontology

UNIT IV: FORENSIC TRACE EVIDENCES

Forensic Analysis of Metals, soils, Plants, Paints – The Chemistry of fire and analysis of flammable residues - Explosions and Explosives - Collection and Analysis of Evidence of Explosives – Fingerprints – History of Fingerprints - Classification of Fingerprints - Automated

Fingerprint Identification Systems- Methods of Detecting Fingerprints - Preservation of Developed Prints- Digital Imaging for Fingerprint Enhancement - Document Examination - The Document Examiner - Handwriting Comparisons-Typescript Comparisons-Alterations, Erasures, and Obliterations

UNIT V: LEGAL ASPECTS OF FORENSIC SCIENCE

Forensic Science and the Law - Admissibility of Evidence - Laboratory Reports - Expert Testimony - Countering Chaos- Logic, Ethics, and the Criminal Justice System - Forensic Science and the Law - Legal Issues in Forensic DNA

TEXTBOOKS

1. Jay A. Siegel, Kathy Mirakovits, Forensic Science: The Basics, 2nd Edition, CRC Press, 2010.
2. Stuart H. James, Jon J. Nordby, Suzanne Bell, Stuart H. James, Jon J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, CRC Press, 2002.
3. Richard Saferstein, Forensic Science, An Introduction, Pearson Education, Inc. (Pearson Prentice Hall), 2011.

REFERENCE BOOKS

1. Robert Milne, Forensic Intelligence, Taylor and Francis Group, 2013.
2. Robert Bruce Thompson and Barbara Fritchman Thompson, An Illustrated Guide to Home Forensic Science Experiments-DIY Science-O'Reilly Media Inc., 2012.
3. Louis B. Schlesinger, Sexual Murder Catathymic and Compulsive Homicides, CRC Press, 2004.
4. Terrence F. Kiely, Forensic Evidence: Science and The Criminal Law, CRC Press LLC, 2001.

**OPEN ELECTIVE
PAPER-4
C.HEALTH SCIENCE**

OBJECTIVES:

*To give students a knowledge about role of science in health care
To introduce physical principles of instrumentation involved in medical diagnosis
To describe the scientific basis for regulating exposures to radiations
To lay the foundations for further studies in medical science and radiology*

OUTCOMES :

*Explaining the fundamentals of health science
Gaining knowledge of types of radiations
Gaining knowledge of breathing mechanism of cardiovascular system
Describing about the environmental effects on health.*

UNIT I: HEALTH SCIENCE FUNDAMENTALS

Electromagnetic spectrum and its medical application- Light - Chemistry of light, Intensity of light, limits of Vision and color vision Sound - Physics of sound- Normal sound levels
Ultrasound fundamentals- Generation of ultrasound-Ultrasound Transducer – Interaction of Ultrasound with Materials-Reflection and Refraction – Absorption and Scattering.

UNIT II: RADIATION

Radioactivity- Transformation mechanisms- Transformation kinetics- Naturally Occurring Radiation- Interaction of radiation with matter- Alpha rays- Beta rays- Gamma rays- Radiation - external exposure- dosimetry- dose response characteristics- Radiation safety guidelines.

UNIT III: SCIENCE OF CARDIOPULMONARY SYSTEM

The Airways, - blood and lung interaction –pressure air flow volume relationships of lungs – physics of alveoli – the breathing mechanism – Major components of cardiovascular system – O₂ and CO₂ exchange in the capillary system – Physical activity of heart – transmural pressure – Bernolli's principles applied to cardiovascular system - Blood flow – laminar and turbulentzz.

UNIT IV: HEALTH SCIENCE INSTRUMENTATION

Radiation detectors- Particle counting instruments- types of counters- resolving time- Nuclear Spectroscopy- Dose measuring instruments- types of dosimeters- neutron measurements- detection reactions- neutron dosimetry- calibration- counting statistics.

UNIT V: ENVIRONMENTAL HEALTH SCIENCE

Naturally occurring radioactive material- Radon- Environmental monitoring programs- Environmental releases- Regulatory guidelines for effluent pathways- Doses from liquid effluent pathways- Doses from gaseous effluent pathways- Pathway selection- Model parameters.

TEXTBOOKS

1. Herman Cember, Thomas E. Johnson, Introduction to Health Physics, 4th Edition, 2008.
2. Joseph John Bevelacqua, Contemporary Health Physics: Problems and Solutions, 1st edition, 1995.

REFERENCES

1. Brown B.H, PV Law ford, R H Small wood, D R Hose, D C Barber , Medical Physics and Biomedical Engineering, CRC Press, 1999.
2. Gopal B.Saha Physics and Radiobiology of Nuclear Medicine, 3rd edition, Springer, 2006.


ANNAMALAI UNIVERSITY
214 - B. Sc. Computer Science

Programme Structure and Scheme of Examination (under CBCS)
(Applicable to the candidates admitted in Affiliated Colleges from the academic year
2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours/ Week	Credit	Maximum Marks		
					CI A	ESE	Total
SEMESTER – I							
22UTAML11	I	Language Course - I : Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I : Communicative English I	5	3	25	75	100
22UCSCC13	III	Core Course -I : Fundamentals of Computers	5	4	25	75	100
22UCSCC14		Core Course – II : Programming in C	5	4	25	75	100
22UCSCP15		Core Practical – I : Programming in C Lab	3	2	40	60	100
		Allied Course - I : Mathematics – I /Mathematical foundation-I	5	4	25	75	100
22UENVS18	IV	Environmental Studies	2	2	25	75	100
Total				22			700
SEMESTER – II							
22UTAML21	I	Language Course - II : Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course - II : Communicative English II	5	3	25	75	100
22UCSCC23	III	Core Course – III : Programming with C++	5	4	25	75	100
22UCSCP24		Core Practical – II : Programming with C++ Lab	3	2	40	60	100
		Allied Course - I : Paper -2 : Mathematics II/Mathematical Foundation-II	5	4	25	75	100
22UCSCE26		Internal Elective – I	3	3	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28		Soft Skill	2	1	25	75	100
Total				21			800

Internal Elective Courses

22UCSCE26-1	Internal Elective – I	Digital logic fundamentals
22UCSCE26-2		Fundamental of Algorithms
22UCSCE26-3		System Software

Allied Courses

22UCSCA16	Theory	Mathematics-I/Mathematical Foundation I
22UCSCA25	Theory	Mathematics-II/Mathematical Foundation II

Allied Courses offered by Computer Science Department to Other Departments

22UCSCA01	Theory	Basics of Computers
22UCSCA02	Theory	Web Technology
22UCSCAP1	Practical	Web Technology Lab
22UCSCA04	Theory	Management Information System

SEMESTER: I PART-III	COURSE CODE: 22UCSCC13 COURSE TITLE: FUNDAMENTALS OF COMPUTERS	CREDIT:4 HOURS: 5/W
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LEARNING OBJECTIVES

1. An understanding of basic concepts of computer science.
2. An introduction to the fundamentals of hardware, software and programming.
3. To understand the concept of Number System.
4. To know the types of memory for storage purpose.
5. To understand the types of input devices to feed the data for action.

Unit I: Introduction to Computer**Hours:10**

Introduction – Types of computers – Characteristics of Computers. Generations of Computers: First Generation – Second Generation – Third Generation – Fourth Generation – Fifth Generation. Classification of Digital Computers: Introduction – Microcomputers – Personal Computer – Portable Computers – Mini Computers – Super Computers – Main Frames.

Unit II: Number System**Hours:15**

Introduction – Decimal Number System – Binary Number System – Binary-Decimal Conversion – Decimal Binary Conversion – Binary Addition – Binary Subtraction – Complements – 9's Complement – 10's Complement – 1's Complements – 2's Complements – BCD - Bits, Bytes, Words – Octal – Hexadecimal Number System.

Unit III: Anatomy of Digital Computer**Hours:10**

Functions and Components of Computer – Central Processing Unit – Control Unit – Arithmetic – Logic Unit – Memory – Registers – Addresses. Memory Units: RAM, ROM, PROM, EPROM, EEPROM, and Flash Memory.

Unit IV: Input Devices**Hours:10**

Introduction – Keyboard – Mouse – Types of Mice – Connections – Mouse pad – Trackball – joystick – Digitizing Tablet – Scanners – Digital Camera – MICR – OCR – OMR – Bar Code Reader – Speech Input Device- Touch Screen – Touch Pad – Light Pen. Output Devices: Introduction – Monitor – Classification of Monitors – Monochrome – Gray Scale – Color – Digital Monitor – Analog Monitor – Characteristics of monitor – Printers.

Unit V: Computer Software**Hours: 15**

Introduction – Operating System – Utilities – Compiler and Interpreters – Word Processor – Spreadsheets – Presentation Graphics – DBMS – Programming Languages: Machine Language – Assembly Language – High level language – Types of HighLevel Languages. Data Processing: Data VS Information – File Processing – Sequential File Processing – Direct Access file Processing.

COURSE OUTCOMES

1. Explain the needs of hardware and software required for a computation task.
2. Can have the knowledge about the generations of computers.
3. Understand the concept of output device.
4. Having the skill about the various types of languages.
5. Understand the concept of file processing.

Text Books:

1. Alexis Leon and Mathews Leon, –Fundamentals of Computer Science and Communication Engineering, Leon Tech world, 1998.

Supplementary Readings

1. B Ram and Sanjay Kumar, –Computer Fundamentals, 5th Edition, New Age International Publishers, 2014.
2. Pradeep K Sinha, Priti Sinha, –Computer Fundamentals, BPB Publications, 2004. Anita Goel, –Computer Fundamentals, 1st Edition, Pearson Education India, 2010.
3. Anita Goel, Computer Fundamentals, Pearson Publication.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	2	3	2
CO3	3	3	2	2	3
CO4	3	2	3	3	2
CO5	2	2	3	2	2

1-LOW 2- MODERATE 3-HIGH

SEMESTER: I PART-III	COURSE CODE: 22UCSCC14 COURSE TITLE: PROGRAMMING IN C	CREDIT: 4 HOURS: 5/W
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LEARNING OBJECTIVES

1. To Provide complete knowledge of C language
2. Students will be able to develop logics which will help them to create programs, applications in C
3. By learning the basic programming constructs they can easily switch over to any other language in future.
4. To understand the concept of function types
5. To acquire knowledge about pointers.

Unit I : Overview of C

Hours: 15

History of C – Importance of C – Basic Structure of C Programs – Programming Style – Character Set – C Tokens – Keywords and Identifiers – Constants, Variables and Data Types – Declaration of Variables – Defining Symbolic Constants – Declaring a variable as a constant – overflow and underflow of data – Operators and Expressions: Arithmetic, relational, logical, assignment operators – increment and decrement operators, conditional operators, bitwise operators, special operators – Arithmetic Expressions- Evaluation of Expressions – Precedence of Arithmetic Operators – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical functions.

Unit II: Managing I/O Operations

Hours:10

Reading and Writing a Character – Formatted Input, Output – Decision Making & Branching: if statement - if else statement - nesting of if else statements - else if ladder – switch statement – the ?: operator – goto statement – the while statement – do statement – the for statement – jumps in loops.

Unit III: Arrays

Hours:10

One-Dimensional Arrays – Declaration, Initialization – Two Dimensional Arrays – Multi-dimensional Arrays – Dynamic Arrays – Initialization. Strings: Declaration, Initialization of string variables – reading and writing strings – string handling functions

Unit IV: User-defined functions

Hours:10

Need – multi-function programs – elements of user defined functions – definition – return values and their types – function calls, declaration, category – all types of arguments and return values – nesting of functions – recursion – passing arrays, strings to functions – scope visibility and life time of variables. Structures and Unions: Defining a structure – declaring a structure variable – accessing structure members – initialization – copying and comparing – operation on individual members – array of structures – arrays within structures – structures within structures – structures and functions – unions – size of structures – bit fields

Unit V: Pointers**Hours: 15**

Understanding Pointers, Accessing the address of a variable – declaring, initialization of pointer variables – accessing a variable through its pointer – chain of pointers – pointer increments and scale factors – pointers and character strings – pointers as function arguments – pointers and structures. Files: Defining, opening, closing a file – IO Operations on files – Error handling during IO operations – command line arguments.

COURSE OUTCOMES

1. To understand the concepts of data types and operators
2. To analyze the usages of the various programming constructs and functions
3. To interpret the importance of arrays and pointers
4. To identify the purpose of structures, unions, macros and bit fields
5. To develop programs using dynamic memory allocation and data file operations

Text Books:

1. E.Balagurusamy, Programming in ANSI C, 7 the Edition, Tata McGraw Hill Pub,2017

Supplementary Readings:

1. Ashok N.Kamthane , Programming with ANSI and Turbo C , Pearson Education, 2006
2. Kanetkar Y., Let us C, BPB Pub., New Delhi, 1999.
3. T.Prabhu, C Programming Made Easy, Kanthimathi Publications

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	2	3	2
CO3	3	2	2	2	2
CO4	3	2	3	3	3
CO5	2	2	3	2	2

1-LOW 2- MODERATE 3-HIGH

SEMESTER: I PART-III	COURSE CODE: 22UCSCP15 COURSE TITLE: PROGRAMMING IN C LAB	CREDIT: 2 HOURS: 3/W
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LEARNING OBJECTIVES

1. To Develop Programs In C Using Basic Constructs.
2. Familiarize The Different Control And Decision Making Statements In “C”
3. Build Programs Using Arrays And Strings.
4. Provide Knowledge On Working With Files And Functions.
5. To Understand The Concepts Of Structures.

LIST OF PROGRAMS**HOURS:45**

1. C Program Swap Numbers in Cyclic Order Using Call by Reference
2. C Program to Remove all Characters in a String Except Alphabets
3. C Program to Sort Elements in Lexicographical Order (Dictionary order)
4. C Program to Calculate Standard Deviation of 10 numbers stored in an array.
5. C Program to Add Two Matrices Using Multi-dimensional Arrays.
6. C Program to Find Largest Number Using Dynamic Memory Allocation
7. C Program To Convert Binary Number To Decimal
8. C Program to Add Two Distances (in inch-feet system) using Structures
9. C Program to Check Whether a Number can be Expressed as Sum of Two Prime Numbers.
10. C Program to Make a Simple Calculator Using switch...case.
11. C Program to Display (i) Fibonacci Sequence (ii) Factorial of a given number.
12. C Program to find odd or even numbers using files.

COURSE OUTCOMES:

1. Demonstrate knowledge on C programming constructs.
2. Study all the Basic Statements in C Programming.
3. Practice the usage of branching and looping statements.
4. Apply string functions and arrays usage.
5. Analysis the use of files and structures.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	2	2	2	3	2
CO3	3	3	2	2	3
CO4	2	2	3	3	2
CO5	2	2	3	2	2

1-LOW 2- MODERATE 3-HIGH

YEAR- I SEMESTER - II PART-III	COURSE CODE:22UCSCC23 COURSE TITLE:PROGRAMMING WITH C++	HRS/WK – 5 CREDIT – 4
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LEARNING OBJECTIVES:

This course enables the students to know about:

1. Object Oriented concepts,C++ language features.
2. Classes, Objects,Inheritance, and Polymorphism.
3. Functions, Constructors, Streams and Files.

UNIT I:**(15Hrs)**

Principles of object oriented programming: Basic concepts of object oriented programming – Benefits of OOPs – Applications of OOPs – Beginning with C++: C++ introduction – Applications of C++ – C++ statements – Structure of C++ program. Tokens, Expressions and Control structures: Tokens – Keywords – Identifiers – Constants – Operators in C++ - Manipulators – Expressions and their types – Basic and user defined data types – operators in C++ – Operator overloading – Operator precedence – Control structures.

UNIT II :**(10Hrs)**

Functions in C++: The main functions – Function prototyping – Call by reference – Return by reference – Inline functions– Default arguments - Function overloading – Friend & Virtual Functions – Math Library functions. Classes and Objects: Specifying a class– Defining member function– Nesting of member functions– Private member functions– Arrays within a class – Static data members – Static member functions – Array of objects – Objects as function arguments – Friendly functions – Returning objects - Pointers to members.

UNIT III :**(10Hrs)**

Constructors and Destructors: Constructors – Parameterized constructors – Multiple constructors in a class – Constructors with default arguments – Copy constructors – Dynamic constructors – Destructors. Operator overloading: Defining – Overloading Unary, Binary operators – Manipulation of strings using operators - Type conversions.

UNIT IV:**(10Hrs)**

Inheritance: Defining derived classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract classes – Constructors in Derived Classes. Pointers, Virtual functions and Polymorphism: Pointers – Pointers to Objects, this Pointer – Virtual functions.Exception handling: Basics – Exception handling mechanism – Throwing and catching exception.

UNIT V :**(15Hrs)**

Managing console I/O operations: C++ streams – C++ stream classes – Unformatted I/O operations – Formatted console I/O operations – Managing output with manipulators. Working with files: classes for file stream operations – opening and closing a file – Detecting End – of – File – File Modes – File pointers and manipulation - Sequential I/O operations – Random access - Error handling during file operations, Command-line arguments.

Course outcomes:

1. Able to understand OOPs concept, C++ language features.
2. Able to understand and apply the concepts of Classes & Objects, friend function, constructors and destructors in program design.
3. Able to design & implement various forms of inheritance, and String classes.
4. Able to apply and analyze operator overloading, and runtime polymorphism.
5. Able to analyze and explore various Stream classes, I/O operations and Exception handling.

Text Book:

1. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill Publications, 8th Edition, 2020.

Supplementary Readings

1. Bjarne Stroustrup, The C++ Programming Language, Pearson Education, 4th Edition, 2014.
2. Rajesh K. Shukla, Object Oriented Programming in C++, Wiley India Pvt. Ltd., 1st edition, 2008.
3. Robert Lafore, Object Oriented Programming in C++, Galgotia Publications Pvt. Ltd., 4th edition, 2001.
4. Tony Gaddis, Judy Walfers, and Godfrey Muganda, Starting Out with C++: Early Objects, Addison-Wesley publication, 8th Edition, 2013.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	3	3	2
CO3	2	3	2	2	2
CO4	2	2	3	3	2
CO5	2	2	3	2	3

1-LOW 2- MODERATE 3-HIGH

<p style="text-align: center;">YEAR-I SEMESTER -II PART-III</p>	<p style="text-align: center;">COURSE CODE:22UCSCP24 COURSE TITLE: PROGRAMMING WITH C++ LAB</p>	<p style="text-align: center;">HRS/WK – 3 CREDIT – 2</p>
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LEARNING OBJECTIVES:

The objectives of the course are to have students :

1. Identify and practice the object-oriented programming concepts and techniques,
2. Practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.

LIST OF PROGRAMS**HOURS: 45**

1. Write a C++ program to find sum of digits of a given number.
2. Write a C++ program to demonstrate the use of Constructors.
3. Write a C++ program to perform Overloading of a Binary Operator.
4. Write an OOP Program to demonstrate the importance of Multilevel inheritance.
5. Write an OOP program to demonstrate the Function overloading.
6. Write a C++ program to find the sum of the given variables using Function with Default arguments.
7. Write a C++ program to demonstrate the use array of Objects.
8. Write a C++ program to handle the Exceptions.
9. Write a C++ program to perform Formatted console operations.
10. Write a C++ program to copy the content of one Text file into another text file.

COURSE OUTCOMES:

Ability to:

1. Creating simple programs using classes and objects in C++.
2. Implement Object Oriented Programming Concepts in C++.
3. Develop applications using stream I/O and file I/O.
4. Implement simple graphical user interfaces.
5. Implement Object Oriented Programs using templates and exceptional handling concepts.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	3
CO2	3	2	3	3	2
CO3	2	3	2	2	2
CO4	3	2	3	3	2
CO5	2	2	3	2	3

1-LOW 2- MODERATE 3-HIGH

INTERNAL ELECTIVE – I

YEAR-I SEMESTER -II PART-III	COURSE CODE:22UCSCE26A COURSE TITLE: DIGITAL LOGIC FUNDAMENTALS	HRS/WK – 3 CREDIT – 3
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OBJECTIVE:

To Understand the basic concepts of Digital Circuits and Logic design of Computers.

Unit-I: Number Systems**HOURS:9**

Digital Computers and Digital Systems - Binary Numbers – Number Base Conversions – Octal and Hexadecimal Numbers – Complements – Signed Binary Numbers – Binary Codes – Binary Storage and Registers – Binary Logic.

Unit-II: Boolean Algebra and Logic Gates**HOURS:9**

Axiomatic Definition of Boolean algebra - Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Other Logic operations – Digital Logic Gates – Integrated Circuits.

Unit-III: Simplification of Boolean Functions**HOURS:9**

The Map Method – Two and Three Variable Maps – Product of Sums Simplification - NAND and NOR Implementation - Other Two-Level Implementations - Don't Care Conditions - The Tabulation Method - Determination of Prime Implicants - Selection of Prime Implicants.

Unit-IV: Combinational Logic**HOURS:9**

Design Procedure – Adders – Subtractors – Code Conversion – Analysis Procedure – Multilevel NAND Circuits – Multilevel NOR Circuits – Exclusive OR Functions.

UNIT-V: Sequential Circuits**HOURS:9**

Flip Flops – Triggering of Flip-Flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment – Flip-Flop Excitation Tables – Design Procedure – Design of Counters.

COURSE OUTCOMES:

1. To Learn the basic design of Computers, Number Systems and Binary Codes.
2. To understand the Boolean algebra and the Logic Gates Operations.
3. To Learn and practice the K-Map Simplifications.
4. To study the Design Procedure of Adders, Subtractors and Multilevel Circuits.
5. To understand Flipflops, its types and the design of Counters.

Text Books:

1. M. Morris Mano, Digital Logic and Computer Design - PHI, 2nd Edition -2006

Supplementary Readings

1. Louis Neshelsky, Introduction to Digital Technology , John Wiley & Sons, Third Edition, 1983.
2. Dr. K. Meena, Principles of Digital Electronics, PHI Learning Private Limited, New Delhi - 1st Edition-2009.
3. Norman Balabanian, Bradley Carlson ,“Digital Logic Design Principles” - -John Wiley & Sons, Inc 1 Edition 1996

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	3	3	2
CO3	3	3	2	2	3
CO4	2	2	3	3	2
CO5	2	2	3	2	2

1-LOW 2- MODERATE 3-HIGH

YEAR-I SEMESTER -II PART-III	COURSE CODE:22UCSCE26B COURSE TITLE: FUNDAMENTALS OF ALGORITHMS	HRS/WK – 3 CREDIT – 3
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LEARNING OBJECTIVES:

1. To know how to analyze the performance of algorithms.
2. To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, and backtracking.

Unit I: (9 Hrs)

Introduction to algorithm, reason for the analysis algorithms, Goal, Running time analysis, Compare Algorithms, Rate of Growth, Commonly Used Rate of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega- Ω Notation, Theta- Θ Notation, Asymptotic Analysis, Properties of Notations, Commonly used Logarithms and Summations, Amortized analysis.

Unit II: (9 Hrs)

Recursion and Back tracking: Recursion – importance – Format of a Recursive function – Recursion and Memory – Recursion versus Iteration – Algorithms for Recursion – Backtracking – Algorithms for Back tracking.

Tree algorithms: Tree – Binary tree – Types and properties of binary tree – Binary tree traversals – Threaded Binary tree traversals – Binary search trees – Balanced Binary search trees – AVL Trees.

Unit III: (9 Hrs)

Graph Algorithms: Introduction - Applications of Graphs - Graph Representation - Graph Traversals - Topological Sort - Shortest Path Algorithms - Minimal Spanning Tree.

Sorting algorithms: Sorting – importance – Classification of Algorithms – Bubble sort – Selection sort – Insertion sort – Merge sort – Heap sort – Quick sort – External sorting.

Unit IV: (9 Hrs)

Searching: Importance – types – Unordered linear search – Ordered linear search – Binary search – comparing basic searching algorithms – String searching algorithms.

Greedy Algorithms: Introduction, Greedy Strategy, Elements of Greedy Algorithms, Advantages and disadvantages of Greedy Method, Greedy Applications, Understanding Greedy Technique.

Unit V:**(9 Hrs)**

Divide and Conquer Algorithms: Introduction - Divide and Conquer Strategy - Divide and Conquer Visualization - Understanding Divide and Conquer - Advantages of Divide and Conquer - Disadvantages of Divide and Conquer - Divide and Conquer Applications.

Dynamic Programming: Introduction - Dynamic Programming Strategy - Properties of Dynamic Programming Strategy - Problems which can be solved using Dynamic Programming - Dynamic Programming Approaches - Examples of Dynamic Programming Algorithms - Understanding Dynamic Programming - Longest Common Subsequence.

COURSE OUTCOMES:

1. 1.To learn the method of analysing algorithms.
2. To understand Recursion and backtracking principles.
3. To gain knowledge on the tree and graph algorithms.
4. To understand the sorting and searching algorithms.
5. To learning the working principles of Greedy, Divide-and-Conquer and Dynamic programming algorithms.

Text book:

1. Narasimha Karumanchi, Data Structures and Algorithms Made Easy: Data Structure and Algorithmic Puzzles, CareerMonk Publications, 2017.

Supplementary Readings

1. Cormen, Thomas H, and Thomas H. Cormen. Introduction to Algorithms. Cambridge, Mass: MIT Press, 2001.
2. Aho, Ullman & Hopcroft, Data Structures and Algorithms, Alfred V. Aho, John E. Hopcroft, and Jeffrey D. Ullman. Data Structures and Algorithmus. Addison-Wesley, 2009.
3. Ellis Horowitz and Sartaj Sahni, Fundamentals of Computer Algorithms, Computer Science Press, 2007.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	3	2	2	3	2
CO3	3	2	2	2	3
CO4	2	2	3	3	2
CO5	2	2	3	3	2

1-LOW 2- MODERATE 3-HIGH

SEMESTER: II PART: III	COURSE CODE:22UCSCE26C COURSE TITLE: SYSTEM SOFTWARE	CREDIT: 3 HOURS: 3/W
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COURSE OBJECTIVES

1. To understand the relationship between system software and machine architecture.
2. To know the design and implementation of assemblers
3. To know the design and implementation of linkers and loaders.
4. To have an understanding of macroprocessors.
5. To have an understanding of system software tools.

Unit I INTRODUCTION

Hours: 8

System software and machine architecture – The Simplified Instructional Computer (SIC) – The SIC/XE Machine Architecture – SIC Programming Examples.

Unit II ASSEMBLERS

Hours: 10

Basic assembler functions : A simple SIC assembler – Assembler algorithm and data structures, Machine dependent assembler features : Instruction formats and addressing modes – Program relocation, Machine independent assembler features : Literals – Symbol-defining statements – Expressions, One pass assemblers and Multi pass assemblers, Implementation example : MASM assembler.

Unit III LOADERS AND LINKERS

Hours: 9

Basic loader functions : Design of an Absolute Loader – A Simple Bootstrap Loader, Machine dependent loader features : Relocation – Program Linking – Algorithm and Data Structures for Linking Loader, Machine-independent loader features: Automatic Library Search – Loader Options, Loader design options : Linkage Editors – Dynamic Linking – Bootstrap Loaders, Implementation example : MSDOS linker.

Unit IV MACRO PROCESSORS

Hours: 9

Basic macro processor functions : Macro Definition and Expansion – Macro Processor Algorithm and data structures, Machine-independent macro processor features : Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters, Macro within Macro, Implementation example : MASM Macro Processor – ANSI C Macro language.

Unit V SYSTEM SOFTWARE TOOLS

Hours: 9

Text editors : Overview of the Editing Process - User Interface – Editor Structure, Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

COURSE OUTCOMES

1. Understand the relationship between system software and machine architecture.
2. Know the design and implementation of assemblers
3. Know the design and implementation of linkers and loaders.
4. Understanding of macroprocessors and its implementation.
5. Understanding of system software tools

Text Books

1. Leland L. Beck (2006). System Software – An Introduction to Systems Programming (3rd Edition). Pearson Education Asia.

Supplementary Readings

1. D. M. Dhamdhare (2000). Systems Programming and Operating Systems (2nd Revised Edition). Tata McGraw-Hill.
2. John J. Donovan (2000). Systems Programming. Tata McGraw-Hill Edition.
3. John R. Levine (2000). Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers.

PROGRAMME OUTCOMES AND COURSE OUTCOMES MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	2	2	2	3	2
CO3	2	3	2	2	3
CO4	3	2	3	3	2
CO5	2	2	3	2	2

1-LOW 2- MODERATE 3-HIGH

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER III									
16.	I	Language	Paper-3	6	4	Tamil/ OtherLanguages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	3	3	Programming in JAVA	25	75	100
19.	III	Core Practical	Practical-3	3	3	Programming in JAVA Lab	25	75	100
20.	III	Allied II	Paper-3	4	3	(Choose any one) 1. Physics I 2. Statistical Methods and Their Applications I	25	75	100
	III	Allied II	Practical	3	0	Physics/Statistics Practical	0	0	0
21.	IV	Skill Based Subject	Paper-1	3	2	Digital Logic Design and Computer Organization	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
		Sem. Total		30	21		175	525	700
SEMESTER IV									
23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
24.	II	English	Paper-4	6	4	English	25	75	100
25.	III	Core Theory	Paper-4	3	3	Relational Database Management Systems	25	75	100
26.	III	Core Practical	Practical-4	3	3	RDBMS Lab	25	75	100
27.	III	Allied II	Paper-4	4	3	(to choose any one) 1. Physics II 2. Statistical Methods and their Applications II	25	75	100
28.	III	Allied II	Practical	3	2	Physics/Statistics Practical	25	75	100
29.	IV	Skill Based Subject	Paper-2	3	2	Wireless Data Communication	25	75	100
30.	IV	Non-Major Elective	Paper-2	2	2	Internet Technology	25	75	100
		Sem. Total		30	23		200	600	800

SEMESTER II

CORE THEORY PAPER -2

C++ & DATA STRUCTURES

Objectives:

1. To understand the concepts of object-oriented programming and master OOP using C++.
2. To understand the concepts of Inheritance, polymorphism and templates.
3. To understand the concepts of different view of data, stack and queues.
4. To understand the concepts of Programming with Recursion, Binary Search Tree and graphs.
5. To understand the concepts of Sorting and Searching Algorithms.

UNIT-I :

Principles of Object Oriented Programming – Beginning with C++ – Token , Expressions and Control Structures- Functions in C++ – Classes and Objects – Constructors and Destructors.

UNIT-II :

Operator Overloading and Type Conversions – Inheritance : Extending Classes – Pointers, Virtual Functions and Polymorphism - Managing Console I/O Operations. Working with Files - Templates – Exception Handling – Manipulating Strings.

UNIT-III:

Data Design & implementations: Different views of data – Abstraction and Built-in Types – Arrays ADTs Stacks and Queue (Linear and Linked) , Stack (Array and Pointer)- Applications- Infix to Postfix Conversions – Queue(Array and Pointer) – List(Array and Pointer) – Applications: (Polynomial Addition) - Doubly Linked Lists.

UNIT – IV:

Programming with Recursion : Recursion – Verifying and Writing Recursive Functions – **Binary Search Tree :** Implementation – Tree Traversal – **Graphs:** Implementations – BFS – DFS – Dijkstras Shortest Path Algorithm.(Chapter 7:Section 7.1,7.4 7.5, Chapter 8:Section 8.1,8.4, Chapter 9:Section 9.3)

UNIT-V:

Sorting and Searching Algorithms: Sorting – Searching – Hashing (Chapter 10: Section 10.1,10.2,10.3)

TEXT BOOK:

1. Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
(Units I, II)
2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010. (Units III, VI & V)

REFERENCES:

1. C++ The Complete Reference, Herbert Schildt, Tata McGraw Hill, 4th Edition, 2003.
2. OOP In ANSI C and Turbo C, Ashok N.Kamthene, Pearson Education, 6th Edition, 2008.
3. Data Structures and Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Addison Wesley Longman Inc., 2nd Edition, 1999.

Course Outcomes:

- The Student will be able to understand the concepts of object oriented programming Apply structure and inline functions.
- The Student will be able to understand the concepts of the types of inheritances and Applying various levels of Inheritance for real time problems Apply the OOPs concepts class and object. Understand Explain the file concept and exception handlings in C++
- The Student will be able to understand the concepts of Stacks and Queue using array and pointers.
- The Student will be able to understand the concepts of Recursion, Binary Search Tree and graphs.
- The Student will be able to understand the concepts of Sorting and Searching Algorithms.

CORE PRACTICAL-2

C++ & DATA STRUCTURES LAB

Objectives:

1. To develop C++ programming skills in design
2. To understand the basic concepts of different abstract types and structure of data.
3. To understand the concepts of Function Overloading
4. To understand the concepts of Stack, Queue, List, Doubly Linked List - using Pointers-using Arrays.
5. To understand the concepts of Searching and Sorting Algorithms.

LIST OF LAB EXERCISES

1. Constructors & Destructors, Copy Constructor.
2. Friend Function & Friend Class.
3. Inheritance.
4. Polymorphism & Function Overloading.
5. Virtual Functions.
6. Overload Unary & Binary Operators Both as Member Function & Non Member Function.
7. Class Templates & Function Templates.
8. Exception Handling Mechanism.
9. Standard Template Library concept.
10. File Stream classes.
11. Array implementation of Stack, Queue : Infix to postfix
12. Implementation of Stack, Queue, List, Doubly Linked List - using Pointers- Polynomial Addition
13. Implementation of Binary Search Tree, Traversal
14. Implementation of Searching and Sorting Algorithms.
15. Graph Implementation of shortest path (Djikstras)

REFERENCE :

1. Object Oriented Programming with C++, E Balagurusamy , Tata McGraw Hill, 6th Edition, 2014.
2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers , 4th Edition, 2010.

Course Outcomes:

- Understand the Creating and Deleting the Objects with the Concepts of Constructors and Destructors.
- Demonstrate the Polymorphism Concepts and Operator Overloading.
- Understand basic Data Structures such as Arrays, Linked Lists, Stacks, Queues, Doubly Linked List and Infix to Postfix Conversion.
- Apply Algorithm for solving problems like Sorting and Searching.
- Apply Algorithms and use Graphs and Trees as tools to visualize and simplify Problems

ALLIED 1

PAPER -2

1. MATHEMATICS II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in $(0,2\pi)$ and $\pi < x < 2\pi$

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Gauss, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) *Allied Mathematics* Vol-I, II S.Chand& company Ltd., New Delhi-55.
5. Isaac, *Allied Mathematics*. New Gamma Publishing House, Palayamkottai

2. MATHEMATICAL FOUNDATIONS II

Objectives

To know about Matrix Operations, Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian, Orthogonal, Unitary Matrices. Rank of a Matrix Solutions of linear equations Consistency and Inconsistency, Characteristic roots and Characteristics Vectors, Cayley - Hamilton Theorem, Integration of rational functions, Integration by parts, Reduction formulae, Area and volume using integration, Planes, Straight lines, Spheres, Curves, Cylinders.

UNIT-I: MATRICES

Multiplication of matrices, Singular and Non-Singular matrices, Adjoint of a Matrix, Inverse of a matrix Symmetric and Skew-Symmetric, Hermitian and Skew-Hermitian, Orthogonal and unitary matrices, Rank of a matrix, Solution of Simultaneous Linear equations by

- (i) Cramer's rule.
- (ii) Matrix Inversion Method.

UNIT-II: MATRICES

Test for Consistency and Inconsistency of linear equations, (Rank Method), characteristic roots and characteristic vectors, Cayley - Hamilton theorem, matrix of linear transformations: reflection about the x, y axes and the line $y=x$, rotation about the origin through an angle, expansion or compression, shears, translation.

UNIT-III

Integration Simple problems, integration of rational function involving algebraic expressions of the form

$$\frac{1}{ax^2+bx+c}, \frac{1}{\sqrt{ax^2+bx+c}}, \frac{px+q}{ax^2+bx+c}, \frac{px+q}{\sqrt{ax^2+bx+c}}$$

integrations using simple substitutions integrations involving trigonometric functions of the form

$$\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2x+b^2\cos^2x}, \text{ Integration by parts.}$$

UNIT-IV

Properties of definite integrals. Reduction formulae for

$$\int \quad \int$$

$\int x^n e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int x^m (1-x)^n dx$, applications of integration for (i) Area under plane curves, (ii) Volume of solid of revolution.

UNIT-V: ANALYTICAL GEOMETRY OF THREE DIMENSION

Planes, straight lines.

Text Book.

P.R.Vittal, Mathematical Foundations - Margham Publication, Chennai.

Reference Books

1. U. Rizwan, Mathematical Foundation - SciTech, Chennai
2. V.Sundaram & Others, Discrete Mathematical Foundation - A.P.Publication, Sirkali.
3. P.Duraipandian & Others, Analytical Geometry 3 Dimension – Emerald publication 1992 Reprint.
4. Manicavachagompillay & Natarajan. Analytical Geometry part II - three Dimension - S.Viswanathan (printers & publication) Put Ltd., 1991.

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER V									
32.	III	Core Theory	Paper-5	6	4	Mobile Application Development	25	75	100
33.	III	Core Theory	Paper-6	6	4	Operating System	25	75	100
34.	III	Core Theory	Paper-7	4	3	Design and Analysis of Algorithms	25	75	100
35.	III	Core Practical	Practical-5	4	3	Mobile Applications Development-Lab	25	75	100
36.	III	Core Practical	Practical-6	4	3	Operating System-Lab	25	75	100
37.	III	Internal Elective	Paper-1	3	3	(tochooseanyone) 1. Data Mining 2. Information Security 3. Software Testing	25	75	100
38.	IV	Skill Based Subject	Paper-2	3	2	Software Engineering	25	75	100
				30	22		175	525	700
SEMESTER VI									
39.	III	Core Theory	Paper-8	5	4	Open Source Software	25	75	100
40.	III	Core Theory	Paper-9	4	4	Python Programming	25	75	100
41.	III	Core Practical	Practical-7	4	3	Python Programming Lab	25	75	100
42.	III	Core Practical	Practical-8	4	2	Open Source Programming Lab	25	75	100
43.	III	Project		5	5	Project Work (Group/Individual Project)	25	75	100
44.	III	Internal Elective	Paper - 2	3	3	(tochooseanyone) 1. Big Data Analytics 2. Cryptography 3. Digital Image Processing	25	75	100
45.	III	Internal Elective	Paper - 3	3	3	(tochooseanyone) 1. Artificial Intelligence 2. System Software 3. Cloud Computing	25	75	100

46.	IV	NMSDC III : Emerging Technology for Employability -	Paper - 3	2	2	(Choose any one) • PBL Android App Development • Machine Learning	25	75	100
47.	V	Extension Activities		0	1		100	0	100
		Sem. Total		30	27		300	600	900
					142				

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)–2022-2023 onwards

Semester: V **Paper type: Core Theory –Paper 5**

Paper code: **Name of the Paper : Mobile Application Development** **Credit:**

4 Total Hours per Week: 6 Hrs. Lecture Hours: 7 Hrs. Tutorial Hours: Practical Hours:

.....

Course Objectives

1. To understand the basics of smartphones and android platforms.
2. To understand the basic concepts of user interface related to app development.
3. To understand the importance of data persistence in mobile environment.
4. To understand the various services and network facilities provided by android platform.
5. To understand the various apps deployed and developed on by mobile platform.

Course Outcomes

1. After studied unit-1, the student will be able to understand android basics.
2. After studied unit-2, the student will be able to gain knowledge of GUI for android.
3. After studied unit-3, the student will be able to understand SQLite database.
4. After studied unit-4, the student will be able to understand android services
5. After studied unit-5, the student will be able to develop simple mobile application using android

Matching Table

Unit	i.Remembering	ii.Understanding	iii.Applying	iv. Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:INTRODUCTIONTOANDROIDPLATFORM**TeachingHours: 15Hrs.**

Introduction to Mobile Application Development – Various platforms – Smart phones – Androidplatform: features – Architecture – Versions – ART (Android Runtime) – ADB (Android DebugBridge) – Development environment/IDE: Android studio and its working environment – Emulatorsetup–Applicationframeworkbasics–XMLrepresentationandAndroidmanifestfile– Creatinga simpleapplication.

Unit-2:ANDROID UIDESIGN**TeachingHours:16Hrs.**

GUI for Android: activities lifecycle – Android v7 support library – Intent: Intent object – Intentfilters–Addingcategories–Linkingactivities–UserInterfacedesigncomponents –BasicViews – Picker Views – List View – Specialized Fragment – Gallery and Image View – Image Switcher – Grid View,OptionsMenu– ContextMenu – ClockView –Webview– RecyclerView

Unit-3:DATAPERSISTENCE**TeachingHours: 15Hrs.**

Different Data Persistence schemes: Shared preferences – File Handling – Managing data usingSQLitedatabase–Contentproviders:usercontentprovider–Androidinbuildcontentproviders.

Unit-4:ANDROIDSERVICES& NETWORKENVIRONMENT**TeachingHours:16Hrs.**

Services:Introduction toservices–Local service–Remote service–Binding the service– Communication between service and activity – IntentService – Multi–Threading: Handlers – AsyncTask– Android network programming: HttpURLConnection– Connecting to REST–based – SOAP based Web services – Broad cast receivers: LocalBroadcastManager– Dynamic broadcastreceiver– SystemBroadcast–TelephonyManager:Sending SMSandmaking calls.

Unit-5:ADVANCEDAPPLICATIONS**TeachingHours: 16Hrs.**

Location based services: Google maps V2 services using Google API – Animations and Graphics:PropertyAnimation–ViewAnimations–DrawableAnimations– MediaandCameraAPI:Working with video and audio inputs – camera API – Sensor programming: Motion sensors –Position sensors – Environmental sensors – Publishing Android Apps: Guide lines – policies andprocessofuploadingApps toGoogleplay.

InternalAssessmentMethods:(Thefollowingitemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaperreview, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops, preparing technicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can begivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.

- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Head First: Android Development”, Dawn Griffiths, David Griffiths, OReilly, 1st Edition, 2015.
2. Barry Burd, “Android Application Development – All-in-one for Dummies”, 2nd Edition, Wiley India, 2016.

Reference Books:

1. “Professional Android™ Sensor Programming”, Greg Milette, Adam Stroud, John Wiley and Sons, Inc 2012.
2. “Android 6 for Programmers, App Driven approach”, Paul Deital, Harvey Deital, Alexander Wald, Prentice Hall, 2015.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	M	S	S	S	S
CO2	S	S	S	M	M	M	M	S	S	S
CO3	S	M	M	S	M	S	M	S	S	S
CO4	M	S	M	M	S	S	M	S	S	S
CO5	S	M	M	M	S	M	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)– 2022-2023 onwards

Semester: V **Paper type: Core Theory– Paper 6**

Paper code: **Name of the Paper : Operating System** **Credit: 4**

Total Hours per Week: 6 Hrs. Lecture Hours: 78 Hrs. Tutorial Hours: Practical Hours:

.....

Course Objectives

1. To understand the structure and functions of operating systems.
2. To understand the principles of scheduler, scheduler algorithms and Deadlock.
3. To learn various memory management schemes.
4. To study I/O management, File system and Mass Storage Structure.
5. To learn the basics of UNIX, LINUX systems and perform administrative tasks on LINUX servers.

Course Outcomes

1. After studied unit-1, the student will be able to learn operating system structure and services.
2. After studied unit-2, the student will be able to enrich the process scheduling skills.
3. After studied unit-3, the student will be able to know about memory allocation.
4. After studied unit-4, the student will be able to understand disk structure and allocation methods.
5. After studied unit-5, the student will be able to understand LINUX system.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: OPERATING SYSTEM BASICS**Teaching Hours: 16Hrs.**

Basic Concepts of Operating System – Services of Operating System – Operating System Types – Computer System Operation – I/O Structure – Storage Structure – Memory Hierarchy – System Components – System Calls – System Programs – System Design and Implementation – Introduction to Process – Process State – Process Control Block – Process Scheduling – Operation on Process – Interprocess Communication – Communication in Client/Server Systems – Threads.

Unit-2: CPU SCHEDULING ALGORITHM AND PREVENTION**Teaching Hours: 16Hrs.**

Introduction – Types of CPU Scheduler – Scheduling Criteria – Scheduling Algorithms – Semaphores – Classic Problems of Synchronization – Basic Concept of Deadlocks – Deadlock Characterization – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery of Deadlock.

Unit-3: STORAGE MANAGEMENT**Teaching Hours: 15Hrs.**

Memory Management – Basics Concept of Memory – Address Binding – Logical and Physical Address Space – Memory Partitioning – Memory Allocation – Paging – Segmentation – Segmentation and Paging – Protection – Fragmentation – Compaction – Demand Paging – Page Replacement Algorithm – Classification of Page Replacement Algorithm.

Unit-4: I/O SYSTEMS**Teaching Hours: 16Hrs.**

File System Storage – File Concept – File Access Methods – Directory Structure – File Sharing – File Protection – File System Implementation – File System Structure – Allocation Methods – Free Space Management – Mass Storage Structure – Disk Structure – Disk Scheduling and Management – RAID Levels.

Unit-5: CASE STUDIES**Teaching Hours: 15Hrs.**

UNIX System – A Case Study – LINUX System – Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.

- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self discussion, self learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Operating System Concepts” – Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003.
2. “Operating System” – William Stalling, Fourth Edition, Pearson Education, 2003.

Reference Books:

1. “Operating systems – Internal and Design Principles”, W. Stallings, 6th Edition, Pearson.
2. “Modern Operating Systems”, Andrew S. Tanenbaum, Second Edition, Addison Wesley Publishing Co., 2001.
3. “Fundamentals of Operating System”, Prof. R. Sriddhar, Dynaram Publication, Bangalore Company.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	S	M	M	M	S
CO2	S	M	M	M	S	M	M	S	M	S
CO3	S	M	M	S	M	S	S	S	S	S
CO4	S	M	M	S	M	S	M	M	S	S
CO5	S	S	M	M	M	M	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)– 2022-2023 onwards

Semester:III **Paper type:Core Theory – Paper7**

Paper code: **Name of the Paper :Design and Analysis of Algorithm** **Credit:**

3 Total Hours per Week:4 Hrs. Lecture Hours:52 Hrs.Tutorial Hours:....Practical Hours:.....

.....

Course Objectives

1. To understand various algorithm design techniques
2. This technique is the basis of efficient algorithms for all kinds of problems.
3. This is a simple approach which tries to find the best solution at every step.
4. Providing a general insight into the dynamic programming approach.
5. Algorithm design paradigm for discrete and combinatorial optimization problems.

Course Outcomes

1. After studied unit-1, the student will be able to gain experience with space and time complexity
2. After studied unit-2, the student will be able to understand the concepts of divide and conquer
3. After studied unit-3, the student will be able to understand the concepts of greedy method
4. After studied unit-4, the student will be able to understand the concepts of multi-stage graph
5. After studied unit-5, the student will be able to understand the concepts of backtracking

Matching Table

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:ALGORITHMANDANALYSIS**TeachingHours:10Hrs.**

Elementary Data Structures: Stack – Queues – Trees – Priority Queue – Graphs – What is an Algorithm? – Algorithm Specification – Performance Analysis: Space Complexity – Time Complexity – Asymptotic Notation – Randomized Algorithms.

Unit-2:DIVIDEAND CONQUER**TeachingHours:10Hrs.**

General Method – Binary Search – Recurrence Equation for Divide and Conquer – Finding the Maximum and Minimum – Merge Sort – Quick Sort – Performance Measurement – Randomized Sorting Algorithm – Selection Sort – A Worst Case Optimal Algorithm – Implementation of Select2 – Stassen's Matrix Multiplications.

Unit-3:THEGREEDY METHOD**TeachingHours:11Hrs.**

The General Method – Container Loading – Knapsack Problem – Tree Vertex Splitting – Job Sequencing with Deadlines – Minimum Cost Spanning Trees – Prim's Algorithm – Kruskal's Algorithm – An optimal Randomized Algorithm – Optimal Storage on Tapes – Optimal Merge Pattern – Single Source Shortest Paths.

Unit-4:DYNAMICPROGRAMMING, TRAVERSAL& SEARCHING**TeachingHours:11Hrs.**

The General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – String Editing – 0/1 Knapsack – Reliability Design – The Traveling Salesperson Problem. Techniques for Binary Trees – Techniques for Graphs – BFS – DFS.

Unit-5:BACKTRACKING&BRANCHANDBOUND**TeachingHours:10Hrs.**

The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Branch and Bound: General Method – LC Branch and Bound – FIFO Branch and Bound.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.

- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Fundamentals of Computer Algorithms”, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Galgotia Publications, Second Edition 2015.
2. “Introduction to Algorithms”, Cormen T.H., Leiserson C.E. and Rivest R.L., PHI Publications, Third Edition, 1998.

Reference Books:

1. “Introduction to the Design and Analysis of Algorithms”, Anany Levitin, Pearson Education, 2nd Edition.
2. ”Introduction to Algorithms” Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Prentice Hall of India, New Delhi, Second Edition, 2007.
3. “Computer Algorithms – Introduction to Design & Analysis” Sara Baase and Allen Van Gelder, Pearson Education New Delhi, Third Edition, 2000.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	M	M	S	M	M	S	M	S	S
CO4	S	S	M	S	M	M	M	S	S	S
CO5	S	S	M	M	M	S	M	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY,VELLORE–632 115
(BachelorofComputerScience)– 2022-2023 onwards

Semester:V Papertype:CorePractical–5

Papercode: Name of the Paper :MobileApplicationsDevelopmentLab Credit:

3TotalHoursperWeek:4Hrs.LectureHours:.....TutorialHours:.....PracticalHours:52Hrs.

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Course Objectives

1. Tounderstandhowtochangefonts.
2. Tounderstandhowtochangecolors.
3. Toknowaboutlayoutmanagers.
4. tounderstanddrawingmethods.
5. Tounderstanddatabaseconnectivity.

Course Outcomes

1. Afterstudiedunit-1,thestudentwillbeabletobuildapplicationtochangefontsandcolors.
2. Afterstudiedunit-2,thestudentwillbeabletoimplementmultithreading.
3. Afterstudiedunit-3,thestudentwillbeabletodevelopGUIapplicationwithdrawingmethods.
4. Afterstudiedunit-4,thestudentwillbeabletobuildapplicationtocreatealarmclock.
5. Afterstudiedunit-5,thestudentwillbeabletoimplementlayoutmanagers.

MatchingTable

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

LIST OF PRACTICAL EXERCISES

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Intent and Activity.
3. Develop an application that uses Layout Managers and event listeners.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of RSS Feed.
6. Implement an application that implements Multi-threading.
7. Develop an application that creates an alarm clock.
8. Develop an application Using Widgets.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Develop an application that makes use of database.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development–exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.

- m. Bring the industry to the campus. Bring the student to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	M	M	S	S	S	S
CO2	S	M	S	S	M	M	M	M	S	S
CO3	S	M	M	S	S	M	M	S	S	S
CO4	S	S	S	M	S	S	S	S	M	S
CO5	S	S	M	S	M	M	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE-632 115
(Bachelor of Computer Science)- 2022-2023 onwards

Semester: V Papertype: Core Practical-6

Papercode: Name of the Paper : Operating System Lab Credit: 3

Total Hours per Week: 4 Hrs. Lecture Hours: Tutorial Hours: Practical Hours: 52 Hrs.

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Course Objectives

1. To know about UNIX commands.
2. To understand the concept of shell programming.
3. To learn how to use vi editor.
4. To understand the concepts of semaphores.
5. To understand the concepts of synchronization.

Course Outcomes (five outcomes for each unit should be mentioned)

1. After studying unit-1, the student will be able to understand UNIX commands.
2. After studying unit-2, the student will be able to write a program using shell commands.
3. After studying unit-3, the student will be able to build an application for semaphores.
4. After studying unit-4, the student will be able to implement synchronization applications.
5. After studying unit-5, the student will be able to develop a program for file allocation strategies.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

LIST OF PRACTICAL EXERCISES

1. Basics of UNIX commands.
2. Shell Programming.
3. Implement the following CPU scheduling algorithms
 - a) Round Robin
 - b) SJF
 - c) FCFS
 - d) Priority
4. Implement all file allocation strategies
 - a) Sequential
 - b) Indexed
 - c) Linked
5. Implement Semaphores
6. Implement all File Organization Techniques
 - a) Single level directory
 - b) Two level
 - c) Hierarchical
 - d) DAG
7. Implement Banker's Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement all page replacement algorithms
 - a) FIFO
 - b) LRU
 - c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- o. Book review and research paper review, syllabus and curriculum review.
- p. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development—exercise
- q. Workshops, preparing technical term dictionaries from text books and reference books.
- r. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- s. Forming digital library: collecting text and reference books, course material.
- t. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- u. Extracurricular and cultural activities may be framed through the syllabus content.
- v. Grouping students for self-discussion, self-learning process.
- w. Following institution and intellectual and writing reports in the course field.
- x. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.

- y. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- z. Extracurricular activities may be framed through their syllabus content.
 - aa. Bring the industries to the campus. Bring the students to the industry.
 - bb. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	M	M	S	S	S
CO2	S	S	M	S	M	S	S	S	S	S
CO3	S	S	M	M	M	M	M	S	S	M
CO4	S	S	M	M	M	S	M	S	S	M
CO5	S	S	M	M	M	M	S	S	S	M

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY,VELLORE–632 115
(BachelorofComputerScience)–2022-2023onwards

Semester:V **Papertype:Internal Elective – Paper1**

Papercode: **Name of the Paper :DataMining** **Credit:3**

TotalHours perWeek:3 Hrs.LectureHours:39 Hrs.TutorialHours:.....PracticalHours:.....

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Course Objectives

1. Tounderstand aboutthebasicsofDataMining andData
2. TounderstandaboutthethodsofDataWarehousing
3. Tounderstand aboutthetechniquesofDataMining
4. TounderstandabouttheimportanceofClusterandoutlierdetection
5. Toimprovethestudent’sknowledgewithrecenttrendsandtools

Course Outcomes

1. Afterstudiedunit-1,thestudentwillbeabletoUnderstandthefunctionalityofvariousdataminingcomponents.
2. Afterstudiedunit-2,thestudentwillbeabletoDescribethedifferentmethodologiesusedindata
3. After studiedunit-3,thestudentwillbeabletoCharacterizethekindsofpatterns
4. Afterstudiedunit-4,thestudentwillbeabletoenrichtheconceptofclustering
5. Afterstudiedunit-5,thestudentwillbeabletoDiscussandcomparevariousapproacheswithothertechniquesindataminin g.

MatchingTable

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:DATA MININGBASICS**TeachingHours:8Hrs.**

What is Data Mining– Kinds of Data – Kinds of patterns – Technologies used for Data Mining– MajorIssuesinData Mining–Data–DataObjectsandAttribute types–DataVisualization–Measuring Data Similarity and Dissimilarity–Data Preprocessing– overview– Data Cleaning– DataIntegration–Data Reduction–Data TransformationandDataDiscretization.

Unit-2:DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING**TeachingHours:8Hrs.**

Data Warehouse–Basicconcepts–Data Warehouse Modeling:Data CubeandOLAP– Data Warehouse DesignandUsage–Data Warehouse Implementation–Data GeneralizationbyAttribute– Oriented Induction–Data Cube Technology–Data Cube Computation Methods–Exploring Cube Technology–Multidimensional Data Analysisincube space.

Unit-3:PATTERNS AND CLASSIFICATION**TeachingHours:8Hrs.**

Patterns–Basicconcepts–Pattern Evaluation Methods–Pattern Mining:Pattern MininginMultilevel– Multidimensional space–Constraint–Based Frequent Pattern Mining– Mining High Dimensional Data and Colossal patterns– Mining compressed or Approximate patterns– Pattern ExplorationandApplication.Classification–Decision tree Induction– Bayes Classification methods–Rule based Classification–Model Evaluation and selection–Techniques to Improve Classification Accuracy–Other Classification methods.

Unit-4:CLUSTERING AND OUTLIER DETECTION**TeachingHours:8Hrs.**

Cluster Analysis– Partitioning Methods–Hierarchical Methods–Density–Based Methods– Grid–Based Methods–Evaluation of Clustering.–Clustering High –Dimensional Data–Clustering Graph and Network Data – Clustering with Constraints–Web Mining– Spatial Mining. Outlier Detection– OutliersandOutliers Analysis–Outlier Detection Methods–Outlier Approaches–Statistical–Proximity–Based–Clustering–Based–Classification Based–High–Dimensional Data.

Unit-5:RECENT TRENDS IN DATA MINING AND TOOLS**TeachingHours:7Hrs.**

Other Methodologies of Data Mining –Data Mining Applications–Data Mining Trends– Recent Data Mining Tools–Rapid miner–Orange–Weka–Klimate–Sisense–Ssd (SQL Server Data Tools)–Oracle–Rattle–Datamelt–Apache Mahout.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development—exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objectivity type, descriptivity type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self discussion, self learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Data Warehousing Fundamentals”, Paulraj Ponnaiah, Wiley Publishers, 2001.
2. “Data Mining: Concepts and Techniques”, Jiawei Han, Micheline Kamber, Morgan Kaufman Publishers, 2006.
3. “Introduction to Data Mining with case studies”, G.K. Gupta, PHI Private limited, New Delhi, 2008. 2nd Edition, PHI, 2011

Reference Books:

1. “Advances in Knowledge Discover and Data Mining”, Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhraic Smyth, Ramasamy Uthrusamy, the M.I.T. Press, 2007.
2. “The Data Warehouse Toolkit”, Ralph Kimball, Margy Ross, John Wiley and Sons Inc., 2002
3. “Building Data Mining Applications for CRM”, Alex Berson, Stephen Smith, Kurt Thearling, Tata McGraw Hill, 2000.

4. "Data Mining: Introductory and Advanced Topics", Margaret Dunham, Prentice Hall, 2002.
5. "Discovering Knowledge in Data: An Introduction to Data Mining", Daniel T. Larose John Wiley & Sons, Hoboken, New Jersey, 2004

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	M	M	S	S	S
CO2	S	M	M	S	M	S	S	M	S	S
CO3	S	M	S	S	S	M	S	S	S	S
CO4	S	S	S	S	M	M	S	S	M	S
CO5	S	M	M	S	M	M	M	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (maybe avoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)– 2022-2023 onwards

Semester: V **Paper type: Internal Elective –Paper 1**

Paper code: **Name of the Paper : Information Security** **Credit: 3**

Total Hours per Week: 3 Hrs. Lecture Hours: 39 Hrs. Tutorial Hours: Practical Hours:

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Course Objectives

1. To understand the basic concepts of Information Security
2. To understand the legal, ethical and professional issues in Information Security
3. To know about risk management
4. To understand the technological aspects of Information Security
5. To understand the concepts of Cryptography and Hacking methods

Course Outcomes

1. After studied unit-1, the student will be able to define and relate the concepts and terms of security
2. After studied unit-2, the student will be able to classify and outline existing attacks and security measures
3. After studied unit-3, the student will be able to understand risk management
4. After studied unit-4, the student will be able to build security models
5. After studied unit-5, the student will be able to criticize and propose solutions for protecting the system from hacking

Matching Table

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:INFORMATIONSECURITYBASICS**TeachingHours:7Hrs.**

Introduction – History – What is Information Security?– Critical Characteristics of Information–
NSTISSC Security Model– Components of an Information System– Securing the Components–
BalancingSecurityandAccess–The SDLC–TheSecuritySDLC.

Unit-2:SECURITYINVESTIGATION**TeachingHours:8Hrs.**

Objective: Security– Business Needs– Threats– Attacks– Legal– Ethical and Professional Issues–
Relevant U.S. Laws – International Laws and Legal Bodies – Ethics and Information Security –
CodesofEthics andProfessionalOrganizations

Unit-3:SECURITYANALYSIS**TeachingHours:8Hrs.**

Risk Management – Introduction – An Overview of Risk Management – Risk Identification –
RiskAssessment – Risk Control Strategies – Selecting a Risk Control Strategy – Quantitative
versusQualitative RiskControlPractices–RiskManagementDiscussionPoints

Unit-4:SECURITY MODELS**TeachingHours: 8Hrs.**

LOGICALDESIGN–BlueprintforSecurity–InformationSecurityPolicy–StandardsandPractices–
ISO 17799/BS 7799– NIST Models– VISA International Security Model– Design ofSecurity
Architecture– Planning for Continuity – Security Physical Design –Firewalls –
SecurityTechnology– IDS–IPS–Honey Pots– Honey Nets–Padded cell Systems Scanning and
AnalysisTools–AccessControlDevices.

Unit-5:CRYPTOGRAPHY ANDETHICALHACKING**TeachingHours:8Hrs.**

Ciphermethods–CryptographicAlgorithmsandTools–AttacksonCryptosystems–Hacking–
EffectsofHacking–Hacker–TypesofHacker–EthicalHacker–Hacktivism–
Networking&ComputerAttacks–MaliciousSoftware(Malware)–ProtectionAgainstMalware–
IntruderAttacks on Networks and Computers – Wireless Hacking– Windows Hacking– Linux
HackingSession.

InternalAssessmentMethods:(Thefollowing
itemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaperreview, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books
level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops, preparing technicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can
begivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.

- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self discussion, self learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Principles of Information Security”, Michael E Whitman and Herbert J Mattord, 5th Edition, Vikas Publishing House, New Delhi, 2003.
2. “Fundamentals of Information Systems Security”, David Kim, Michael G. Solomon, 3rd Edition, Jones & Bartlett Learning, October 2016.
3. “The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy”, Patrick Enebreton, 2nd Edition, Syngress Basics Series–Elsevier, 2011.
4. “Hands-On Ethical Hacking and Network Defense”, Michael T. Simpson, Kent Backman, James E. Corley, Second Edition, CENGAGE Learning, 2010.

Reference Books:

1. “Handbook of Information Security Management”, Micki Krause, Harold F. Tipton, sixth Edition, CRC Press LLC, 2004.
2. “Hacking Exposed”, Stuart McClure, Joel Scrambray, George Kurtz, Tata McGraw–Hill, 2003.
3. “Computer Security Art and Science”, Matt Bishop, 2nd Edition, Pearson/PHI, 2002.

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	M	S	S	S
CO2	S	S	M	M	M	S	S	S	S	S
CO3	S	M	M	S	M	M	M	S	S	S
CO4	S	M	S	M	S	M	M	S	S	S
CO5	S	M	M	M	M	M	S	S	S	S

PO–ProgrammeOutcome,CO –Courseoutcome

S –Strong ,M–Medium,L– Low(maybeavoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)–2022-2023 onwards

Semester: V

Paper type: Internal Elective –Paper 1

Paper code:

Name of the Paper : Software Testing

Credit:

3 Total Hours per Week: 3 Hrs. Lecture Hours: 39 Hrs. Tutorial Hours: Practical Hours:

.....

Course Objectives

1. To understand the concept of software testing, and software quality
2. To learn to inspect and detect errors by going through each and every code segment
3. To gain knowledge of various functional and structural testing techniques
4. To understand basic concept of Software Management tools and object oriented testing
5. To understand basic concept of Software quality and software quality assurance

Course Outcomes

1. After studied unit-1, the student will be able to understand the knowledge and comparison of various testing strategies.
2. After studied unit-2, the student will be able to analyze various testing methods
3. After studied unit-3, the student will be able to Apply the software testing techniques in commercial environments
4. After studied unit-4, the student will be able to Build the role of management in a software development..
5. After studied unit-5, the student will be able to attain the attributes and assessment of quality, reliability.

Matching Table

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:INTRODUCTIONTOSOFTWARETESTING**TeachingHours:7Hrs.**

Fundamentals of software testing – need for software testing– Psychology of testing – various approaches – characteristics of testing – principles of testing – testing strategies – verification and validation–DefectandPreventionstrategies.

Unit-2:SOFTWAREDEVELOPMENTMODELANDTESTING**TeachingHours:8Hrs.**

Water fall model– V–model– Spiral model– Agile model – Life cycle of testing– Static Testing – dynamic testing–Whiteboxtesting–Blockboxtesting–Regressiontesting–IntegrationTesting – SystemandPerformanceTesting–UsabilityTesting

Unit-3:FUNCTIONALANDSTRUCTURALTESTING**TeachingHours:8Hrs.**

Boundary Value Analysis – Equivalence Class Testing – Decision Table – Based Testing – CauseEffect Graphing Technique – Path testing –Cyclomatic Complexity –Graph Metrics – Data FlowTesting–Slicebasedtesting

Unit-4:TESTMANAGEMENTANDTOOLS**TeachingHours:8Hrs.**

Test planning – cost–benefit analysis of testing – monitoring and control–Test reporting – Testcontrol – Specialized testing – Object Oriented Testing – Automated Tools for Testing – ToolSelectionandImplementation–Challengesintestautomation –GUITesting

Unit-5:SOFTWAREQUALITYANDSOFTWAREQUALITYASSURANCE**TeachingHours: 8Hrs.**

Introductiontosoftwarequalityandsoftwarequalityassurance–basicprinciplesaboutthesoftware quality and software quality assurance – Planning for SQA – various models for softwareproductqualityandprocess quality–SCM–RAD–SystemDocumentation

InternalAssessmentMethods:(Thefollowingitemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaperreview, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops, preparing technicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparingquestionpaperbythecandidates:objectivetype,descriptivetype,training canbegivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.
- f. Villages, institutions, various people groups may be adopted by the departments of thecolleges for practicing their theoretical study. Innovative methods may be implemented inthepracticesandreportcanbewrittenfordocumentation, further discussionandresearch.
- g. Extracurricularandculturalactivitiesmaybeframedthroughthesyllabuscontent.

- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Software Testing– A Craftsman’s Approach”– Paul C.Jorgensen – Second Edition – CRC Press 2008
2. “Software Testing”,–Ron Patton, Second Edition–Sams Publishing, Pearson Education, 2007.
3. “Software Testing–A Craftsman’s Approach”–Paul C.Jorgensen, Second Edition–CRC Press, 2008

Reference Books:

1. “Software Testing and Analysis: Process, Principles and Techniques”– Mauro Pezze, Michal Young–Wiley India, 2008
2. “Software Engineering”–K.K. Aggarwal & Yogesh Singh–New Age International Publishers – New Delhi, 2003.
3. “Software Testing–Principles and Practices”– Srinivasan Desikan and Gopalaswamy Ramesh, Pearson Education, 2006.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	M	M	M	S	S	S	M	M	S
CO5	S	S	M	M	M	S	S	S	S	S

PO–Programme Outcome, CO –Course outcome
 S –Strong ,M–Medium, L– Low(may be avoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)– 2022-2023 onwards

Semester: V

Paper type: Skill Based Subject – Paper 3

Paper code:

Name of the Paper : Software Engineering

Credit:

2 Total Hours per Week: 3 Hrs. Lecture Hours: 39 Hrs. Tutorial Hours: Practical Hours:

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Course Objectives

1. Introduce the concepts and methods required for the construction of large software intensive systems.
2. Get the idea of choosing the Requirements in Software Engineering.
3. Give an understanding the concept of Data Engineering.
4. To impart knowledge on Testing and Debugging.
5. To enable the student to learn the basic of Project Management & Scheduling.

Course Outcomes

1. After studied unit-1, the student will be able to recall the various techniques of software process models
2. After studied unit-2, the student will be able to understand the requirements for a software project
3. After studied unit-3, the student will be able to create architectural design
4. After studied unit-4, the student will be able to understand testing strategies
5. After studied unit-5, the student will be able to understand software project management

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:INTRODUCTIONTOEVOLVINGSOFTWARE**TeachingHours:8Hrs.**

EvolvingRoleof Software–Nature of Software–SoftwareEngineering–TheSoftwareProcess–SoftwareEngineeringPractices–SoftwareMyths–AGenericViewofProcessModel
– Process Assessmentand Improvement– Process Models : Waterfall Model – IncrementalProcessModels–EvolutionaryProcessModels–ConcurrentModels.

Unit-2:REQUIREMENTSENGINEERING**TeachingHours:8Hrs.**

RequirementsEngineering:EstablishingtheGroundwork–InitiatingtheRequirementsEngineering Process – Eliciting Requirements – Collaborative Requirements Gathering – QualityFunction Deployment – Usage Scenarios – Elicitation work Products – Building the RequirementsModel – Elements of Requirements Model – Analysis Pattern – Requirements Analysis – DataModelingConcepts.

Unit-3:DATAENGINEERING**TeachingHours:7Hrs.**

Data Engineering: Design Process and Design Quality – Design Concepts – The Design Model–Creating an Architectural Design – Software Architecture – Data Design – Architectural style – Architectural Design –Architectural MappingUsingData Flow–PerformingUserInterfaceDesign–GoldenRules.

Unit-4:TESTINGSTRATEGIES**Teaching Hours: 8**

Hrs.TestingStrategies:StrategicApproachtoSoftwareTesting–StrategicIssues–TestStrategiesforConventionalandObjectOrientedSoftware–ValidationTesting–SystemTesting–ArtofDebugging.Software Testing Fundamentals– White Box Testing– Basis Path Testing– ControlStructureTesting–BlackBoxTesting–ModelBasedTesting.

Unit-5:PROJECT MANAGEMENT**TeachingHours:8Hrs.**

Project Management: Management Spectrum – People – Product – Process – Project – CriticalPractices –Estimation: Project Planning Process – Software Scope and Feasibility – Resources –SoftwareProjectEstimation–ProjectScheduling–QualityConcepts–SoftwareQualityAssurance–ElementsofSoftware QualityAssurance–FormalTechnicalReviews.

InternalAssessmentMethods:(Thefollowingitemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaperreview, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops, preparing technicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can begivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.

- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self discussion, self learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbook:

1. "Software Engineering – A Practitioner's Approach", Roger S Pressman, McGraw Hill International Edition, New York :2005, Seventh Edition
2. "Software Engineering", Mall Rajib, PHI Learning, 2009, 3 Third Edition.

Reference Book:

1. "Software Engineering", Ian Somerville, Pearson Education, 2006, 7th Edition.
2. "Software Engineering Concepts" Richard Fairley, Tata McGraw–Hill Education, 2011.
3. "Software Engineering: Theory and Practice", Pfleger and Lawrence, Pearson Education, 2001, Second Edition.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	M	M	S	S	M	S
CO2	S	S	S	M	M	S	M	S	S	S
CO3	S	M	M	S	M	M	M	S	S	S
CO4	S	S	M	M	S	S	S	M	M	M
CO5	S	M	M	S	M	M	M	M	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)– 2022-2023 onwards

Semester: VI **Paper type: Core Theory – Paper 8**

Paper code: **Name of the Paper : Open Source Software**

Credit: 4 Total Hours per Week: 4 Hrs. Lecture Hours: 52

Hrs. Tutorial Hours: Practical Hours:

.....
Course Objectives

1. To understand the concept of HTML, HTML5 and CSS.
2. To learn to inspect and detect errors by going through each and every code segment.
3. To understand basic concept of JavaScript and MySQL.
4. To understand basic concept of PHP
5. To understand basic concept of PERL

Course Outcomes

1. After studied unit-1, the student will be able to build static web pages using HTML and CSS.
2. After studied unit-2, the student will be able to understand Linux Filesystem.
3. After studied unit-3, the student will be able to build validation coding using Javascript.
4. After studied unit-4, the student will be able to build dynamic pages using PHP.
5. After studied unit-5, the student will be able to understand PERL basics.

Matching Table (Put Yes/No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION TO HTML, CSS

Teaching Hours: 11 Hrs.

Need of Open Source – Advantages of Open source – Application of Open Source – HTML – HTML tags – Dynamic Web content – HTTP Request and Response Procedure – Introduction to HTML5 – HTML5 Canvas – HTML5 Audio and Video – Introduction to CSS – CSS Rules – Style Types – CSS Selectors – CSS Colors.

Unit-2:LINUX

TeachingHours: 10Hrs.

Introduction:LinuxEssentialCommands–KernelModeandusermode–FilesystemConcept–StandardFiles–TheLinuxSecurity Model–ViEditor–PartitionsCreation–ShellIntroduction–StringProcessing–InvestigationandManagingProcesses–NetworkClients–InstallingApplication.

Unit-3:JAVA SCRIPT AND MYSQL

TeachingHours:10Hrs.

Java script :Advantages of JavaScript –JavaScript Syntax–Data type– Variable– Array – Operatorsand Expressions– Loops– functions – Dialog box– MySQL – The show Databases and Table –The USE command –Create Database and Tables – Describe Table – Select, Insert, Update, andDelete statement.

Unit-4:PHP

TeachingHours:11Hrs.

PHPIntroduction–General SyntacticCharacteristics–PHPScripting–Commentingyourcode–Primitives,OperationsandExpressions–PHPVariables–OperationsandExpressionsControlStatement–Array–Functions–BasicFormProcessing–FileandFolderAccess–Cooking–Sessions–DatabaseAccesswithPHO.

Unit-5:PERL

TeachingHours:10Hrs.

PERL : Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – StatementsandControlstructures–Subroutines,Packages,andModules–WorkingwithFiles–DataManipulation.

InternalAssessmentMethods:(Thefollowingitemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaperreview, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops, preparing technicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can begivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.
- f. Villages, institutions, various people groups may be adopted by the departments of thecolleges for practicing their theoretical study. Innovative methods may be implemented inthepracticesandreportcanbewrittenfordocumentation, further discussionandresearch.
- g. Extracurricularandculturalactivities maybeframedthroughthesyllabuscontent.
- h. Groupingstudentsforselldiscussion,selflearningprocess.
- i. Followinginstitutionandintellectualandwritingreportsinthecoursefield.
- j. BloomTaxonomymaybeintroducedforteaching,learningandevaluationprocesswithinthe frameworkofquestionsettingpatternandinternalassessmentpattern.
- k. Forapplicationorientedstudy:Villages,Institutions,variouspeoplegroupsmaybeadoptedbythe departmentsofthecollegesforpracticingtheirtheoreticalstudy.Innovative

methods may be implemented in the practices and report can be written for documentation, further discussion and research.

- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “The Complete Reference Linux”, Peterson, Tata McGraw HILL–2010
2. “Perl: The Complete Reference”, Martin C. Brown, Tata McGraw Hill Publishing Company Limited, Indian Reprint 2009.
3. “MYSQL: The Complete Reference”, Vikram Vaswani, 2nd Edition, Tata McGraw Hill Publishing Company Limited, Indian Reprint 2009
4. “PHP: The Complete Reference”, Steven Holzner, 2nd Edition, Tata McGraw Hill Publishing Company Limited, Indian Reprint 2009.
5. “Complete Reference HTML”, T.A. Powell, 3rd Edition, Tata McGraw Hill Publishing Company Limited, Indian Reprint 2002.
6. “Mastering Javascript”–J. Jaworski, BPB Publications, 1999

Reference Books:

1. “Fundamentals of Open Source Software”, by M.N. Rao, PHI publishers.
2. “MySQL Bible”, Steve Suchring, John Wiley, 2002
3. “The Linux Kernel Book”, Remy Card, Eric Dumas and Frank Mevel, Wiley Publications, 2003
4. Ivan Byross, HTML, DHTML, Javascript, Perl, BPB Publication

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	S	S	S
CO2	S	S	M	S	S	M	S	S	S	S
CO3	S	M	M	S	S	M	S	M	S	S
CO4	S	S	M	S	M	M	S	M	S	S
CO5	S	M	M	S	M	M	S	S	S	S

PO–Programme Outcome, CO –Course outcome
 S –Strong ,M–Medium,L– Low(may be avoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)– 2022-2023 onwards

Semester: VI **Paper type: Core Theory– Paper 9**

Paper code: **Name of the Paper : Python Programming** **Credit: 4**

Total Hours per Week: 4 Hrs. Lecture Hours: 52 Hrs. Tutorial Hours: Practical Hours:

.....
Course Objectives

1. To understand the tokens of Python.
2. To learn control statements in Python.
3. To know about built-in functions.
4. To learn about the concept of List.
5. To understand how to handle exception.

Course Outcomes

1. After studying unit-1, the student will be able to write simple Python programs giving basic knowledge.
2. After studying unit-2, the student will be able to understand control structures.
3. After studying unit-3, the student will be able to create functions.
4. After studying unit-4, the student will be able to arrange elements through sorting.
5. After studying unit-5, the student will be able to handle exception.

Matching Table

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION

Teaching Hours: 11 Hrs.

Identifiers– Keywords -Statements and Expressions–Variables–Operators–Arithmetic operators–
Assignment operators–Comparison operators–Logical operators–Bitwise operators

- Precedence and Associativity – Data types- Number – Booleans – Strings -Indentation – Comments – Single line comment – Multiline comments - Reading Input – Print Output – TypeConversions – int function – float function – str() function – chr() function – complex() function –ord() function – hex() function – oct() function -type() function and Is operator – Dynamic andStronglytypedlanguage.

Unit-2: STATEMENTS EXCEPTION AND STRING OPERATIONS

|

TeachingHours: 10Hrs.

Control Flow Statements – If statement – If else statement – If elif else statement – nested ifstatement - while loop – for loop – continue and break statements – catching exceptions using tryand except statement – syntax errors – exceptions – exception handling – Strings – str() function-Basicstringoperations–Stringcomparison–Builtinfunctionsusingstrings– Accessingcharactersinstring–String slicing–Stringjoining– split()method– stringtraversing.

Unit-3:FUCTIONS

TeachingHours: 11Hrs.

Functions – Built in functions – function definition and calling -return statement – void function – scope and lifetime of variables – args and kwargs – command line arguments - Tuples – creation – basic tuple operations – tuple() function – indexing – slicing – built-in functions used on tuples – tuple methods – packing – unpacking – traversing of tuples – populating tuples – zip()function-Sets –Traversingofsets–setmethods –frozenset.

Unit-4: LISTS

TeachingHours: 10Hrs.

Lists: Using List- List Assignment and Equivalence – List Bounds- Slicing - Lists and Functions- Prime Generation with a List.List Processing: Sorting-Flexible Sorting- Search- List Permutations- RandomlyPermutingaList-ReversingaList.

Unit-5:OBJECTS

TeachingHours: 10Hrs.

Objects: Using Objects- String Objects- List Objects. Custom Types: Geometric Points- Methods- Custom Type Examples- Class Inheritance. Handling Exceptions: Motivation- ExceptionExamples-UsingExceptions-CustomExceptions.

InternalAssessmentMethods:(Thefollowingitemsmaybroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaperreview, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books
level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops,preparingtechnicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can
begivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.

- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. Gowrishankar S, Veena A, "Introduction to Python programming", 1st Edition, CRC Press/Taylor & Francis, 2008. (Units 1-3)
2. Learn to Program with Python, 3rd Edition, Richard L. Halterman, Southern Adventist University. (Units 4-5)

Reference Books:

1. Core Python Programming, 2nd Edition, Wesley J. Chun, Prentice Hall.
2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for working with Data", 1st edition, O'Reilly Media, 2016.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	M	S	S	S	S
CO2	S	M	M	M	M	M	S	M	M	S
CO3	S	M	S	S	S	S	S	M	S	S
CO4	S	M	M	S	M	S	M	M	M	S
CO5	S	S	S	S	M	M	M	M	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY, VELLORE-632 115
(Bachelor of Computer Science)-2022-2023 onwards

Semester: VI

Paper type: Core-Practical-7

Paper code:

Name of the Paper : Python Programming Lab

Credit:

3 Total Hours per Week: 4 Hrs. Lecture Hours:.. Tutorial Hours:..... Practical Hours: 52 Hrs.

.....
Course Objectives

1. To know about basic data types, operators in Python.
2. To understand Loops in Python.
3. To understand the concepts of Arrays.
4. To understand how to handle string.
5. To know about functions.

Course Outcomes (five outcomes for each unit should be mentioned)

1. After studied unit-1, the student will be able to write a program using operators.
2. After studied unit-2, the student will be able to develop a program using loops.
3. After studied unit-3, the student will be able to implement a program using Arrays.
4. After studied unit-4, the student will be able to implement the concept of String functions.
5. After studied unit-5, the student will be able to build an application with basic expressions.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

LIST OF PRACTICAL EXERCISES

1. Develop a Python program to find the area and perimeter of a circle.
2. Develop a Python program to generate Fibonacci series.
3. Develop a Python program to compute the GCD of two numbers.
4. Develop a Python program to generate first n prime numbers.
5. Develop a Python program to find the sum of squares of n natural numbers.
6. Develop a Python program to find the sum of the elements in an array.
7. Develop a Python program to find the largest element in the array.
8. Develop a Python program to check if the given string is a palindrome or not.
9. Develop a Python program to store strings in a list and print them.
10. Develop a Python program to find the length of a list, reverse it, copy it and then clear it.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

MappingwithProgrammeOutcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	S	M	S	S
CO2	S	S	M	M	S	M	S	M	S	S
CO3	S	M	M	M	S	M	S	M	S	S
CO4	S	S	S	M	S	S	S	S	M	S
CO5	S	M	S	S	S	S	S	S	M	S

PO–ProgrammeOutcome,CO –Courseoutcome
S –Strong ,M–Medium,L– Low(maybeavoided)

THIRUVALLUVARUNIVERSITY,VELLORE-632 115
(BachelorofComputerScience)-2022-2023onwards

Semester:VI **Papertype:Core -Practical-8**

Papercode: **Name of the Paper : OpenSourceProgrammingLab** **Credit:**

2TotalHoursperWeek: 4Hrs. LectureHours:.....TutorialHours:..PracticalHours:52Hrs.

.....
CourseObjectives

1. TounderstandthebasicHTMLTags.
2. Tounderstand thetypesofCSS.
3. TolearnJavascriptfunctions.
4. ToknowaboutPHPformelements.
5. TolearnPHPwithMYSQLdatabaseconnectivity.

Course Outcomes

1. Afterstudiedunit-1,thestudentwillbeabletodesignstaticwebpages.
2. After studiedunit-2,thestudentwillbeabletolinkcommonstyletothewebpagesusingCSS.
3. Afterstudiedunit-3,thestudentwillbeabletovalidateformcontrolsusingjavascript.
4. Afterstudiedunit-4,thestudentwillbeabletodesigndynamicwebpagesusingPHP.
5. Afterstudiedunit-5,thestudentwillbeabletodevelopPHPprogramwithMYSQLdatabaseconnection.

MatchingTable

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

LIST OF PRACTICAL EXERCISES

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets).
3. Develop a shell program to find the factorial of an integer positive number.
4. Develop a shell program to find the details of a user session.
5. Create a simple calculator in JavaScript.
6. Develop a JavaScript program to scroll your name in the scrollbar.
7. Develop a program and check message passing mechanism between pages.
8. Application for Email Registration and Login using PHP and MySQL.
9. Program to Create a File and write the Data into it using PHP.
10. Program to perform the String Operation using Perl.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development—exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.

- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S
CO3	S	M	M	S	M	M	S	M	M	S
CO4	S	S	M	M	M	S	S	S	S	S
CO5	S	S	S	S	M	M	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (maybe avoided)

THIRUVALLUVARUNIVERSITY,VELLORE–632 115
(BachelorofComputerScience)– 2022-2023 onwards

Semester:VI Papertype:Internal Elective–Paper2

Papercode: Name of the Paper :BigDataAnalytics Credit:3

TotalHoursperWeek: 3 Hrs.LectureHours: 39Hrs.TutorialHours:.....PracticalHours:.....

.....
Course Objectives

1. Toexplorethefundamentalconceptsofbigdataanalytics.
2. Tolearntousevariousstechniquesforminingdatastream.
3. TolearntheBigdataBusinessPerspective
4. TounderstandtheapplicationsusingMapReduceConcepts.
5. TointroduceprogrammingtoolsHIVEinHadooecosystem.

Course Outcomes

1. Afterstudiedunit-1,thestudentwillbeabletounderstandthekeyissuesinbigdatamanagement.
2. Afterstudiedunit-2,thestudentwillbeabletooutlinebigdatapanning, processing.
3. Afterstudied unit-3,the student willbe able toAcquirefundamental enabling techniques andscalable.
4. Afterstudiedunit-4,thestudentwillbeabletoexaminevariousbigdatatoolsandtechniques.
5. Afterstudiedunit-5,thestudentwillbeabletoachieveadequateperspectivesofBigDataAnalytics invariousApplicationslikerecommender system,SocialMediaApplicationsandetc.

MatchingTable

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:INTRODUCTIONTO BIGDATA

TeachingHours:7Hrs.

Introductiontobigdata:IntroductiontoBigDataPlatform–ChallengesofConventionalSystems

– Intelligent data analysis – Nature of Data – Characteristics of Data – Evolution of Big Data – DefinitionofBigData–ChallengeswithBigData–Volume,Velocity,Variety– OtherCharacteristicsofData–NeedforBigData–AnalyticProcessesandTools–Analysisvs.Reporting.

Unit-2:MININGDATA STREAMS

TeachingHours:8Hrs.

Mining data streams: Introduction To Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elementsin a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Realtime Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis–StockMarketPredictions.

Unit-3:BIGDATAFROMDIFFERENTPERSPECTIVES

TeachingHours:8Hrs.

BigdatafrombusinessPerspective:Introductionofbigdata–Characteristicsof bigdata–Datainthe warehouse and data in Hadoop– Importance of Big data– Big data Use cases– Patterns for Bigdata deployment. Big data from Technology Perspective– Application Development in Hadoop– GettingyourdatainHadoop.

Unit-4:HADOOP ANDMAPREDUCE

TeachingHours:8Hrs.

Hadoop: The Hadoop Distributed File System – Components of HadoopAnalysing the Data withHadoop– Scaling Out–Hadoop Streaming– Design of HDFS–Java interfaces to HDFS Basics– Developing a Map Reduce Application–How Map Reduce Works–Anatomy of a Map Reduce Jobrun–Failures–JobScheduling–ShuffleandSort–Taskexecution–MapReduceTypesandFormats– MapReduceFeatures–Hadoopenvironment.

Unit-5:FRAMEWORKS

TeachingHours:8Hrs.

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive – fundamentals of HBase and ZooKeeper– IBMInfoSphereBigInsightsandStreams.

InternalAssessmentMethods:(Thefollowingitemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaper review, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops,preparingtechnicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can begivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.

- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Intelligent Data Analysis”, Michael Berthold, David J. Hand, Springer, 2007.
2. “Hadoop: The Definitive Guide“, Tom White Third Edition, O'Reilly Media, 2012.

Reference Books:

1. “Big Data and Analytics” Seema Acharya, Subhasini Chellappan, Wiley 2015.
2. “Mining of Massive Datasets”, Anand Rajaraman and Jeffrey David Ullman, CUP, 2012.
3. “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data” .Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, McGraw Hill Publishing, 2012.
4. “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Bill Franks, John Wiley & Sons, 2012.
5. “Making Sense of Data”, Glenn J. Myatt, John Wiley & Sons, 2007.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	S	M	S	S	S
CO2	S	S	S	S	M	S	M	M	S	S
CO3	S	S	S	S	S	S	M	M	S	S
CO4	S	M	M	S	M	S	M	M	S	S
CO5	S	M	M	M	M	S	M	M	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY,VELLORE–632 115

(BachelorofComputerScience)–2022-2023onwards

Semester:VI

Papertype:Internal Elective– Paper2

Papercode:

Name of the Paper :Cryptography

Credit: 3

TotalHoursperWeek: 3Hrs. LectureHours:39Hrs. TutorialHours:..... PracticalHours:.....

.....
Course Objectives

1. UnderstandOSIsecurityarchitectureandclassicalencryptiontechniques.
2. Understandthedifferentcryptographicoperationsofsymmetriccryptographicalgorithms.
3. UnderstandthedifferentcryptographicoperationsofPublickeycryptographicalgorithms.
4. Tomakeuseofapplicationprotocolstodesignandmanageasecuresystem.
5. TolearntheconfigurationandmanageE–mailandWLANSecurity.

Course Outcomes

1. Afterstudiedunit-1,thestudentwillbeabletoknowthesecurityattacksandservices.
2. Afterstudiedunit-2,thestudentwillbeabletounderstandtheconceptofEncryptionStandards.
3. Afterstudiedunit-3,thestudentwillbeabletounderstandpublickeycryptographicalgorithms.
4. Afterstudiedunit-4,thestudentwillbeabletolearntheconceptofhashfunctions.
5. Afterstudiedunit-5,thestudentwillbeabletounderstandtheEmailsecurity.

MatchingTable

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:COMPUTERANDNETWORKSECURITY**TeachingHours:7Hrs.**

Computer Security Concepts – OSI security architecture –Security trends – Security attacks – Security Services – Security Mechanisms – Fundamental Security Design Principles– AttackSurfacesandAttackTrees–ModelforNetworkSecurity–NetworkStandards.

Unit-2:SYMMETRICCRYPTOGRAPHYTeachingHours:8Hrs.

Symmetric Cipher– Classical Encryption Technique – Symmetric Cipher Model – SubstitutionTechniques, Transposition Technique – Steganography – Block Cipher and the Data EncryptionStandard – The Data Encryption Standard – Differential and Linear Cryptanalysis – Block CipherPrinciples.AdvancedEncryptionStandard– AESStructure – AESTransformationFunction.

Unit-3:PUBLCKEYCRYPTOGRAPHY**TeachingHours:8Hrs.**

Public Key Cryptography and RSA Principles– RSA Algorithm, Key ManagementandotherPublicKeyCryptosystemsKeyManagement,Diffie– HellmanKeyExchange,EllipticCurveArithmetic–EllipticCurve Cryptography– PseudorandomNumberGeneration.

Unit-4:HASHFUNCTIONSANDDIGITALSIGNATURES**TeachingHours:8Hrs.**

CryptographicHashFunctions – ApplicationofHashFunctions –TwoSimpleHashFunctions –Secure Hash Algorithm(SHA) –Message Authentication Codes –Authentication requirement – Authentication function – MAC – HMAC – CMAC – Digital signature and authenticationprotocols – Digital Signature Standards –Digital Signatures Schemes– Digital Certificate – KeyManagementandDistribution.

Unit-5:SECURITYAPPLICATIONS**Teaching Hours: 8**

Hrs.IntrusionDetectionSystem–PasswordManagement–IntroductiontoFirewall– FirewallGenerations– Web Security – Wireless network Security – Electronic Mail Security– Internet MailArchitecture–S/MIME–PrettyGoodPrivacy(PGP).

InternalAssessmentMethods:(Thefollowingitemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaperreview, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops, preparing technicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can begivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.
- f. Villages, institutions, various people groups may be adopted by the departments of thecolleges for practicing their theoretical study. Innovative methods may be implemented inthepracticesandreportcanbewrittenfordocumentation, further discussionandresearch.
- g. Extracurricularandculturalactivitiesmaybeframedthroughthesyllabuscontent.
- h. Groupingstudentsforselldiscussion,selflearningprocess.

- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Cryptography and Network Security Principles and Practices”, William Stallings, Pearson/PHI, 8th Edition, 2017.
2. “CRYPTOGRAPHY & NETWORK SECURITY” – Principles and Practices, William Stallings, Pearson Education, Third Edition.

Reference Books:

1. “Modern Cryptography Theory and Practice”, Wenbo Mao, Pearson Education, 2004.
2. “Cryptography and Network Security”, Behrouz Forouzan, Debdeep Mukhopadhyay, Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. “Quantum Cryptography and Secret–Key Distillation”, Gilles van Assche, Cambridge University Press, 2010.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	M	S	S	S
CO2	S	S	S	M	M	M	M	S	M	S
CO3	S	M	M	M	M	M	M	S	S	S
CO4	S	S	M	M	M	S	S	S	M	S
CO5	S	S	S	M	M	M	M	M	S	M

PO–Programme Outcome, CO –Course outcome
 S –Strong ,M–Medium,L– Low(may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)–2022-2023 onwards

Semester: VI **Paper type: Internal Elective– Paper 2**

Paper code: **Name of the Paper : Digital Image Processing**

Credit: 3 Total Hours per Week: 3 Hrs. Lecture Hours: 39

Hrs. Tutorial Hours: .. Practical Hours:

Course Objectives

1. To know the basics of Digital image and techniques.
2. To understand various Image enhancement ideas.
3. To understand Image restoration techniques.
4. To understand degrees of image resolution and compression methods.
5. To understand concepts of image representation and recognition.

Course Outcomes

1. After studying unit-1, the student will be able to understand the concepts like MatLab, DIP, electromagnetic spectrum and etc.
2. After studying unit-2, the student will be able to analyze smoothing and sharpening techniques.
3. After studying unit-3, the student will be able to know about image filters.
4. After studying unit-4, the student will be able to gain knowledge about compression techniques.
5. After studying unit-5, the student will be able to know about image representation.

Matching Table

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:FUNDAMENTALS**TeachingHours:7Hrs.**

Introduction – Origin – Steps in Digital Image Processing – Components – Applications of DIP – Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Images in Matlab – Pixels – Color models – Digital Image Processing in Multimedia.

Unit-2:IMAGE ENHANCEMENT**TeachingHours:8Hrs.**

Spatial Domain – Gray level transformations – Histogram Quantization – Histogram matching and processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering – Introduction to Fourier Series – Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal – Butterworth and Gaussian filters.

Unit-3:IMAGERESTORATION AND SEGMENTATION**TeachingHours:8Hrs.**

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities – Edge Linking and Boundary detection – Region based segmentation – Active Contour Models – Snakes – Fuzzy Connectivity – Morphological processing – erosion and dilation.

Unit-4:WAVELETS AND IMAGE COMPRESSION**TeachingHours:8Hrs.**

Wavelets – Subband coding – Multi resolution expansions – Compression: Fundamentals – Image Compression models – Error Free Compression – Predictive Compression Methods – Vector Quantization – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

Unit-5:IMAGEREPRESENTATION AND RECOGNITION**TeachingHours:8Hrs.**

Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems – Chain Code – Polygonal approximation, signature, boundary segments – Shape number – Fourier Descriptor moments – Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.

- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbook:

1. "Digital Image Processing," Rafael C. Gonzalez, Richard E. Woods, Prentice Hall, Third Edition, 2008.
2. "Digital Image Processing and Computer Vision," Sonka, Hlavac, Boyle, Cengage Learning, 2009
3. "Fundamentals of Digital Image Processing", Anil Jain K, PHI Learning Pvt. Ltd., 2011.

Reference Book:

1. "Digital Image Processing", S. Sridhar, Oxford University Press; Second edition, 2016.
2. "Digital Image Processing", Gonzalez & Woods, Pearson Education India, 2016.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	M	M	M	S	S
CO2	S	S	M	M	M	M	S	M	S	S
CO3	S	S	M	M	M	S	S	S	M	S
CO4	S	M	S	M	S	M	M	S	S	S
CO5	S	M	M	M	S	M	M	M	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)– 2022-2023 onwards

Semester:VI **Papertype:Internal Elective– Paper3**

Papercode: **Name of the Paper :ArtificialIntelligence** **Credit:3**

TotalHoursperWeek: 3Hrs. LectureHours:39Hrs. TutorialHours:..... PracticalHours:.....

.....

Course Objectives

1. To know the basics of Artificial Intelligence.
2. To Understand the Methods and algorithms in AI.
3. To learn to represent knowledge in solving AI problems.
4. To Understand Statistical logics and know about Software agents.
5. To learn how Machine learning is related to AI.

Course Outcomes

1. After studied unit-1, the student will be able to recall the fundamentals of artificial intelligence
2. After studied unit-2, the student will be able to understand the techniques used for AI
3. After studied unit-3, the student will be able to know about knowledge representation.
4. After studied unit-4, the student will be able to gain knowledge about fuzzy logic.
5. After studied unit-5, the student will be able to evaluate the design of new artificial intelligence and machine learning applications

Matching Table (Put Yes/No in the appropriate box)

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:INTRODUCTIONTOARTIFICIALINTELLIGENCE TeachingHours:7Hrs.

History of AI – Artificial Narrow Intelligence (ANI) – Artificial General Intelligence (AGI) – Artificial Super Intelligence (ASI) – Characteristics – Types of AI – Domains – ProgrammingLanguagesofAI–Applications ofAI–FutureofAI.

Unit-2:AI–PROBLEM SOLVINGMETHODS TeachingHours:8Hrs.

Problem solving Methods – Search Strategies: Uninformed – Informed – Heuristics – Generate andtest–hill climbing–Bestfirstsearch –problem reduction –Local SearchAlgorithms andOptimization – Game Playing mini–max procedure – Optimal Decisions in Games – Alpha – BetaPruning–StochasticGames

Unit-3:AI–KNOWLEDGEREPRESENTATION TeachingHours:8Hrs.

ProceduralVersusdeclarativeknowledge–logicprogramming–ForwardVersusbackwardreasoning – Matching – Control knowledge – Ontological Engineering– Categories and Objects –Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoning withDefaultInformation.

Unit-4:STATISTICALREASONINGANDAGENTS TeachingHours:8Hrs.

Probability and Bayes Theorem – Certainty factors – Probabilistic Graphical Models – BayesianNetworks–MarkovNetworks–FuzzyLogic.ArchitectureforIntelligentAgents– Agentcommunication–NegotiationandBargaining–ArgumentationamongAgents– TrustandReputationinMulti–agentsystems.

Unit-5:MACHINELEARNING ANDAPPLICATIONS TeachingHours:8Hrs.

Types of Machine Learning – Neural Networks – Deep Learning – Natural Language Processing – MachineTranslation–SpeechRecognition–Robot–Hardware–Perception–Planning–Moving.

InternalAssessmentMethods:(Thefollowingitemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaperreview, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops,preparingtechnicaltermdictionariesfromtextbooksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can begivenbytheteacher

- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbook:

1. "Artificial Intelligence", Elaine Rich, Kevin Knight, Tata McGraw Hill, II Edition.
2. "Artificial Intelligence: A Modern Approach", Stuart Russell, Peter Norvig, Third Edition, Prentice Hall of India, New Delhi, 2010.
3. "Prolog: Programming for Artificial Intelligence", I. Bratko, Addison-Wesley Educational Publishers Inc., Fourth edition 2011.

Reference Book:

1. "Machine Learning for Beginners 2019", Matt Henderson, This Is Charlotte, 2019
2. "Introduction to Artificial Intelligence and Expert Systems", Dan W. Patterson, Pearson, 2015

Course Material: website links, e-Books and e-journals Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	M	M	S	S
CO2	S	M	S	S	M	M	S	M	S	S
CO3	S	S	M	M	S	M	M	S	S	S
CO4	S	M	S	M	M	M	M	S	S	S
CO5	S	S	M	M	S	S	M	M	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY,VELLORE-632 115

(BachelorofComputerScience)- 2022-2023 onwards

Semester:VI Papertype:Internal Elective-Paper3

Papercode: Name of the Paper :SystemSoftware Credit:3

TotalHoursperWeek: 3Hrs. LectureHours:39Hrs. TutorialHours:..... PracticalHours:.....

.....

Course Objectives

1. To understand the basicconceptsofsystemsoftware
2. Abilityto tracethepathofasourcecodetoobjectcodeand toexecutablefile
3. Todesignandimplementationofloadersandlinkers
4. Tounderstandtheconceptsofmacroprocessor
5. Abilitytoanalyzethefunctionsofcompilers

Course Outcomes(fiveoutcomesforeachunitsshould bementioned)

1. Afterstudiedunit-1,thestudentwillbeabletoanalyzeCISCandRISCmachines.
2. Afterstudiedunit-2,thestudentwillbeabletoknowhowassemblersareworking.
3. Afterstudiedunit-3,thestudentwillbeabletodistinguishLinkerandLoader.
4. Afterstudiedunit-4,thestudentwillbeabletolearnmacroprocessor.
5. Afterstudiedunit-5,thestudentwillbeabletounderstandthefunctionsofcompilers.

MatchingTable

Unit	i.Remembering	ii.Understanding	iii.Applying	iv.Analyzing	v.Evaluating	vi.Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1:INTRODUCTIONTOSYSTEMSOFTWARE

TeachingHours:7Hrs.

System software vs. Application software – Different types of system software – SIC& SIC/XEArchitecture–traditional(CISC)machines–RISCmachines.

Unit-2:ASSEMBLERS

TeachingHours:8Hrs.

Basic assembler functions– Machine dependent and independent assembler features– Assemblerdesignoptions–One pass assemblers–Multipassassemblers–MASMassembler.

Unit-3:LOADERSAND

LINKERS

TeachingHours:8Hrs.Ba

asic loader functions–Simple bootstrap loaders – Machine dependent and independent loaderfeatures–Linkage editors–Dynamiclinking.

Unit-4:MACROPROCESSOR

TeachingHours:8Hrs.Ba

asic macro processor functions–Machine dependent and independent macro processor features– Macroprocessordesignoptions.

Unit-5:COMPILERS

TeachingHours:8Hrs.Ba

asic compiler functions–Machine dependent compiler features–Machine independent compilerfeatures–CompilerdesignoptionstheYACC compiler–Compiler.

InternalAssessmentMethods:(Thefollowingitemsmaybebroughtundertest,seminarandassignmentframework)

- a. Bookreviewandresearchpaper review, syllabusandcurriculumreview.
- b. Datacollectionandpaperwritingpractices:books level,fieldstudylevel.Usingthecoursestudyforsocietyandnaturedevelopment–exercise
- c. Workshops,preparing technicaltermdictionariesfromtext booksandreferencebooks.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can begivenbytheteacher
- e. Formingdigitallibrary:collectingtextandreferencebooks,coursematerial.
- f. Villages, institutions, various people groups may be adopted by the departments of thecolleges for practicing their theoretical study. Innovative methods may be implemented inthepacticesandreportcanbewrittenfordocumentation, furtherdiscussionandresearch.
- g. Extracurricularandculturalactivitiesmaybeframedthroughthesyllabuscontent.
- h. Groupingstudentsforselldiscussion,selflearningprocess.
- i. Followinginstitutionandintellectualandwritingreportsinthecoursefield.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process withintheframeworkofquestionsettingpatternandinternalassessmentpattern.
- k. Forapplicationorientedstudy:Villages,Institutions,variouspeoplegroupsmaybeadopted by the departments of the colleges for practicing their theoretical study. Innovativemethods may be implemented in the practices and report can be written for documentation,furtherdiscussionandresearch.
- l. Extracurricularactivitiesmaybeframedthroughtheirsyllabuscontent.

m. Bringtheindustriestothecampus. Bringthestudentstotheindustry.

- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “System Software – An introduction to system programming”, Leland L. Beck & D. Manjula, Pearson Education, 3rd edition, 2007.
2. “Compilers – Principles, techniques and tools”, A. V. Aho, Ravi Sethi, J. D. Ullman, 2nd Edition, Pearson Education, 2011.

Reference Books:

1. “Systems Programming and Operating Systems”, D. M. Dhamdhere, Second Revised Edition, Tata McGraw Hill, 2000.
2. “Systems Programming”, John J. Donovan, Tata McGraw Hill Edition, 2000.
3. “Systems Programming”, Srimanta Pal, Oxford University Press, 2011.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	S	M	M	S
CO2	S	S	M	M	S	M	S	M	S	S
CO3	S	M	M	S	M	S	M	M	S	S
CO4	S	M	S	S	M	S	M	S	S	S
CO5	S	M	M	M	M	M	M	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVARUNIVERSITY, VELLORE–632 115
(Bachelor of Computer Science)– 2022-2023 onwards

Semester: VI **Paper type: Internal Elective– Paper 3**

Paper code: **Name of the Paper : Cloud Computing** **Credit: 3**

Total Hours per Week: 3 Hrs. Lecture Hours: 39 Hrs. Tutorial Hours: Practical Hours:

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Course Objectives

1. To understand the concepts in Cloud Computing.
2. To understand the concepts of Cloud Computing Services.
3. To enable the Students to learn Programming Models in Cloud Computing and its Environments.
4. The students should be made to learn the basics of Software Development in Cloud.
5. At the end of the course, the student should be able to learn Security Aspects of Cloud Computing.

Course Outcomes

1. After studied unit-1, the student will be able to recall the fundamental concepts of cloud computing technology.
2. After studied unit-2, the student will be able to compare and interpret the various cloud services.
3. After studied unit-3, the student will be able to analyze cloud architecture and examine the applications.
4. After studied unit-4, the student will be able to understand networking for cloud computing.
5. After studied unit-5, the student will be able to assess and elaborate the cloud security considerations and models.

Matching Table (Put Yes/No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: UNDERSTANDING CLOUD COMPUTING**Teaching Hours: 7Hrs.**

Computing Paradigms – Cloud Computing Fundamentals – History of Cloud Computing – Cloud Computing Architecture & Management – Cloud Computing Deployment Models – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Cloud Services.

Unit-2: DEVELOPING CLOUD SERVICES**Teaching Hours: 8Hrs.**

Cloud Service Models – SOA & Cloud – Multicore Technology – Memory and Storage Technologies – Networking Technologies – Web 2.0 – 3.0 – Software Process Models for Cloud – Agile SDLC for Cloud Computing – Pervasive Computing – Application Environment – Virtualization.

Unit-3: PROGRAMMING MODELS FOR CLOUD COMPUTING Teaching Hours: 8Hrs.

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – CGL – Map Reduce – Programming models for Aneka – Hadoop Library from Apache – Mapping Applications – Programming Support – Google App Engine, Amazon AWS – Cloud Software Environments – Eucalyptus, Open Nebula, Open Stack, CloudSim – SAP Labs – EMC – Salesforce – VMware.

Unit-4: SOFTWARE DEVELOPMENT IN CLOUD**Teaching Hours: 8Hrs.**

Different Perspectives on SaaS Development – New Challenges in Cloud – Cloud Aware Software Development Using PaaS Technology – Networking for Cloud Computing – Networking Issues in Data Centers – Transport Layer Issues in DCNs – TCP Enhancements for DCNs – Open Source Support for Cloud – Open Source Tools for IaaS Open Source Tools for IaaS – Open Source Tools for PaaS – Open Source Tools for Research.

Unit-5: SECURITY IN CLOUD COMPUTING**Teaching Hours: 8Hrs.**

Security Aspects – Platform Related Security – Audit and Compliance – Cloud Security Challenges and Risks – Software as a Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security – Identity Management and Access Control – Autonomic Security – Advance Concepts in Cloud Computing.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development—exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self discussion, self learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Essentials of Cloud Computing” – K. CHANDRASEKARAN – CRC Press Taylor and Francis Group in Informal Business – 2015.
2. Cloud Computing – A Practical Approach for Learning and Implementation, A. Srinivasan and J. Suresh, Pearson India Publications, 2014

Reference Books:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
2. John W. Rittinghouse and James F. Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009.
4. Kumar Saurabh, “Cloud Computing – insights into New – Era Infrastructure”, Wiley India, 2011.
5. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O’Reilly.

**CourseMaterial:websitelinks,e-Booksande-
journalsMappingwithProgrammeOutcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	M	M	S	S	S
CO2	S	S	M	S	S	M	S	S	S	S
CO3	S	S	M	S	M	S	M	S	S	S
CO4	S	S	S	M	M	S	M	S	S	S
CO5	S	S	M	M	S	M	M	M	S	S

PO–ProgrammeOutcome,CO–Courseoutcome
S –Strong ,M–Medium,L– Low(maybeavoided)



ANNAMALAI UNIVERSITY

M.Sc. (COMPUTER SCIENCE)

Programme Structure and Scheme of Examination (under CBCS)
(Applicable to the candidates admitted from
the academic year 2022 -2023 onwards)

Sem	Course Code	Study Components & Course Title	Hours	Credit	Maximum Marks		
					CIA	ESE	Total
		SEMESTER-I					
I	22PCSCC11	Core Theory - I :Design and Analysis of Algorithm	5	4	25	75	100
	22PCSCC12	Core Theory -II: Advanced Java Programming	5	4	25	75	100
	22PCSCC13	Core Theory -III: Advanced Database Management System	5	4	25	75	100
	22PCSCP14	Core Practical- I:Algorithm LAB using JAVA	4	2	40	60	100
	22PCSCP15	Core Practical- II: Advanced RDBMS LAB	4	2	40	60	100
	22PCSCE16	Core Elective-I	4	4	25	75	100
	22PCSCO17	Open Elective-I	3	3	25	75	100
		Total	30	23			700
		SEMESTER-II					
II	22PCSCC21	Core Theory -IV: Advanced Web Technology	5	4	25	75	100
	22PCSCC22	Core Theory -V:DataMining and Business Intelligence	5	4	25	75	100
	22PCSCC23	Core Theory -VI: Distributed Operating System	5	4	25	75	100
	22PCSCP24	Core Practical- III: Advanced Web Technology LAB	4	2	40	60	100
	22PCSCP25	Core Practical-IV: Data Mining Lab Using R	4	2	40	60	100
	22PCSCE26	Core Elective-II	5	4	25	75	100
	22PHUMR27	Compulsory Course: Human Rights	2	2	25	75	100
		Total	30	22			700

Sem	LIST OF CORE ELECTIVE PAPERS (Choose 1 out 3 in each Semester)						
I	22PCSCE16-1	Compiler Design	4	4	25	75	100
	22PCSCE16-2	Human Computer Interaction	4	4	25	75	100
	22PCSCE16-3	Theory of Computation	4	4	25	75	100
II	22PCSCE26-1	Cryptography and Network Security	4	4	25	75	100
	22PCSCE26-2	Open Source Computing	4	4	25	75	100
	22PCSCE26-3	Soft Computing	4	4	25	75	100

Sem	List of Open Electives (Choose 1 out 3 in each Semester)						
I	22PCSCO17-1	Fundamentals of Computer Application	3	3	25	75	100
	22PCSCO17-2	IoT and its Applications	3	3	25	75	100
	22PCSCO17-3	Multimedia and its applications	3	3	25	75	100

SEMESTER - I CORE - I	22PCSCC11: DESIGN AND ANALYSIS OF ALGORITHMS	CREDITS: 4 HOURS:
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COURSE OBJECTIVES

- 1) Learning basic concepts of Algorithm.
- 2) Method of sorting algorithms analyzed.
- 3) To Analyze Greedy Algorithm and Knapsack Problem.
- 4) To analyze Dynamic Programming.
- 5) To learn effective problem solving in Computing applications and analyze the algorithmic procedure to determine the computational complexity of algorithms.

UNIT I

Introduction: Algorithm Definition–Algorithm Specification–Performance Analysis–Asymptotic Notations. Elementary Data Structures: Stacks and Queues–Trees–Dictionaries – Priority Queues–Sets and Disjoint Set -Union–Graphs

UNIT II

Divide and Conquer: The General Method – Defective Chessboard –Binary Search – Finding the Maximum and Minimum – Merge Sort –Quick Sort – Selection–Stassen’s Matrix Multiplication.

UNIT III

The Greedy Method: General Method–Container Loading–Knapsack Problem–Tree Vertex Splitting–Job Sequencing With Deadlines–Minimum Cost Spanning Trees– Optimal Storage On Tapes–Optimal Merge Patterns–Single Source Shortest Paths.

UNIT IV

Dynamic Programming: The General Method – Multistage Graphs –All-Pairs Shortest Paths–Single-Source Shortest Paths–Optimal Binary Search Trees–String Editing–0/1Knapsack- Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees –Techniques for Graphs–Connected Components and Spanning Trees–Bi connected Components and DFS.

UNIT V

Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets–Graph Coloring–Hamiltonian Cycles–Knapsack Problem Branch and Bound: Least Cost searchhod–0/1Knapsack Problem.

COURSE OUTCOMES

At the end of the course, the student will be able to

- 1) Acquire knowledge on the concepts of Algorithm
- 2) Implementing various Algorithmic and sorting approach
- 3) Able to develop Greedy Algorithm.

- 4) Acquire knowledge in Dynamic Programming.
- 5) Develop Back tracking methods and its applications.

Text Books

- 1) Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

Supplementary Readings

- 1) Data Structures Using C-Langsam, Augenstein, Tenenbaum, PHI
- 2) Data structures and Algorithms, V.Aho, Hopcroft, Ullman, LPE
- 3) Introduction to design and Analysis of Algorithms-S.E.Goodman, ST.Hedetniem-TMH.
- 4) Carlos A. Coello, Gary B. Lamont, David A. Van Veldhuizen, "Evolutionary Algorithms for Solving Multi-Objective Problems", Springer 2nd Edition, 2007.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	3	3	2	2	2
CO3	2	3	3	2	2
CO4	1	3	3	2	1
CO5	2	3	3	3	2

SEMESTER - I CORE – II	22PCSCC12: ADVANCED JAVA PROGRAMMING	CREDITS: 4 HOURS: 75
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COURSE OBJECTIVES

- 1) To get familiar with the concept of packages, interface.
- 2) Able to understand Inheritance and Exception handling in java.
- 3) To learn the concept of Graphical User Interface (GUI).
- 4) Analyse Network Programming, and database manipulation.
- 5) Student will be able to develop web application using Java Servlet and Java Server Pages technology.

UNIT I

Data Types, Variables and Arrays: Primitive Types-Literals-Variables-Type Conversion and Casting- Arrays. Operators: Arithmetic- Bitwise-Relational- Boolean-Logical – Assignment-Conditional. Control Statements: Selection statements- Iteration Statements- Jump Statements. Classes and Methods: Fundamentals- Declaring objects- Methods- Constructors-Overloading Methods- Recursion – Nested and Inner Classes-Command Line Arguments.

UNIT II

Inheritance: Basics-Super Class- Method Overriding- Abstract Classes. Packages and Interfaces: Packages- Access Protection – Importing Packages- Interfaces. Exception Handling: Fundamentals – Types – Try and Catch – Throw – throws- Finally – Built in Exceptions.

UNIT III

The Applet Class: Basics – Architecture – Applet Skeleton – Display Methods – Status Window- Passing Parameters. Event Handling: Event Model – Classes – KeyEvent Class- Event Listener Interfaces. AWT: Window Fundamentals – Working with frame windows- Graphics- Working with color- working with fonts. AWT controls – Labels- Buttons- Check Box- Choice Controls – Lists- Scroll Bars – TextField- Text Area.

UNIT IV

Servlet Fundamentals: Servlet overview and Architecture- Servlet Basics- Servlets and HTML- servlet Sessions- Servlets, JDBC, and Inter Servlet Communications. JSP Fundamentals: JSP Overview and Architecture – JSP Implicit Objects – JSP Standard Actions- Handling JSP Errors – Custom JSP Tag Libraries.

UNIT V

Using Relational Databases: Introduction – JDBC Drivers for RDBM Systems- Using java.sql API, Using javax.sql API – connection pooling. Network Programming: Introduction – Working with URLs – Working with Sockets – Remote Method Invocation.

COURSE OUTCOMES

At the end of the course, the student will be able to

- 1) Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.
- 2) Use the Java language for writing well-organized, complex computer programs with both command line and graphical user interfaces
- 3) Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events
- 4) Apply Servlets and JSP for creating Web based applications using JDBC
- 5) Design and Develop various application by integrating any of Servlets, JSPs, Swing and Applet using Database

Text Books

- 1) Herbert Schildt, “Java the Complete Reference”, Oracle Press, TMH Company Ltd, New Delhi, 9th Edition, 2014.
- 2) James goodwill, “ Developing Java Servlets: Web applications with servlets and JSP”, 2nd Edition, SAMS Publishers, USA
- 3) Joe Wiggles worth and Paula McMillan, “Java Programming Advanced Topics”, 3rd Edition, TMH, 2009.

Supplementary Readings

- 1) Alan Grid, “Java Programming”, Via Etenea Limited, 2020.
- 2) John Dean, Raymond Dean, “Introduction to Programming with JAVA- A Problem Solving Approach”, Tata McGraw Hill, 2012.
- 3) Ralph Bravaco, Shai Simonson, “Java Programming: From the Ground Up”, Tata McGraw Hill, 2012.
- 4) Herbert Schildt, Dale Skrien, “Java Fundamentals – A Comprehensive Introduction”, Tata McGraw Hill, 2013.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	3	3	2	2	2
CO3	2	3	3	2	2
CO4	1	3	3	2	1
CO5	2	3	3	3	2

SEMESTER - I CORE – III	22PCSCC13: ADVANCED DATABASE MANAGEMENT SYSTEM	CREDITS: 4 HOURS: 75
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COURSE OBJECTIVES

- 1) To understand the basic concepts and terminology related to DBMS and Relational Database Design.
- 2) To the design and implement Distributed Databases.
- 3) To apply normalization techniques to improve database design.
- 4) To understand advanced DBMS techniques to construct tables and write effective queries, forms, and reports.
- 5) Analyze a T/O based techniques for designing the database.

UNIT I

Formal review of relational database and FDs Implication – Closure - its correctness

UNIT II

3NF and BCNF -Decomposition and synthesis approaches - Review of SQL99 - Basics of query processing - external sorting -file scans

UNIT III

Processing of joins -materialized vs. pipelined processing -query transformation rules -DB transactions -ACID properties -interleaved executions – schedules -serialisability

UNIT IV

Correctness of interleaved execution -Locking and management of locks -2PL –deadlocks -multiple level granularity -CC on B+ trees -Optimistic CC

UNIT V

T/O based techniques -Multi version approaches -Comparison of CC methods - dynamic databases -Failure classification - recovery algorithm -XML and relational databases.

COURSE OUTCOMES

- 1) Exposure for students to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries.
- 2) Know how of the file organization, Query Optimization, Transaction management, and database administration techniques.
- 3) Elaborate the concept of Concurrency control and Failure Recovery.
- 4) Illustrate concept of CC on B++ tree, Optimistic CC
- 5) Use Modern database such as XML and relational databases.

Text Books

- 1) R. Ramakrishnan, J. Gehrke, Database Management Systems, McGraw Hill, 2004
- 2) Silberschatz, H. Korth, S. Sudarshan, Database system concepts, 5/e, McGraw Hill, 2008.

Supplementary Readings

- 1) K. V. Iyer, Lecture notes available as PDF file for classroom use.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	2	3
CO2	2	3	2	2	2
CO3	3	2	2	2	2
CO4	2	3	3	2	2
CO5	3	2	2	3	2

SEMESTER - I CORE PRACTICAL- I	22PCSCP14: ALGORITHM LAB USING JAVA	CREDITS: 2 HOURS: 4
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COURSE OBJECTIVES

- 1) Implement Sorting algorithm methods.
- 2) Analyze DFS and BFS Algorithm methods.
- 3) To evaluate Back Tracking and Greedy Algorithm.
- 4) Implement Dijkstra's Algorithm.
- 5) To Develop Dynamic Programming.

List of Experiments:

- 1) Implement Quick sort algorithm for sorting a list of integers in ascending order.
- 2) Implement Merge sort algorithm for sorting a list of integers in ascending order.
- 3) Implement the DFS algorithm for a graph.
- 4) Implement the BFS algorithm for a graph.
- 5) Implement backtracking algorithm for the N-queens Problem.
- 6) Implement the backtracking algorithm for the Hamiltonian Circuit's problem.
- 7) Implement Greedy Algorithm for Job Sequencing With Deadlines.
- 8) Implement Dijkstra's algorithm for the Single source shortest path problem.
- 9) Minimum cost Spanning Tree Using Prim's Algorithm.
- 10) Implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.

COURSE OUTCOMES

- 1) To get Knowledge about Sorting Algorithm
- 2) To acquire techniques about DFS and BFS Algorithmic approach
- 3) To perform various Back track Programming techniques
- 4) To acquire knowledge in Dijkstra's Algorithm
- 5) To become a better knowledge in algorithm

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	2	3
CO2	2	3	2	2	2
CO3	3	2	2	2	2
CO4	2	3	3	2	2
CO5	3	2	2	3	2

SEMESTER - I CORE PRACTICAL – II	22PCSCP15: ADVANCED RDBMS LAB	CREDITS: 2 HOURS:
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COURSE OBJECTIVES

- 1) To explore the features of a Database Management Systems.
- 2) To interface a database with front end tools.
- 3) To understand the internals of a database system.
- 4) To use of different Evaluation Plans.
- 5) To interface of Concurrency & Transactions & Big Data Analysis Using Hadoop.

List of Experiments:

- 1) Basic SQL
- 2) Intermediate SQL
- 3) Advanced SQL
- 4) ER Modeling
- 5) Database Design and Normalization
- 6) Accessing Databases from Programs using JDBC
- 7) Building Web Applications using PHP & MySQL
- 8) Indexing and Query Processing
- 9) Query Evaluation Plans
- 10) Concurrency and Transactions
- 11) Big Data Analytics using Hadoop

COURSE OUTCOMES

- 1) Ability to use databases for building web applications.
- 2) Gaining knowledge about the internals of a database system.
- 3) To use of ER Modeling, Database Design & Normalization
- 4) Implement the plan using Web Applications Using PHP & My SQL
- 5) Analysis various Query Evaluation plans, Big Data Analysis

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	3
CO2	3	3	2	3	2
CO3	2	3	3	2	2
CO4	2	2	3	2	3
CO5	3	3	2	3	2

SEMESTER – I CORE ELECTIVE – I	22PCSCE16-1: COMPILER DESIGN	CREDITS: 4 HOURS: 75
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COURSE OBJECTIVES

- 1) Discover principles, algorithms and techniques that can be used to construct various phases of compiler.
- 2) Acquire knowledge about finite automata and regular expressions.
- 3) Learn context free grammars, compiler parsing techniques.
- 4) Explore knowledge about Syntax Directed definitions and translation scheme.
- 5) Understand intermediate machine representations and actual code generation.

Unit I

Lexical analysis -Language Processors, The Structure of a Compiler, Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens–Finite automata-Regular expression to automata.

Unit II

Syntax Analysis - The role of the parser - Context-free grammars – Writing a grammar-Top down Parsing-Bottom-up Parsing- LR parsers-LALR parsers.

Unit III

Semantic Analysis- Inherited and Synthesized attributes –Dependency graphs–Ordering the evaluation of attributes – S-attributed definitions – L-attributed definitions – Applications of Syntax Directed translation–Syntax Directed translations schemes- Storage organization–Stack allocation of space.

Unit-IV

Intermediate Code Generation- Variants of Syntax trees–Three Address code – Types and Declarations -Translation of Expressions –Type checking-Control flow-Back patching- Switch Statements-Procedure calls.

Unit-V

Code Generation and Code Optimization - Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs–Optimization of Basic Blocks-A simple code generator–Peephole Optimization.

COURSE OUTCOMES

- 1) To provide sound knowledge in Lexical Analysis.
- 2) To understand the importance of context-free Grammar.
- 3) To explore knowledge in Semantic Analysis.
- 4) To know the Variants of Syntax trees.

- 5) To identify Code generations and code optimization.

Text Books

- 1) Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, "Compilers Principles, Techniques and Tools", Second Edition, Pearson Education Asia, 2009.

Supplementary Readings

- 1) A.V. Aho, Ravi Sethi, J.D. Ullman, Compiler Principles, Techniques and Tools, Addison-Wesley, 2003.
 2) Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.
 3) Kenneth C. Louden, Compiler Construction Principle and Practice, Vikas publishing House, 2004.
 4) Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001.
 5) S. Godfrey Winster, S. Aruna Devi, R. Sujatha, "Compiler Design", yes dee Publishers, Third Reprint 2019.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
C01	3	2	2	3	2
C02	2	3	3	3	2
C03	3	2	2	3	3
C04	2	2	3	3	3
C05	3	2	3	3	2

SEMESTER - I CORE ELECTIVE - I	22PCSCE16-2: HUMAN COMPUTER INTERACTION	CREDITS: 4 HOURS: 75
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COURSE OBJECTIVES

- 1) To impart knowledge related to the various concepts, methods of Human Computer Interaction techniques.
- 2) Helps to Understand Interaction and Design basics.
- 3) Able to understand Design rules.
- 4) Approaches to user support Adaptive help systems – Designing user support systems.
- 5) Implementing new ideas and users support.

Unit I: The Interaction:

Introduction – Models of interaction – Frameworks and HCI Ergonomics – Interaction styles–Elements of the WIMP interface– Interactivity – The context of the interactions.**Paradigms:** Introduction–Paradigms for interaction.

Unit II: Interaction, Design basics:

Introduction – What is design? – User focus – Scenarios – Navigation design – Screen design and layout–Interaction and prototyping.

HCL in the software process: Introduction–The software life cycle– Usability engineering–interactive design and prototyping–Designrationate.

Unit III: Design rules:

Introduction– Principles to support usability – Standards – Guidelines – Golden rules and heuristics–HCI patterns.

Implementation Support: Introduction–Elements of windowing systems–Programming the application Using toolkits–User interface management systems.

Unit IV: Evaluation techniques:

What is evaluation–Goals of evaluation–Evaluation through expert analysis –Evaluation through user participation–Choosing an evaluation method.

Universal Design: Introduction – Universal design principles – Multi-modal interaction – Designing for diversity – summary. Introduction – Requirements of user support – Approaches to user support Adaptive help systems – Designing user support systems.

Unit V: User support:

Introduction Requirements of user support – Approaches to; user support – Adaptive help systems designing – designing user support systems.

COURSE OUTCOMES

- 1) Discuss the conceptual, practical, and ethical issues involved in evaluation.
- 2) Describe what interaction design is and how it relates to human computer interaction and other fields.
- 3) Discuss the advantages and disadvantages of using analytical evaluation.
- 4) Implementing ideas in application programs.
- 5) User support system can help to designing process

Text Books

- 1) Human Computer Interaction, Third Edition, “Alan Dix, Janet Finlay, Gregory D. Abowd and Russell Beale”, Pearson Education, 2004.

Supplementary Readings

- 1) Human Computer Interaction in the New Millennium, “John C. Carroll”, Pearson Education- 2002.
- 2) Handbook of Human-Computer Interaction, M. G. Helander, Elsevier, 2014.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
C01	1	2	3	2	2
C02	2	3	2	3	2
C03	3	3	2	3	3
C04	3	2	3	2	3
C05	3	1	3	3	3

SEMESTER – I CORE ELECTIVE – I	22PCSCE16-3: THEORY OF COMPUTATION	CREDITS: 4 HOURS: 75
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COURSE OBJECTIVES

- 1) To introduce students to the mathematical foundations of computation including automata theory.
- 2) Ability to understand the theory of formal languages and grammars.
- 3) To Understand the notions of algorithm, decidability, complexity and computability.
- 4) To enhance Students' ability to understand and conduct mathematical proofs for computational algorithms.
- 5) To Understand Un decidable problems about turning machine.

Unit I

Introduction to formal proof – Additional forms of proof– Inductive proofs –Finite. Automata (FA) – Deterministic Finite Automata (DFA) –Non-deterministic Finite Automata (NFA)–Finite Automata with Epsilon transitions.

Unit II

Regular Expression– FA and Regular Expressions – Proving languages not to be regular–Closure properties of regular languages –Equivalence and minimization of Automata.

Unit III

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages–Definition of the Push down automata – Languages of a Push down Automata – Equivalence of Push down automata and CFG –Deterministic Push down Automata.

Unit IV

Normal forms for CFG–Pumping Lemma for CFL–Closure Properties of CFL–Turing Machines–Programming Techniques for TM. A language that is not Recursively Enumerable (RE).

Unit V

An undecidable problem RE–Undecidable problem about Turing Machine–Post’s Correspondence Problem–The classes P and NP.

COURSE OUTCOMES

- 1) Analyse and design finite automata, pushdown automata.
- 2) To Analyse Turing machines, formal languages and grammars.
- 3) Demonstrate their understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.
- 4) To Prove the basic results of the Theory of Computation.
- 5) To State and explain the relevance of the Church-Turing thesis.

Text Books

- 1) Peter Linz, “An Introduction to Formal Languages and Automata” , Third Edition , Narosa, 2005.
- 2) J.E.Hopcroft, R.Motwani and J.D. Ullman , “ Introduction to Automata Theory , Languages and Computations ” , second Edition , Pearson Education,2007.

Supplementary Readings

- 1) H.R.Lewis and C.H. Papadimitriou, “Elements of the theory of Computation”, Second Edition, Pearson Education, 2003.
- 2) Thomas A. Sudkamp,” An Introduction to the Theory of Computer Science, Languages and Machines”, Third Edition, Pearson Education, 2007.
- 3) Raymond Greenlaw H . James Hoover , “Fundamentals of Theory of Computation, Principles and Practice”, Morgan Kaufmann Publishers, 1998.
- 4) Micheal Sipser, “Introduction of the Theory and Computation”, Thomson Brokecole, 1997.
- 5) J.Martin, “Introduction to Languages and the Theory of computation,” Third Edition, Tata McGraw Hill, 2007.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	1	2	3	2	2
CO2	2	3	2	3	2
CO3	3	3	2	3	3
CO4	3	2	3	2	3
CO5	3	1	3	3	3

SEMESTER - II CORE – IV	22PCSCC21: ADVANCED WEB TECHNOLOGY	CREDITS: 4 HOURS: 75
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COURSE OBJECTIVES

- 1) Explore the backbone of webpage creation by developing .NET skill.
- 2) Enrich knowledge about HTML control and web control classes.
- 3) Provide depth knowledge about ADO.NET
- 4) Understand the need of usability, evaluation methods for web services.
- 5) Developing Component based Programming.

UNIT I

OVERVIEW OF ASP.NET - The .NET framework – Learning the .NET languages Data types – Declaring variables- Scope and Accessibility- Variable operations Object Based manipulation-Conditional Structures- Loop Structures-Functions and Subroutines. Types, Objects and Namespaces: The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding namespaces and assemblies. Setting Up ASP.NET and IIS.

UNIT II

Developing ASP.NET Applications - ASP.NET Applications: ASP.NET applications–Code behind-The Global.asax application file- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form fundamentals: A simple page applet-Improving the currency converter- HTML control classes-The page class-Accessing HTML server controls. Web controls: Web Control Classes – Auto Post Back and Web Control events-Accessing web controls. Using Visual Studio.NET: Starting a Visual Studio.NET Project- Web form Designer-Writing code-Visual studio.NET debugging. Validation and Rich Controls: Validation-A simple Validation example-Understanding regular expressions- A validated customer form. State management -Tracing, Logging, and Error Handling.

UNIT III

Working with Data- Overview of ADO.NET - ADO.NET and data management-Characteristics of ADO.NET-ADO.NET object model. ADO.NET data access: SQLbasics–Select, Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a Data Reader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data. Data binding: Single value Data Binding- Repeated value data binding- Data binding with data bases. Data list – Data grid – Repeater – Files, Streams and Email – Using XML.

UNIT IV

Web Services- Web services Architecture: Internet programming then and now-WSDL-SOAP-Communicating with a web service – Web service discovery and UDDI. Creating Web services: Web service basics- The Stock Quote web service – Documenting the web service-Testing the web service- Web service Data types- ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class-An example with Terra Service.

UNIT V

Advanced ASP.NET- Component Based Programming: Creating a simple component-Properties and state-Database components- Using COM components. Custom controls: User Controls Deriving Custom controls. Caching and Performance Tuning: Designing and scalability-Profiling-Catching-Output catching-Data catching. Implementing security: Determining security requirements-The ASP.NET security model-Forms authentication-Windows authentication.

COURSE OUTCOMES

- 1) Acquire knowledge on the concepts of .Net
- 2) Implementing various HTML controls and Visual studio projects
- 3) Able to develop applications using ADO .Net
- 4) Acquire knowledge in web services
- 5) Develop websites which contains adaptive web pages

TextBooks

- 1) Mathew MacDonald, “ASP.NET Complete Reference”, TMH 2005.

Supplementary Readings

- 1) Crouch Matt J, “ASP.NET and VB.NET Web Programming”, Addison Wesley 2002.
- 2) J. Liberty, D. Hurwitz, “Programming ASP.NET” ,Third Edition, O'REILLY, 2006.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	2
CO2	2	2	2	3	3
CO3	3	3	2	3	3
CO4	3	2	3	3	3
CO5	3	1	3	3	2

SEMESTER - II CORE – V	22PCSCC22: DATA MINING AND BUSINESS INTELLIGENCE	CREDITS: 4 HOURS: 75
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COURSE OBJECTIVES

- 1) Demonstrate an understanding of the importance of data mining.
- 2) Understand principles of business intelligence.
- 3) Organize and prepare the data needed for data mining using pre-processing techniques.
- 4) Perform exploratory analysis of the data to be used for mining.
- 5) Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.

UNIT I

Introduction to data mining (DM): Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process- What is Business Intelligence (BI) - BI architecture and its types- What is data warehousing- Need for data warehousing - Basic elements of data warehousing – OLAP and OLTP Definitions – Difference between OLAP and OLTP.

UNIT II

Data Pre-processing: Why to pre-process data? - Data cleaning: Missing Values, Noisy Data - Data Integration and transformation - Data Reduction: Data cube aggregation, Dimensionality reduction - Data Compression - Numerosity Reduction - Data Mining Primitives - Languages and System Architectures: Task relevant data - Kind of Knowledge to be mined - Discretization and Concept Hierarchy.

UNIT III

Concept Description and Association Rule Mining: What is concept description? - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons Association Rule Mining: Market basket analysis - basic concepts - Finding frequent item sets: Apriori algorithm - generating rules – Improved Apriori algorithm – Incremental ARM – Associative Classification – Rule Mining.

UNIT IV

Classification and Prediction: What is classification and prediction? – Issues regarding Classification and prediction: Classification methods: Decision tree, Bayesian Classification, Rule based, CART, Neural Network Prediction methods, Linear and nonlinear regression, Logistic Regression. Introduction of tools such as DB Miner /WEKA/DTREG DM Tools.

UNIT V

Data Mining for Business Intelligence Applications: Data mining for business Applications like Balanced Score card, Fraud Detection, Clickstream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance and CRM etc., Data Analytics Life Cycle: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.

COURSE OUTCOMES

- 1) Analyse the concept of Data mining, Data Warehouse, Business Intelligence and OLAP.
- 2) Demonstrate data pre-processing techniques and application of association rule mining algorithms.
- 3) Apply various classification algorithms and evaluation of classifiers for the given problem.
- 4) Analyse data mining for various business intelligence applications for the given problem.
- 5) Apply classification and regression techniques for the given problem.

Text Books

- 1) J. Han, Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann, 3rd Edition, 2011.
- 2) P. N. Tan, M. Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education, 2018.
- 3) Carlo Verrellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley India Publications, 2011.
- 4) G. Shmueli, N.R. Patel, P.C. Bruce, Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner, 2nd Edition, Wiley India.

Supplementary Readings

- 1) DursunDelen, “Predictive Analytics”, Pearson Education, 2020.
- 2) Michael Berry and Gordon Linoff Data Mining Techniques, 2nd Edition Wiley Publications.
- 3) Michael Berry and Gordon Linoff Mastering Data Mining- Art & science of CRM, Wiley Student Edition.
- 4) VikramPudi & Radha Krishna, Data Mining, Oxford Higher Education.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	3	3	3	2	2
CO3	3	3	3	2	1
CO4	2	3	3	3	1
CO5	2	3	3	3	2

SEMESTER - II CORE - VI	22PCSCC23: DISTRIBUTED OPERATING SYSTEM	CREDITS: 4 HOURS: 75
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COURSE OBJECTIVES

- 1) To study Distributed operating system concepts.
- 2) To understand hardware, software and Communication in Distributed OS.
- 3) To learn the distributed resource management components.
- 4) Practices to learn concepts of OS and Program the principles of Operating Systems.
- 5) To Learn Linux Operating System.

UNIT I

Introduction–Operating System Definition–Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem–Process Deadlock–Models of Deadlock–Conditions for Deadlock–System with single unit requests, Consumable Resources, Reusable Resources.

UNIT II

Distributed Operating Systems: Introduction-Issues–Communication Primitives – Inherent Limitations –Lamport’s Logical Clock, Vector Clock, Global State, Cuts–Termination Detection–Distributed Mutual Exclusion–Non Token Based Algorithms–Lamport’s Algorithm - Token Based Algorithms –Distributed Deadlock Detection– Distributed Deadlock Detection Algorithms – Agreement Protocols

UNIT III

Distributed Resource Management – Distributed File Systems – Architecture–Mechanisms–Design Issues – Distributed shared Memory–Architecture–Algorithm–Protocols–Design Issues–Distributed Scheduling–Issues–Components–Algorithms.

UNIT IV

Failure Recovery and Fault Tolerance– Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems–Synchronous and Asynchronous Check pointing and Recovery–Check pointing in Distributed Database Systems–Fault Tolerance Issues – Two-Phase and Non blocking Commit Protocols –Voting Protocols–Dynamic Voting Protocols.

UNIT V

Multi processor and Database Operating Systems –Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling –Memory management–Reliability/Fault Tolerance –

Database Operating Systems–concepts–Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.

COURSE OUTCOMES

- 1) Acquire knowledge on the concepts advanced operating system and approaches.
- 2) Implementing Lamport’s Algorithm - Token Based Algorithms –Distributed Deadlock Detection Algorithm.
- 3) Gaining knowledge Distributed Resource Management–Distributed File Systems.
- 4) Acquire knowledge in Failure Recovery and Fault Tolerance.
- 5) To know the Features of Android OS, Ubuntu, Google ChromeOS and Linux operating systems.

Text Books

- 1) Mukesh Singhal N.G.Shivaratri, “Advanced Concepts in Operating Systems”, McGraw Hill 2000.
- 2) Distributed Operating System–Andrew S. Tanenbaum, PHI.

Supplementary Readings

- 1) Abraham Silberschatz, Peter B.Galvin, G.Gagne “Operating Concepts”, 6th Edition Addison Wesley publications 2003.
- 2) Andrew S.Tanenbaum, “Modern Operating Systems”, 2nd Edition Addison Wesley 2001.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	1
CO2	2	3	1	3	2
CO3	3	2	2	3	3
CO4	3	3	3	3	3
CO5	3	2	3	3	3

SEMESTER - II CORE PRACTICAL – III	22PCSCP24: ADVANCED WEB TECHNOLOGIES LAB	CREDITS: 2 HOURS: 75
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COURSE OBJECTIVES

- 1) Create simple Web service Programs.
- 2) Develop windows application based web services.
- 3) Accessing Database in Web services.
- 4) To create an application that simulates sending a SOAP message.
- 5) Develop a Web intranet/internet based Web Service Client.

List of Experiments:

- 1) Create a simple Web Service that converts the temperature from Fahrenheit to Celsius and vice versa.
- 2) Use the above Web Service on a webpage and execute to fetch the results
- 3) Create a Web Services provider and make it available on the Internet or intranet.
- 4) Create a web based Consumer of an existing web service.
- 5) Create a Windows application based consumer of an existing web service.
- 6) Write an application that simulates sending a SOAP message as a request and receiving another as a response.
- 7) Develop a Web Service that provides images as responses.
- 8) Develop a web service that access table contents of a database.
- 9) Develop a console based Web Service Client.
- 10) Develop a Web intranet/internet based Web Service Client.

COURSE OUTCOMES

- 1) Acquire Excellent knowledge and execute simple web service programs.
- 2) Implementing various techniques in web services.
- 3) Able to develop applications based web services from existing programs.
- 4) Using SOAP techniques.
- 5) Develop Client server based web Services.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2
CO2	2	1	2	3	2
CO3	3	2	1	3	3
CO4	3	2	3	1	3
CO5	3	2	3	3	2

SEMESTER - II CORE PRACTICAL – IV	22PCSCP25: DATA MINING LAB USING R	CREDITS: 2 HOURS: 75
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COURSE OBJECTIVES

- 1) To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting-edge technology for building competitive advantage.
- 2) To enable students to effectively identify sources of data and process it for data mining.
- 3) To learn how to gather and analyze large sets of data to gain useful business understanding through the R language.
- 4) To impart skills that can enable students to approach business problems.
- 5) To analytically identifying opportunities to derive business value from data.

List of Experiments:

- 1) Introductory commands in R.
- 2) Programs using Descriptive Statistics.
- 3) Program to demonstrate pre-processing on dataset Mtcars.
- 4) Program to demonstrate Association rules on Groceries dataset using Apriori Algorithm.
- 5) Program to demonstrate Classification Rules process on dataset Titanic using id3 Algorithm.
- 6) Program to demonstrate Classification rule process on dataset Titanic using CART Algorithm.
- 7) Program to demonstrate Classification rule process on Breast Cancer dataset using Naïve Bayesian Algorithm.
- 8) Program to demonstrate Clustering rule process on dataset Iris using simple K-Means.
- 9) Program to demonstrate Clustering rule process on dataset Iris using Hierarchical Clustering.
- 10) Program to demonstrate Outlier Detection using dataset Iris.

COURSE OUTCOMES

- 1) Use different features of R Programming language.
- 2) Preprocess the data for mining for any dataset.
- 3) Determine association rules.
- 4) Model the classifiers for classifying various dataset.
- 5) Examine clusters from the available data.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	1	2	2	3	3
CO2	2	2	3	3	2
CO3	1	3	3	1	2
CO4	1	3	3	2	2
CO5	2	3	3	2	2

SEMESTER – II CORE ELECTIVE – II	22PCSCE26-1: CRYPTOGRAPHY AND NETWORK SECURITY	CREDITS: 4 HOURS: 4
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COURSE OBJECTIVES

- 1) To understand basics of Cryptography and Network Security.
- 2) To be able to secure a message over in secure channel by various means.
- 3) To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
- 4) To understand various protocols for network security to protect against the threats in the networks.
- 5) To Understand Intruders and detection Techniques.

Unit I

Introduction - Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

Unit-2

Symmetric Encryption and Message Confidentiality – Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Stream Ciphers and RC4, Cipher Block Modes of Operation, Location of Encryption Devices, Key Distribution. Public-key Cryptography and Message Authentication: Approaches to Message Authentication, Secure Hash Functions and HMAC, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures, Key Management.

Unit-3

Authentication Applications - Kerberos, x.509 Authentication Service, Public-Key Infrastructure. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME.

Unit-4

IP Security- IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations. Web Security: Web Security Considerations, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Network Management Security: Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3.

Unit-5

Intruders - Intruders, Intrusion Detection, Password Management. Malicious Software: Virus and Related Threats, Virus Counter measures, Distributed Denial of Service Attacks. Firewalls: Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.

COURSE OUTCOMES

- 1) Provide security of the data over the network.
- 2) Do research in the emerging areas of cryptography and network security.
- 3) Implement various networking protocols.
- 4) Protect any network from the threats in the world.
- 5) To protect from intruders and Virus Threats

Text Books

- 1) Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata McGraw Hill, (2007) , Reprint (2015).
- 2) Stallings William, “Cryptography and Network Security-Principles and Practice (2017).
- 3) WilliamStallings, “Network Security Essentials Applications and Standards”, Third Edition, Pearson Education, (2008).

Supplementary Readings

- 1) Man Young Rhee, “Internet Security: Cryptographic Principles”, “Algorithms And Protocols”, Wiley Publications, (2003).
- 2) Charles Pfleeger, “Security in Computing”, 4th Edition, Prentice Hall Of India, (2006).
- 3) Ulysess Black,” Internet Security Protocols”,Pearson Education Asia,(2000).
- 4) Charlie Kaufman And Radia Perlman, Mike Speciner, “Network Security,Second Edition, Private Communication In Public World”, PHI(2002).
- 5) Bruce Schneier And Neils Ferguson, “Practical Cryptography”,First Edition,Wiley Dreamtech India Pvt Ltd,(2003).
- 6) Douglas R Simson, “Cryptography–Theory and Practice”, First Edition, CRC Press, (1995).

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
C01	3	3	2	3	3
C02	3	3	3	2	2
C03	3	3	2	3	2
C04	3	3	2	3	2
C05	3	3	3	2	2

SEMESTER – II CORE ELECTIVE – II	22PCSCE26-2: OPEN SOURCE COMPUTING	CREDITS: 4 HOURS: 4
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COURSE OBJECTIVES

- 1) To understand the features of PHP.
- 2) To develop the different applications using PHP.
- 3) To demonstrate the applications using PHP with Mysql.
- 4) To understand the concepts of Perl.
- 5) To develop the applications using Perl.

Unit I: BASIC PHP

Web Server-Apache-PHP-Data Types-User defined Variables-Constants-Operators-Control Structures-User defined Functions-Directory Functions-File system Functions-Arrays-String Functions-Date and Time Functions-Mathematical Functions-Miscellaneous Functions.

UNIT II: ADVANCED PHP WITH MYSQL

Exceptions handling-Error Handling Functions-Predefined Variables- Cookies - Sessions-COM-DOM-CURL-SOAP-Classes and Objects-Mail Function-URL Functions. PHP with MySQL:PHP MySQL Functions-Database driven application.

UNIT III: ADVANCED PHP WITH AJAX, SEO AND CMS PHP WITH AJAX

Introducing Ajax-Ajax Basics-PHP and Ajax-Database Driven Ajax. PHP with SEO: Basic SEO-Provocative SE Friendly URLs-Duplicate Content- CMS: Word press Creating an SE-Friendly Blog.

UNIT IV: BASIC PERL

Introduction-Scalar Data-Lists and Arrays-Subroutines-Input and Output-Hashes-Regular Expressions-Control Structures-Perl Modules-File Tests

UNIT V: ADVANCED PERL

Directory Operations-Strings and Sorting-Smart Matching-Process Management-Advanced Perl Techniques

COURSE OUTCOMES

- 1) Students are able to understand the features of PHP.
- 2) Students are able to develop the different applications using PHP.
- 3) Students are able to demonstrate the applications using PHP with Mysql.
- 4) Students are able to understand the concepts of Perl.
- 5) Students are able to develop the applications using Perl.

Text Books

- 1) Mehdi Achour, Fried helm, Betz Antony Dovgal, Nuno Lopes, Hannes Magnusson, Georg Richter, Damien Seguy, Jakub Vrana and several others, “ PHP Manual (Download the manual from PHP official website www.php.net)”, 1997-2011 the PHP Documentation Group.

- 2) LeeBabin, "Beginning Ajax with PHP From Novice to Professional ", Apress , 2007 (Chapters 1, 2, 3 and 4) Jaimie Sirovich and Cristian Darie, "Professional Search Engine Optimization with PHP A Developer's Guide to SEO",Wiley Publishing ,Inc., Indian apolis, Indiana, 2007 (Chapters2,3,5and16).
- 3) Randal L. Schwartz, Tom Phoenix, brian d foy, "Learning Perl, Fifth Edition Making Easy Things Easy and Hard Things Possible " , O'Reilly Media , June 2008.

Supplementary Readings

- 1) Steven D.Nowicki, Alec Cove, Heow Eide goodman,"Professional PHP", WroxPress, 2004.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	2	3
CO2	2	2	2	3	2
CO3	2	2	3	2	3
CO4	2	3	2	3	3
CO5	3	2	2	3	2

SEMESTER – II CORE ELECTIVE – II	22PCSCE26-3: SOFT COMPUTING	CREDITS: 4 HOURS: 4
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COURSE OUTCOMES

- 1) Familiarize with soft computing concepts.
- 2) Introduce and use the idea of fuzzy logic and use of heuristics based on human experience.
- 3) Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques.
- 4) Learn the concepts of Genetic algorithm and its applications.
- 5) Acquire the knowledge of Rough Sets.
- 6) Introduce students to Bi-directional Associative Memory.

UNIT I Introduction to Soft Computing

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNIT II Artificial Neural Networks

Back propagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network - Hopfield Neural Network-Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks-Support Vector Machines - Spike Neuron Models.

UNIT III Fuzzy Systems

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures -Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNIT IV Genetic Algorithms

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction -Inheritance Operators - Cross Over - Inversion and Deletion - Mutation Operator - Bit-wise Operators -Convergence of Genetic Algorithm.

UNIT V Hybrid Systems

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy Art Map: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller

COURSE OUTCOMES

- 1) Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
- 2) Understand fuzzy logic and reasoning to handle and solve engineering problems.
- 3) Apply the Classification and clustering techniques on various applications.
- 4) Understand the advanced neural networks and its applications.
- 5) Perform various operations of genetic algorithms, Rough Sets.
- 6) Comprehend various techniques to build model for various applications.

Text Books

- 1) Soft Computing – Advances and Applications – Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning.

Supplementary Readings

- 1) S. N. Sivanandam& S. N. Deepa, “Principles of Soft Computing”, 2nd edition, Wiley India, 2008.
- 2) David E. Goldberg, “Genetic Algorithms-In Search, optimization and Machine learning”, Pearson Education.
- 3) J. S. R. Jang, C.T. Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, Pearson Education, 2004.
- 4) G.J. Klir& B. Yuan, “Fuzzy Sets & Fuzzy Logic”, PHI, 1995.
- 5) Melanie Mitchell, “An Introduction to Genetic Algorithm”, PHI, 1998.
- 6) Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, McGraw- Hill International editions, 1995.

OUTCOME MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	3
CO2	2	2	2	3	2
CO3	2	3	3	2	3
CO4	2	2	3	3	3
CO5	3	2	2	3	2

		30		25				1000
SEMESTER III						CIA	Uni. Exam	Total
19.	Core	Paper -7	5	4	Distributed Operating System	25	75	100
20.	Core	Paper -8	5	4	XML and Web Services	25	75	100
21.	Core	Paper -9	5	3	Programming using Python	25	75	100
22.	Practical	Paper -7	3	2	Practical 7: Unix	25	75	100
23.	Practical	Paper -8	3	2	Practical 8: XML and Web Services	25	75	100
24.	Practical	Paper -9	3	2	Practical 9: Programming using Python	25	75	100
Internal Elective for same major students								
25.	Core Elective	Paper -3	3	3	(To choose one out of 3) A. Block chain Technology B. Internet of Things C. Network Security	25	75	100
External Major for other major Students (Inter/multi-disciplinary papers)								
26.	Open Elective	Paper - 3	3	3	(To choose one out of 3) A. Programming using C B. Programming using C++ C. Programming using Python	25	75	100
27.	**MOOC Courses		-	-				100
			30	23		200	600	900
SEMESTER IV						CIA	Uni. Exam	Total
28.	Core	Paper-10	5	4	Mobile Application Development	25	75	100
29.	Core	Paper-11	6	4	Software Project Management	25	75	100
30.	Practical	Paper-10	3	2	Practical 1: Mobile Application Development	25	75	100
31.	Core	Project	10	5	Project with viva voce (Compulsory)	100 (75 Project + 25 viva)		100
Internal Elective for same major students (Choose any one)								
32.	Core Elective	Paper - 4	3	3	(To choose one out of 3) A. Big Data Analysis B. Artificial Intelligence C. Machine Learning	25	75	100
External Major for other major Students (Inter/multi-disciplinary papers)								
33.	Open Elective	Paper - 4	3	3	(To choose one out of 3) A. Cyber Security B. Decision Support system C. Research Methods & Ethics	25	75	100
			30	21		125	375	600
			120	90				3300

* Field Study

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

- (i). Head of the respective department
- (ii). Mentor
- (iii). One faculty from other department

****Mooc Courses**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

SEMESTER III

PAPER - 7

DISTRIBUTED OPERATING SYSTEM

COURSE OBJECTIVES

- To understand foundations of Distributed Systems.
- To introduce the idea of memory management
- To understand in detail the system level and support required for distributed system.
- To understand the shell script commands of Unix

COURSE OUTCOMES

CO1 - Students are able to understand foundations of Distributed Systems.

CO2 - Students are able to get the idea of memory management

CO3 - Students are able to comprehend in detail the system level and support required for distributed system.

CO4 - Students are able to recognize the shell script commands of Unix

UNIT-I: INTRODUCTION

Operating system concepts - System Calls - OS Structure - Process and Threads: Process - Threads - Inter Process Communication - Scheduling - Classical IPC Problems.

UNIT-II: MEMORY MANAGEMENT

Memory abstraction - Virtual Memory - Page Replacement Algorithm - Design issues for paging systems - implementation issues - Segmentation. File Systems: Files - Directories - File System Implementation - File System Management and Optimization.

UNIT-III: INPUT/OUTPUT

Principles of I/O hardware - Principles of I/O software - I/O Software Layers - Disks - Clocks - User Interface - Thin Clients - Power Management. Deadlocks: Resources - Introduction - The Ostrich Algorithm - Deadlock Avoidance - Deadlock Prevention - Other issues.

UNIT-IV: MULTIMEDIA OPERATING SYSTEM

Introduction - Multimedia Files - Video & Audio compression - Multimedia Process Scheduling - Multimedia File System Paradigms - File placement - Caching - Disk scheduling for Multimedia - Multiple Processor system: Multiprocessor - Multicomputers - Virtualization - Distributed systems.

UNIT-V: SECURITY

Security Environment - Basics of Cryptography - Protection Mechanisms - Authentication - Insider Attacks - Exploiting Code Bugs - Malware – Defenses - Case Study: LINUX.

TEXT

1. Andrew S. Tanenbaum - Modern Operating System - Prentice Hall of India Pvt Limited, 2001

REFERENCES

1. Pradeep K. Sinha. - Distributed Operating Systems Concepts and Design - Prentice Hall of India Pvt Limited, 2008
2. Andrew S. Tanenbaum and Maarten Van Steen - Distributed Systems - Prentice Hall of India Pvt Limited, 2002.

WEB REFERENCES

https://en.wikipedia.org/wiki/Distributed_operating_system

<https://www.tutorialspoint.com/distributed-operating-system>

https://lasr.cs.ucla.edu/classes/188_winter15/readings/distributed_os_notes.html

PAPER - 8

XML AND WEB SERVICES

COURSE OBJECTIVE

- To examine fundamental XML technology
- To understand the use of JSON
- To gain an understanding about the role of web services in commercial applications
- To learn the emerging standard protocols like SOAP, WSDL and UDDI.
- To introduce the role of web services in CMS

COURSE OUTCOMES

CO1 - Students are able to understand the use of web services in B2C and B2B applications.

CO2 - Students are able to understand the design principles and application of SOAP and REST based web services.

CO3 - Students are able to design collaborating web services according to a specification.

CO4 - Students are able to implement an application that uses multiple web services in a realistic business scenario.

UNIT - I: XML TECHNOLOGY FAMILY

XML – benefits – Advantages of XML over HTML, EDI, Databases – XML based standards – DTD – XML Schemas – X-Files – XML processing – DOM – SAX – presentation technologies – XSL – XHTML – voiceXML – Transformation – XSLT – XLINK – XPATH.

UNIT - II: JSON AND JSON SCHEMA

Introduction to JSON – JSON Comparison with XML – JSON syntax, Datatypes, Objects – Examples – JSON Schema: Hello World! – The type Keyword – Declaring a JSON schema – JSON schema reference: Type specific keywords – Generic Keywords – Combining schemas – The \$schema Keyword – Regular Expression – Structuring a complex schema: Reuse.

UNIT - III: ARCHITECTING WEB SERVICES

Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service-oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.

UNIT - IV: WEB SERVICE BUILDING BLOCKS: SOAP, WSDL AND UDDI

Introduction to SOAP – Basic SOAP syntax – Sending SOAP messages – Future of SOAP – Introduction to WSDL – Basic WSDL syntax- SOAP binding – Introduction of UDDI – UDDI API – Future of UDDI.

UNIT - V: XML-E-BUSINESS & XML-CONTENT MANAGEMENT SYSTEM

Business to Business – Business to Customer – Different types of B2B Interaction – Components of E-business XML Systems – Enterprise Integration – ebXML – RosettaNet – Introduction of Web Content Management – Components of Content Management System – Role of XML in Web Content Management – Role of metadata (RDF and PRISM) in Web Content Management.

TEXTS

1. Ron Schmelzer et al. “XML and Web Services”, Pearson Education, 2002.
2. Micheal Droettboom, “Understanding JSON Schema Release 1.0”, 2013.

REFERENCES

1. Ethan Cerami, “Web Services Essentials”, O’Reilly, Shroff Publishers & Distributors Pvt.Ltd, Fourth Edition, 2002.
2. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Prentice Hall Edition, 2004.

WEB REFERENCES

www.w3schools.com/xml/
<https://www.tutorialspoint.com/xml/>
www.xmlmaster.org/en/article/d01/
www.quackit.com/xml/tutorial/
www.tutorialspoint.com/webservices/
www.javatpoint.com/web-services-tutorial
tutorials.jenkov.com/web-services/

PAPER - 9
PROGRAMMING USING PYTHON

COURSE OBJECTIVES

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python.

COURSE OUTCOMES

CO1 - Students are able to explore the fundamental concepts of Python

CO2 - Students are able to understand Basics of Python programming language

CO3 - Students are able to solve simple problems using Python

CO4 - Students are able to acquire fundamental knowledge and skills on Python Programming

CO5 - Students are able to understand the nuances of this language.

CO6 - Students are able to know the usage of modules and packages in Python

CO7 - Students are able to familiarize with file concepts in Python

CO8 - Students are able to familiarize with web concepts using Python.

UNIT - I: OVERVIEW

Introduction to Python: Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) – Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion.

UNIT - II: FLOW CONTROL & FUNCTIONS

Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

UNIT - III: MODULES, PACKAGES AND FILE HANDLING

Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling: Opening a File - Closing a File - Writing to a File – Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python.

UNIT - IV: OBJECT ORIENTED PROGRAMMING

Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes - Destructors in Python Encapsulation - Data Hiding- Inheritance - Method Overriding Polymorphism. Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments- Raising Exception - User-defined Exception - Assertions in Python

UNIT - V: REGULAR EXPRESSIONS & WEB APPLICATIONS

Regular Expressions: The match() function - The search() function - Search and Replace - Regular Expression Modifiers: Option Flags - Regular Expression Patterns - Character Classes - Special Character Classes - Repetition Cases - findall() method - compile() method. Web Application Framework- Django Architecture- Starting development- Case Study: Blogging App.

TEXTS

1. Jeeva Jose and P. SojanLal, "Introduction to Computing and Problem Solving with Python", Khanna Book Publishing Co. (P) Ltd., 2016.
2. ArshdeepBahga, Vijay Madiseti, "Cloud Computing: A Hands – On Approach" Universities press (India) Pvt. limited 2016.

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1. Wesley J. Chun, "Core Python Programming", Second Edition, Prentice Hall Publication, 2006.
2. Timothy A Budd, "Exploring Python", Tata McGraw Hill, New Delhi, ISBN: 780071321228

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<https://www.codecademy.com/learn/python>
<https://www.Codementor.io>
<https://www.Python.org>

PRACTICAL - 7
DISTRIBUTED OPERATING SYSTEM

1. Write a shell script to copy, rename and print multiple files using choice menus.
2. Write a shell script to display logged in users who are using high CPU percentage.
3. Write a shell script to list processes based on CPU percentage and memory un usage.
4. Write a shell script to display total used and free memory space.
5. Write a shell script that takes as command-line input a number n and a word. The program should then print the word n times, one word per line.
6. Write a shell scripts using the following statements. a) While-loop b) For-loop c) If-then-else d) Switch
7. Write a shell script using grep statement.
8. Write a shell script that can search all immediate sub-directories of the currentdirectory for a given file and then quit if it finds one.

PRACTICAL-8
XML AND WEB SERVICES

1. Simple XML file
2. Validating XML document using Internal DTD, External DTD
3. Validating an XML document using XSD
4. Validating an XML document with attributes using XSD
5. XML with mixed contents
6. Validating an XML document using XSD that implements user defined data type
7. Presenting an XML file using XSLT elements
8. Transforming XML using XSLT and implementing XPath – Nodeset functions
9. Transforming XML using XSLT and implementing XPath – number functions
10. Creating a Web Service and Creating and invoking a Web Service

PRACTICAL-9
PROGRAMMING USING PYTHON

1. Working with numbers
2. Implementing String operations
3. Working with Tuples and Set
4. Implementation of Dictionaries
5. Demonstrating List Operations.
6. Flow Control and Functions
7. Modules and Packages
8. File handling
9. Object Oriented Programming
10. Exception Handling and Regular Expressions

CORE ELECTIVE

PAPER - 3

(to choose one out of 3)

A. BLOCKCHAIN TECHNOLOGY

COURSE OBJECTIVES

- To understand the functions of Blockchain
- To have clarity in the Concepts, challenges, solutions with respect to Blockchain
- To understand the facts and myths related to cryptocurrencies.
- To apply the concept of Blockchain for various applications.
- To correlate current Indian scenario in governing cryptocurrencies in India with Global standard.

COURSE OUTCOMES

CO1 - Students are able to understand the functions of Blockchains

CO2 - Students are able to have clarity in the Concepts, challenges, solutions with respect to blockchain

CO3 - Students are able to understand the facts and myths related to cryptocurrencies.

CO4 - Students are able to apply the concept of Blockchain for various applications.

CO5 - Students are able to correlate Current Indian scenario in governing cryptocurrencies in India with Global standard.

UNIT – I: BLOCKCHAIN 1.0

Currency, Technology Stack: Blockchain, Protocol, Currency, the Double-Spend and Byzantine Generals' Computing Problems, How a Cryptocurrency Works, Summary: Blockchain 1.0 in Practical Use, The Blockchain Is an Information Technology.

UNIT – II: BLOCKCHAIN 2.0

Contracts, Financial Services, Crowdfunding, Bitcoin Prediction Markets, Smart Property, Smart Contracts, Blockchain 2.0 Protocol Projects, Wallet Development Projects, Blockchain Development Platforms and APIs, Blockchain Ecosystem: Decentralized Storage, Communication, and Computation, Ethereum: Turing-Complete Virtual Machine, Dapps, DAOs, DACs, and DASs: Increasingly Autonomous Smart Contracts, The Blockchain as a Path to Artificial Intelligence.

UNIT – III: BLOCKCHAIN 3.0

Justice Applications Beyond Currency, Economics, and Markets, Blockchain Technology Is a New and Highly Effective Model for Organizing Activity, Distributed Censorship-Resistant Organizational Models, Namecoin: Decentralized Domain Name System, Digital Identity Verification, Digital Art: Blockchain Attestation Services (Notary, Intellectual Property Protection), Blockchain Government.

UNIT – IV: BLOCKCHAIN 3.0

Efficiency and Coordination Applications Beyond Currency, Economics, and Markets, Blockchain Science: Gridcoin, Foldingcoin, Blockchain Genomics, Blockchain Health, Blockchain Learning: Bitcoin MOOCs and Smart Contract Literacy, Blockchain Academic

Publishing: Journalcoin, The Blockchain Is Not for Every Situation, Centralization-Decentralization Tension and Equilibrium.

UNIT – V: ADVANCED CONCEPTS

Terminology and Concepts, Currency, Token, Tokenizing, Currency Multiplicity: Monetary and Nonmonetary Currencies, Demurrage Currencies: Potentially Inventory and Redistributable, Limitations: Technical Challenges, Business Model Challenges, Scandals and Public Perception, Government Regulation, Privacy Challenges for Personal Records, Overall: Decentralization Trends Likely to Persist.

TEXT

1. Melanie. Swan. Blockchain: Blueprint for a new economy. " O'Reilly Media, Inc.", 2015.

REFERENCES

1. Colm Gordon, “Blockchain Simplified”, 2017.
2. Melanie Swan “Blockchain”, O’Reilly Media, Inc., 2015.
3. Imran basher, “Mastering Blockchain” Packt publication, 2nd Edition, 2018.

WEB REFERENCES

<https://www.udemy.com/course/blockchain-and-bitcoin-fundamentals>

<https://www.tutorialspoint.com/blockchain/index.htm>

CORE ELECTIVE

PAPER - 3

B. INTERNET OF THINGS

COURSE OBJECTIVES

- To design and Develop IOT based solution for real world applications
- To realize the evolution of Internet in Mobile Devices, Cloud & Sensor Networks
- To understand the building blocks of Internet of Things and its characteristics.
- To understand the concepts of IOT and its application.

COURSE OUTCOMES

CO1 - Students are able to design and develop IOT based solution for real world applications

CO2 - Students are able to realize the evolution of Internet in Mobile Devices, Cloud & Sensor Networks

CO3 - Students are able to understand the building blocks of Internet of Things and its characteristics.

CO4 - Students are able to understand the concept of IOT and its application.

UNIT - I: INTRODUCTION

Introduction and Definition of Internet of Things, IoT Growth – A Statistical View, Application Areas of IoT, Characteristics of IoT, Things in IoT, IoT Stack, Enabling Technologies, IoT Challenges, IoT Levels, Is Cyber Physical System the same as IoT? Is WSN the same as IoT?

UNIT - II: INTRODUCTION TO SENSORS, MICROCONTROLLERS, AND THEIR INTERFACING

Introduction to Sensor Interfacing, Types of Sensors, Controlling Sensors through Webpages, Microcontrollers: A Quick Walkthrough, ARM. Protocols for IoT – Messaging and Transport Protocols, Messaging Protocols (MQTT, CoAP, AMQP), Transport Protocols (Li-Fi, BLE).

UNIT - III: PROTOCOLS FOR IOT

Addressing and Identification, Internet Protocol Version 4 (IPv4), Internet Protocol Version 6 (IPv6), Uniform Resource Identifier (URI). Cloud for IoT - Introduction, IoT with Cloud – Challenges, Selection of Cloud Service Provider for IoT Applications: An Overview, Introduction to Fog Computing, Cloud Computing: Security Aspects, Case Study: How to use Adafruit Cloud? Application of Data Analytics in IOT.

UNIT - IV: APPLICATION BUILDING WITH IOT

Introduction, Smart Perishable Tracking with IoT and Sensors, Smart Healthcare – Elderly Fall Detection with IoT and Sensors, Smart Inflight Lavatory Maintenance with IoT, IoT–Based Application to Monitor Water Quality, Smart Warehouse Monitoring – Let the Drone Fly for You, Smart Retail – IoT Possibilities in the Retail Sector, Prevention of Drowsiness of Drivers by IoT-Based Smart Driver Assistance Systems, System to Measure Collision Impact in an Accident with IoT.

UNIT - V: GETTING FAMILIARIZED WITH ARDUINO IDE

Architecture, Arduino Programming, A Simple Application, Arduino Playground. Getting Familiarized with Raspberry Pi - Story behind Raspberry Pi, Architecture, Compatible Peripherals, Add-Ons, and Accessories, Operating System for Raspberry Pi, Setting up Raspberry Pi, Initial Configuration for Raspberry Pi, Linux Based Softwares in Raspberry Pi, Application Development with Raspberry-Pi – A Quick Walk Through.

TEXT

1. Shiram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, Internet of Things, Wiley, India, 2019.

REFERENCES

1. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on Approach)”, 1stEdition, VPT, 2014.
2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.

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<https://www.coursera.org/courses?query=iot>

<https://online.stanford.edu/courses/xee100-introduction-internet-things>

https://www.tutorialspoint.com/internet_of_things/index.htm

CORE ELECTIVE

PAPER - 3

C. NETWORK SECURITY

COURSE OBJECTIVES

- Identify some of the driving factors needed for network security
- Identify and classify attacks and threats
- Compare and contrast symmetric and asymmetric encryption systems.
- Identify the web systems vulnerable to attack.
- Use appropriate secure mail applications and security protocols

COURSE OUTCOMES

CO1 - Students are able to identify some of the driving factors needed for network security

CO2 - Students are able to Identify and classify attacks and threats

CO3 - Students are able to compare and contrast symmetric and asymmetric encryption systems.

CO4 - Students are able to identify the web systems vulnerable to attack.

CO5 - Students are able to use appropriate secure mail applications and security protocols

UNIT- I: SECURITY IN COMPUTING ENVIRONMENT

Need for Security - Security Attack - Security Services - Information Security - Methods of Protection. Basics of Cryptography: Terminologies used in Cryptography - Substitution Techniques- Transposition Techniques. Encryption and Decryption: Characteristics of Good Encryption Technique -Properties of Trustworthy Encryption Systems - Types of Encryption Systems - Confusion and Diffusion -Cryptanalysis.

UNIT-II: SYMMETRIC KEY ENCRYPTION

Data Encryption Standard (DES) Algorithm - Double and Triple DES - Security of the DES - Advanced Encryption Standard (AES) Algorithm - DES and AES Comparison. Public Key Encryption: Characteristics of Public Key System - RSA Technique - Key Exchange -Diffie-Hellman Scheme - Cryptographic Hash Functions - Digital Signature – Certificates - Certificate Authorities.

UNIT - III: IP SECURITY

Overview of IP Security (IPSec) - IP Security Architecture - Modes of Operation - Security Associations (SA) - Authentication Header (AH) - Encapsulating Security Payload (ESP) - Internet Key Exchange. Web Security: Web Security Requirements - Secure Socket Layer (SSL) - Transport Layer Security (TLS) - Secure Electronic Transaction (SET).

UNIT - IV: ELECTRONIC MAIL SECURITY

Pretty Good Privacy - Threats to E-Mail - Requirements and Solutions - Encryption for Secure E-Mail - Secure E-Mail System. Firewalls: Firewalls – Types - Comparison of Firewall Types - Firewall Configurations - Planning and Enforcing Security Policies: Planning Security Policies - Risk Analysis - Security Policies for an Organization - External Security.

UNIT-V: PROTECTION OF COMPUTING RESOURCES

Secure Programs - Non-malicious Program Errors - Viruses and Other Malicious Code - Targeted Malicious Code - Methods of Control. Security Features in Operating System: Objects to be Protected - Protection Methods of Operating Systems - Memory Protection - File Protection - User Authentication.

TEXT

1. William Stallings. Cryptography and network security, 4/E. Pearson Education India, 2006.

REFERENCE

2. Singh, "Network Security and Management", 2nd ed., PHI.

WEB REFERENCES

<https://alison.com/course/introduction-to-computer-network-security>

<https://www.udemy.com/course/certified-secure-netizen/>

OPEN ELECTIVE

PAPER - 3

(to choose one out of 3)

A. PROGRAMMING USING C

COURSE OBJECTIVES

- To identify situations where computational methods and computers would be useful.
- To enhance their analyzing and problem-solving skills and use the same for writing programs in C.
- To develop logics and that will help them to create programs, applications in C.
- To identify programming task involved in a given computational problem.
- To approach the programming tasks using techniques learned and write pseudo-code.
- To choose the right data representation formats based on the requirements of the problem.
- To use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
- To enter the program on a computer, edit, compile, debug, correct, recompile and run it.
- To identify tasks in which the numerical techniques learned are applicable and apply them to write programs.

COURSE OUTCOMES

CO1 - Students are able to understand a functional hierarchical code organization.

CO2 - Students are able to define and manage data structures based on problem subject domain.

CO3 - Students are able to work with textual information, characters and strings.

CO4 - Students are able to work with arrays, structures, pointers and files.

UNIT – I: DATA TYPES, OPERATORS AND STRUCTURES

Structure of a C program – Basic data types (int, float, char, double, void) – constants and variables (variable declaration, integer, real, float, character, variables) – operators and expressions (arithmetic operators, relational operators, logical operators, bitwise operators, type casting, type conversion, enumerated data type, typedef) – Control Constructs (if, switch, while, do...while, for, break and continue, exit() function, goto and label).

UNIT – II: ARRAYS AND FUNCTIONS

Arrays (declaration, one and two dimensional arrays) - Character Arrays and Strings. Function Fundamentals (General form, Function Definition, Function arguments, return value) – Parameter passing: call-by-value and call-by-reference – Recursion – Passing Arrays to Function – Passing Strings to Function.

UNIT – III: POINTERS

Understanding Pointers – Accessing the Address of a Variable – Declaring the Pointer Variables – Initialization of Pointer Variables – Accessing a Variable through its Pointer –

Pointer Expressions – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions returning Pointers – Pointers to Functions.

UNIT – IV: STORAGE CLASSES, STRUCTURES AND UNIONS

Scope rules (Local variables and global variables, scope rules of functions) -Type modifiers and storage class specifier.

Structures – Basics of Structure – Declaring of Structure – Referencing Structure elements - Array of Structures – Nesting of Structures - Passing Structures to function – Pointers and Structures - Unions.

UNIT – V: FILE MANAGEMENT IN C

Introduction – Defining and Opening a File – Closing a File – Input / Output Operations on Files – Command Line Arguments.

TEXT

1. E.Balagurusamy, “Programming in ANSI C”, Seventh Edition, McGraw Hill Education Private Limited, NewDelhi: 2017.

REFERENCES

1. YashavantKanetkar, “Let us C”, BPB Publications, Tenth Edition - New Delhi: 2010
2. Ashok N.Kamthane, “Programming in C”, Second Impression, Pearson: 2012.

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<http://www.c4learn.com/?gclid=COK1y6nHk7wCFcUA4godmlgAKA/>

<http://www.cprogramming.com/tutorial/c-tutorial.html/>

<http://www.tutorialspoint.com/cprogramming/>

OPEN ELECTIVE

PAPER - 3

B. PROGRAMMING USING C++

COURSE OBJECTIVES

- To understand object oriented programming and advanced C++ concepts.
- To understand the various functions and arguments in object oriented programming.
- To understand the classes and objects in C++.
- To be familiar with inheritance and polymorphisms.
- To be able to understand the concepts of files and exception handling.

COURSE OUTCOMES

CO1 - Students are able to understand object oriented programming and advanced C++ concepts.

CO2 - Students are able to understand the various functions and arguments in object oriented programming.

CO3 - Students are able to understand the classes and objects in C++.

CO4 - Students are able to familiarize with inheritance and polymorphisms.

CO5 - Students are able to understand the concepts files and exception handling.

UNIT – I: BASIC CONCEPTS

A look at Procedure Oriented Programming – Object Oriented Programming Paradigm – Basic Concepts of Object Oriented Programming – Benefits of OOP – Object Oriented Languages – Beginning With C++ - A Simple C++ Program – Structure of C++ Program – Tokens – Basic Data Types – Scope Resolution Operator – Manipulators – Expressions – Control Structures.

UNIT – II: FUNCTIONS

Functions – Function Prototyping – Call by Value – Call by Reference – Inline Functions – Default Arguments – Passing Arrays to Functions – Passing Structures to Functions – Recursion – Pointers – Function Overloading – Friend Functions.

UNIT – III: CLASSES AND OBJECTS

Defining Member Functions – Private Member Function – Data Members – Member Functions – Arrays of Objects – Objects as Function Arguments – Friendly Functions – Constructors and Destructors – Object Pointers.

UNIT – IV: INHERITANCE AND POLYMORPHISM

Operator Overloading – Inheritance – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Virtual Base Classes – Abstract Classes – Polymorphism – Virtual Functions.

UNIT – V: EXCEPTION HANDLING AND FILES

Exception Handling – File I/O Stream – File Stream Operations – Opening and Closing a File – Sequential Access.

TEXT

1. E Balagurusamy, “Object Oriented Programming with C++”, 5th Edition, McGraw Hill Education India Pvt Ltd. 2012.

REFERENCES

1. Andrew C. Staugaard JR, “Structured and Object-Oriented Problem Solving Using C++”, 3rd Edition, Prentice Hall, 2002.
2. Herbert Schildt, “C++: The Complete Reference”, 3rd Edition, Tata McGraw Hill, 1999.

WEB REFERENCES

<http://www.doc.ic.ac.uk/~wjk/C++Intro/>

<http://www.ideone.com/>

<http://www.compilr.com/c-compiler>

OPEN ELECTIVE

PAPER - 3

C. PROGRAMMING USING PYTHON

COURSE OBJECTIVES

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python.

COURSE OUTCOMES

CO1 - Students are able to explore the fundamental concepts of Python

CO2 - Students are able to understand Basics of Python programming language

CO3 - Students are able to solve simple problems using Python

CO4 - Students are able to acquire fundamental knowledge and skills on Python Programming

CO5 - Students are able to understand the nuances of this language.

CO6 - Students are able to know the usage of modules and packages in Python

CO7 - Students are able to familiarize with file concepts in Python

CO8 - Students are able to familiarize with web concepts using Python.

UNIT - I: OVERVIEW

Introduction to Python: Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) – Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion.

UNIT - II: FLOW CONTROL & FUNCTIONS

Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

UNIT - III: MODULES, PACKAGES AND FILE HANDLING

Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling: Opening a File - Closing a File - Writing to a File – Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python.

UNIT - IV: OBJECT ORIENTED PROGRAMMING

Class Definition - Creating Objects - Built-in Attribute Methods - Built-in Class Attributes - Destructors in Python Encapsulation - Data Hiding- Inheritance - Method Overriding Polymorphism. Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments- Raising Exception - User-defined Exception - Assertions in Python

UNIT - V: REGULAR EXPRESSIONS & WEB APPLICATIONS

Regular Expressions: The match() function - The search() function - Search and Replace - Regular Expression Modifiers: Option Flags - Regular Expression Patterns - Character Classes - Special Character Classes - Repetition Cases - findall() method - compile() method. Web Application Framework- Django Architecture- Starting development- Case Study: Blogging App.

TEXTS

1. Jeeva Jose and P. SojanLal, “Introduction to Computing and Problem Solving with Python”, Khanna Book Publising Co. (P) Ltd., 2016.
2. ArshdeepBahga, Vijay Madisetti, “Cloud Computing: A Hands – On Approach” Universities press (India) Pvt. limited 2016.

REFERENCES

1. Wesley J. Chun, “Core Python Programming”, Second Edition, Prentice Hall Publication, 2006.
2. Timothy A Budd, “Exploring Python”, Tata McGraw Hill, New Delhi, ISBN: 780071321228

WEB REFERENCES

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<https://www.codecademy.com/learn/python>
<https://www.Codementor.io>
<https://www.Python.org>

SEMESTER IV

PAPER - 10

MOBILE APPLICATION DEVELOPMENT

COURSE OBJECTIVES

- To know the basis of Android application and development environment
- To able to develop simple and professional application
- To get ready for the job opportunity in mobile application development

COURSE OUTCOMES

CO1 - Students are able to know about the mobile application development environment

CO2 - Students are able to develop interface and design

CO3 - Students are able to use the techniques in Mobile Applications

UNIT - I: INTRODUCTION TO ANDROID

History of Android Platform- Android APIs- Android Architecture Application Framework- Features of Android- Android Applications- Application Components - Manifest File- Downloading and Installing Android and Android SDK - Setting up Android Virtual and physical Device - Exploring the Development Environment - The Java Perspective Using Eclipse - DDMS Perspective - Command-Line Tools- Developing and Executing the First Android Application - Using Eclipse IDE to Create an Application - Running Your Application - Exploring the Application - Using Command - Line Tools.

UNIT – II: ACTIVITIES, INTENTS AND FRAGMENTS

Working with Activities- Creating an Activity- Starting an Activity – Managing the Life cycle of an Activity - Applying Themes and Styles to an Activity- Displaying a Dialog in the Activity - Hiding the title of the activity- Using Intents-Exploring Intent Objects- Exploring Intent Resolution- Exploring Intent Filters - Resolving Intent Filter Collision - Linking the Activities Using Intent - Obtaining Results from Intent – Passing Data Using an Intent Object- Fragments - Hiding Title Bar and Screen Orientation - Fragment Implementation - Finding Fragments - Adding, Removing and Replacing Fragments - Finding Activity Using Fragment - Using the Intent Object to Invoke Built-in Application..

UNIT - III: UI USING VIEWS AND VIEW - GROUPS

Working with View Groups – Linear Layout – Relative Layout – Scroll Layout – Table Layout – Frame Layout – Tab Layout using the Action Bar – Working with Views – Text – Edit Text – Button – Radio Button – Check Box – Image Button – Toggle Button – Rating Bar – Binding Data with Adapter View Class – List View – Spinner – Gallery – Designing the Auto Text Complete View – Screen Orientation – Anchoring the Views of Current Activity – Handling UI Events – Handling User Interaction with Activities and Views – Specialized Fragments – List Fragment – Dialog Fragment – Preference Fragment – Creating Menus, Option Menus, Context Menu and Sub Menu.

UNIT - IV: HANDLING PICTURES AND MENUS WITH VIEWS AND STROING THE DATA

Working with Image Views – Displaying Images in the Gallery View – Displaying Images in the Grid View – Using the Image Switcher View- Designing Context Menu for Image View- Using the Analog-Clock and Digital Clock Views – Embedding Web Browser in an Activity - Notifying the User Creating the Toast Notification - Creating the Status Bar Notification-

Creating the Dialog Notification - Introducing the Data Storage Options - Using Preferences - Using the SQLite Database Creating the Database - Executing the Database Operations.

UNIT - V: EMAILING, TELEPHONY AND SMS IN ANDROID

Building an Application to Send Email - Handling Telephony - Displaying Phone Information Application Receiving Phone Calls – Making Outgoing Phone Calls Application - Handling SMS Sending SMS Using SMS Manager - Sending SMS Using Intent - Receiving SMS Using the Broadcast Receiver Object- Role of Default SMS Providers - . Publishing Android Application: Export android application – Google play store registration.
Supplementary Learning: Building Mobile Applications using Xamarin

TEXTS

1. Pradeep Kothari, “Android Application Development (with kitkat support) Black Book”, Kogent Learning Solution Inc., Dreamtech Press India Pvt. Ltd, Wiley Publications.
2. Sayed Y. Hashimi, SatyaKomatineni, Dave MacLean, “Pro Android 2”, 2010 Edition, Wiley publications.

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1. Reto Meier ,”Professional Android Application Development”,2009 Edition, Willy Publication.
2. ZigurdMednieks, Laird Dornin, G. Blake Meike,and Masumi Nakamura, “Programming Android”, OReilly publications.

WEB REFERENCES

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PAPER - 11

SOFTWARE PROJECT MANAGEMENT

COURSE OBJECTIVES

- To provide sound knowledge in Project Management.
- To understand the importance of requirement gathering
- To explore different models in Software Development
- To know the workflow of a Project
- To identify various actors in the activity

COURSE OUTCOMES

CO1 - Students are able to understand the activities during the project scheduling of any software application.

CO2 - Students are able to learn the risk management activities and the resource allocation for the projects.

CO3 - Students are able to apply the software estimation and recent quality standards for evaluation of the software Projects.

CO4 - Students are able to acquire knowledge and skills needed for the construction of highly reliable software project.

CO5 - Students are able to create reliable, replicable cost estimation that links to the requirements of project planning and managing.

UNIT I: INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT

Introduction: Project – Software Projects vs other types of Project – Activities Covered by SPM – Some Ways of Categorizing Software Projects – Stakeholders, Setting Objectives – The Business Case - Project Success and Failure - Management and Management Control. Project Evaluation: A Business Case – Project Portfolio Management – Evaluation of Individual Projects – Cost Benefit Evaluation – Risk Evaluation.

UNIT II: PROJECT PLANNING AND SELECTION OF PROJECT APPROACH

Project Planning - Introduction to Step Wise Project Planning – Step 0 to Step 10. Selection of an Appropriate Project Approach -Introduction – Build or Buy – Choosing Methodologies and Technologies – Software Processes and Process Models – Choice of Process Models – The Waterfall Model– Prototyping – other ways of categorizing prototype- Agile Methods – Extreme Programming - Selecting the Most Appropriate Process Model.

UNIT III: EFFORT ESTIMATION AND ACTIVITY PLANNING

Effort Estimation – Introduction –Estimates – Problems with Over and Under-estimate – Basis for Software Estimating – Effort Estimation Techniques – Bottom-up Estimating – Top-down Approach and Parametric Models – Expert Judgment - Estimating by Analogy – Albrecht Function Point Analysis – Function Mark II – COCOMO & COCOMO II – Cost Estimation – Staffing Pattern. Activity Planning –Introduction – Objectives of Activity Planning – When to plan – Project Schedules – Project and Activities – Sequencing and Scheduling Activities – Networking Planning Models – Formulating a Network Model– Activity on Arrow Networks.

UNIT IV: RISK MANAGEMENT, RESOURCE ALLOCATION AND MONITORING

Risk Management –Risk – Categories of Risk – A Framework for Dealing with Risk – Risk Identification – Risk Assessment – Risk Planning – Risk Management. Resource Allocation – Introduction – The Nature of Resources – Identifying Resource Requirements – Scheduling Resources. Monitoring –Creating the Framework – Collecting the Data – Review and Project Termination Review – Visualizing Progress – Cost Monitoring and Earned Value Analysis – Getting the Project Back to Target – Change Control – SCM.

UNIT V: MANAGING PEOPLE AND WORKING IN TEAMS

Managing People –Understanding Behavior – Organizational Behavior – Selecting the Right Person for the Job – Instruction in the Best Methods – Motivation – The Oldham-Hackman Job Characteristics Model – Stress – Health and Safety. Working in Teams –Introduction – Becoming a Team – Decision Making – Organization and Team Structures – Coordination Dependencies – Dispersed and Virtual Teams – Communication Genres – Communication Plans – Leadership.

TEXT

1. BOB Huges, Mike Cotterell, Rajib Mall “Software Project Management”, McGraw Hill, Fifth Edition,2011.

REFERENCES

1. Futrell, “Quality software Project management”, Pearson Education India.
2. Royce, “Software Project Management”, Pearson Education India.

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PRACTICAL - 10
MOBILE APPLICATION DEVELOPMENT

1. Simple Android Application.
2. Working with Activity
3. Working with Fragments
4. UI Controls (Text, Edit Text, Button, Radio Button)
5. UI Controls (Check Box, and Layout, Image Button, Toggle Button)
6. UI Controls (Rating Bar, List View, Gallery)
7. CRUD Operations Using SQLite DB
8. Emailing
9. Telephony
10. SMS

CORE ELECTIVE

PAPER - 4

(to choose one out of 3)

A. BIG DATA ANALYSIS

COURSE OBJECTIVES

- To understand the needs for Big Data and its environments.
- To learn the basic requirements of Big Data Technologies.
- To expose the knowledge of MapReduce programming framework(Hadoop).
- To be familiar with with NoSQL DB's Cassandra and MongoDB
- To understand Hive and Pig technologies for analyzing the Big Data.

COURSE OUTCOMES

CO1 - Students are able to learn about types of digital data and big data

CO2 - Students are able to gain knowledge of various Big data analytics and its Technologies

CO3 - Students are able to study about various NoSQL databases and management techniques

CO4 - Students are able to work with NoSQL databases such as MongoDB and Cassandra

CO5 - Students are able to design Big data queries using Hive and Pig.

UNIT – I: INTRODUCTION TO BIG DATA

Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment

UNIT – II: BIG DATA ANALYTICS

Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment

UNIT – III: BIG DATA TECHNOLOGIES AND DATABASES

Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of apache cassandra and its needs, Characteristics of Cassandra

UNIT – IV: HADOOP FOUNDATION FOR ANALYTICS

History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures

UNIT – V: HADOOPMAPREDUCE AND YARN FRAMEWORK:

Introduction to MapReduce, Processing data with Hadoop using MapReduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats

TEXT

1. Seema Acharya and Subhashini Chellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd., 2016

REFERENCE BOOKS

1. “Big Data” by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
2. “Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics” by Souendra Mohanty, Madhu Jagadeesh and Harsha Srivatsa, Apress Media, Springer Science + Business Media New York, 2013
3. “Mining of Massive Datasets”, Anand Rajaraman, Jure Leskovec, Jeffery D. Ullman, Springer, July 2013.
4. “Hadoop: The definitive Guide”, Tom White, O'Reilly Media, 2010.

WEB REFERENCES

<http://strata.oreilly.com/2010/09/the-smaq-stack-for-big-data.html>

http://blogs.computerworld.com/18840/big_data_smaq_down_storage_mapreduce_and_query

CORE ELECTIVE

PAPER - 4

B. ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

- To provide a strong foundation of fundamental concepts in Artificial Intelligence
- To provide a basic exposition to the goals and methods of Artificial Intelligence
- To enable the student to apply these techniques in applications which involve perception, reasoning and learning

COURSE OUTCOMES

CO1 - Students are able to understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.

CO2 - Students are able to apply these techniques in applications which involve perception, reasoning and learning.

CO3 - Students are able to explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.

CO4 - Students are able to acquire the knowledge of real world Knowledge representation.

CO5 - Students are able to analyze and design a real world problem for implementation and understand the dynamic behavior of a system.

CO6 - Students are able to use different machine learning techniques to design AI machine and enveloping applications for real world problems

UNIT – I: INTRODUCTION

AI Problems - AI techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems

UNIT – II: HEURISTIC SEARCH TECHNIQUES

Generate and Test - Hill Climbing- Best-First - Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

UNIT – III: USING PREDICATE LOGIC

Representing simple facts in logic - Representing Instance and Is a relationships - Computable functions and predicates - Resolution.

UNIT – IV: REPRESENTING KNOWLEDGE USING RULES

Procedural Vs Declarative knowledge – Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.

UNIT – V: GAME PLAYING

The minimax search procedure – Expert System - Perception and Action

TEXT

1. Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.

REFERENCES

1. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.
3. George F. Luger, “Artificial Intelligence-Structures and Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.

WEB REFERENCES

https://www.tutorialspoint.com/artificial_intelligence/

<https://learn.saylor.org/course/view.php?id=96>

<https://in.udacity.com/course/intro-to-artificial-intelligence--cs271>

CORE ELECTIVE

PAPER - 4

C. MACHINE LEARNING

COURSE OBJECTIVES

To introduce the concepts like

- conceptualization and summarization of big data and machine learning
- Introduction to the course, recap of linear algebra and probability theory basics.
- Bayesian Classification: Naive Bayes, Parameter Estimation (ML, MAP), Sequential Pattern Classification.
- Non-parametric Methods: k-Nearest Neighbours Discriminative Learning models: Logistic Regression, Perceptrons, Artificial Neural Networks, Support Vector Machines

COURSE OUTCOMES

CO1 - Students are able to design and implement machine learning solutions to classification, regression, and clustering problems;

CO2 - Students are able to evaluate and interpret the results of the algorithms.

CO3 - Students are able to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.

CO4 - Students are able to solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.

CO5 - Students are able to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.

CO6 - Students are able to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

UNIT – I: INTRODUCTION TO MACHINE LEARNING

Learning Systems- Goals and Applications- Aspects of developing a learning system- Training data- Linear Perceptrons as Neurons- Neural Nets- Working- Layers- Activation Functions- Feed Forward Neural Networks- Limitations- DBNs- Deep learning for Bigdata- Local minima- rearranging neurons- Spurious local minima- Comparison of AI- Machine learning & Deep learning.

UNIT – II: TYPES OF LEARNING

Supervised Learning- Unsupervised Learning- Case Study- Classification- MLP in Practice- Overfitting-Linear and non-linear discriminative- decision trees- Probabilistic- K-nearest neighbor learning algorithm- curse of dimensionality.

UNIT – III: LEARNING ALGORITHMS

Logistic Regression- Perceptron- Exponential Family- Generative Learning algorithms- Gaussian Discriminant Analysis- Naïve Bayes- SVM-Kernels- Model Selection- Bagging- Boosting- Evaluating and debugging- Classification errors.

UNIT – IV: UNSUPERVISED AND LEARNING ALGORITHMS

Clustering- K-means Clustering- EM algorithm- Mixture of Gaussians- Factor Analysis- Principal and Independent Component Analysis- latent Semantic Indexing- Spectral or sub-space clustering.

UNIT – V: REINFORCEMENT LEARNING, IOT AND MACHINE LEARNING

Markov Decision Processes- Bellman Equations- Value Iteration and Policy Iteration- Linear quadratic regulation- LQG Q-Learning- Policy versus value learning- POMDPS- IoT- Recent trends- various models. Case Study: Object Detection and smudging using gradient Descent, Spam Filtering based on Text Classification.

TEXTS

1. Rajiv Chopra, "Machine Learning", Khanna Publications, New Delhi, 2018.
2. V.K. Jain, "Machine Learning", Khanna Publications, New Delhi, 2018.

REFERENCES

1. Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 2013.
2. Pattern Classification, 2nd Ed., Richard Duda, Peter Hart, David Stork, John Wiley & Sons, 2001.
3. Pattern Recognition and Machine Learning, Christopher Bishop, Springer 2006.

WEB REFERENCES

<https://www.datacamp.com/courses/introduction-to-machine-learning-with-r>
<https://elitedatascience.com/learn-machine-learning>
<https://www.analyticsvidhya.com/learning-path-learn-machine-learning/>

OPEN ELECTIVE

PAPER - 4

(to choose one out of 3)

A. CYBER SECURITY

COURSE OBJECTIVES

- To understand the cyber threats and their Impact
- To have an awareness towards cybercrimes and legal impact against them
- To avoid becoming a Victim to cyber threats
- To assess risks and weakness in security policies
- To respond to security alerts and identify flaws in systems and networks

COURSE OUTCOMES

CO1 - Students are able to understand the cyber threats and their Impact

CO2 - Students are able to have an awareness towards cybercrimes and legal impact against them

CO3 - Students are able to avoid becoming a Victim to cyber threats

CO4 - Students are able to assess risks and weakness in security policies

CO5 - Students are able to respond to security alerts and identify flaws in systems and networks

UNIT - I: INTRODUCTION TO CYBERCRIME AND CYBEROFFENSES

Introduction, Cybercrime - Definition and Origins of the Word - Cybercrime and Information Security - Cybercriminals - Classifications of Cybercrimes - The Legal Perspectives - Cybercrimes: An Indian Perspective - Cybercrime and the Indian ITA 2000 - A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyberoffenses: How Criminals Plan Them – Introduction - How Criminals Plan the Attacks - Social Engineering – Cyberstalking - Cybercafe and Cybercrimes - Botnets: The Fuel for Cybercrime - Attack Vector - Basics of Cloud Computing.

UNIT - II: TOOLS AND METHODS USED IN CYBERCRIME

Introduction - Proxy Servers and Anonymizers – Phishing - Password Cracking - Keyloggers and Spywares - Virus and Worms - Trojan Horses and Backdoors – Steganography - DoS and DDoS Attacks - SQL Injection - Buffer Overflow – Phishing - Identity Theft (ID Theft).

UNIT - III: UNDERSTANDING COMPUTER FORENSICS

Introduction - Historical Background of Cyberforensics - Digital Forensics Science - The Need for Computer Forensics - Cyberforensics and Digital Evidence - Forensics Analysis of E-Mail - Digital Forensics Life Cycle, Chain of Custody Concept - Network Forensics - Approaching a Computer Forensics Investigation - Setting up a Computer Forensics Laboratory: Understanding the Requirements - Computer Forensics and Steganography - Relevance of the OSI 7 Layer Model to Computer Forensics - Forensics and Social Networking Sites: The Security/Privacy Threats - Computer Forensics from Compliance Perspective - Challenges in Computer Forensics - Special Tools and Techniques - Forensics Auditing – Antiforensics.

UNIT - IV: CYBERSECURITY

Organizational Implications – Introduction - Cost of Cybercrimes and IPR Issues: Lessons for Organizations - Web Threats for Organizations: The Evils and Perils - Security and Privacy Implications from Cloud Computing - Social Media Marketing: Security Risks and Perils for Organizations - Social Computing and the Associated Challenges for Organizations - Protecting People's Privacy in the Organization - Organizational Guidelines for Internet Usage - Safe Computing Guidelines and Computer Usage Policy - Incident Handling: An Essential Component of Cybersecurity - Forensics Best Practices for Organizations - Media and Asset Protection: Best Practices for Organizations - Importance of Endpoint Security in Organizations.

UNIT - V: CYBERCRIME AND CYBERTERRORISM

Social, Political, Ethical and Psychological Dimensions – Introduction - Intellectual Property in the Cyberspace - The Ethical Dimension of Cybercrimes - The Psychology - Mindset and Skills of Hackers and Other Cybercriminals - Sociology of Cybercriminals - Information Warfare: Perception or An Eminent Reality? Cybercrime: Illustrations - Examples and Mini-Cases - Real-Life Examples - Mini-Cases - Illustrations of Financial Frauds in Cyber Domain - Digital Signature-Related Crime Scenarios - Digital Forensics Case Illustrations - Online Scams. Cybercrimes - Legal Perspectives - Why Do We Need Cyberlaws: The Indian Context - The Indian IT Act - Challenges to Indian Law and Cybercrime Scenario in India - Consequences of Not Addressing the Weakness in Information Technology Act - Digital Signatures and the Indian IT Act - Amendments to the Indian IT Act - Cybercrime and Punishment, Cyberlaw, Technology and Students: Indian Scenario.

TEXT

1. Jennifer L, Bayuk J, Heale P, Rohmeyer, Marcus Sachs, Jeffrey Schmidt and Joseph Weiss “Cyber Security Policy Guidebook”, John Wiley & Sons ,2012.

REFERENCES

1. Rick Howard, “Cyber Security Essentials”, Auerbach Publications, 2011.
2. Richard A, Clarke, Robert Knake, “Cyber war: The Next Threat to National Security & What to Do About It”, Ecco, 2010.
3. Dan Shoemaker, “Cyber security The Essential Body of Knowledge”, Cengage Learning, 2011.

WEB REFERENCES

<https://www.javatpoint.com/cyber-security-tutorial>

<https://www.pewresearch.org/internet/quiz/cybersecurity-knowledge/>

OPEN ELECTIVE

PAPER - 4

B. DECISION SUPPORT SYSTEM

COURSE OBJECTIVES

- To introduce the decision making system, models and support
- To appraise the general nature and range of decision support and group support systems
- To impart about knowledge based system and advanced intelligent systems

COURSE OUTCOMES

CO1 - Students are able to recognize the relationship between business information needs and decision making

CO2 - Students are able to appraise the general nature and range of decision support systems

CO3 - Students are able to appraise issues related to the development of DSS

CO4 - Students are able to select appropriate modeling techniques

CO5 - Students are able to analyze, design and implement a DSS

UNIT - I: DECISION-MAKING SYSTEMS, MODELING, AND SUPPORT

Decision-Making: Introduction and Definitions, Systems, Models, Phases of the Decision-Making Process, Decision-Making: The Intelligence Phase, The Design Phase, The Choice Phase, The Implementation Phase, How Decisions Are Supported, Personality Types, Gender, Human Cognition, and Decision Styles, The Decision Makers

UNIT – II: DECISION SUPPORT AND GROUP SUPPORT SYSTEM

DSS Configurations, What Is a DSS?, Characteristics and Capabilities of DSS, Components of DSS, The Data Management Subsystem, The Model Management Subsystem, The User Interface (Dialog) Subsystem, The Knowledge-Based Management Subsystem, The User, DSS Hardware, DSS Classifications. **Group Support System:** Group Decision-Making, Communication, and Collaboration, Communication Support, Collaboration Support: Computer-Supported Cooperative Work, Group Support Systems, Group Support Systems Technologies, Group systems Meeting room and Online, The GSS Meeting Process, Distance Learning, Creativity and Idea Generation.

UNIT - III: KNOWLEDGE-BASED SYSTEMS

Concepts and Definitions of Artificial Intelligence, Evolution of Artificial Intelligence, The Artificial Intelligence Field, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, How Expert Systems Work, Problem Areas Suitable for Expert Systems, Benefits and Capabilities of Expert Systems, Problems and Limitations of Expert Systems, Expert System Success Factors, Types of Expert Systems, Expert Systems on the Web.

UNIT- IV: KNOWLEDGE ACQUISITION, REPRESENTATION, AND REASONING

Concepts of Knowledge Engineering, Scope and Types of Knowledge, Methods of Knowledge Acquisition from Experts, Knowledge Acquisition from Multiple Experts, Automated Knowledge Acquisition from Data and Documents, Knowledge Verification and Validation, Representation of Knowledge, Reasoning in Rule-Based Systems, Explanation and Meta knowledge, Inferencing with Uncertainty, Expert Systems Development, Knowledge Acquisition and the Internet.

UNIT – V: ADVANCED INTELLIGENT SYSTEMS

Machine-Learning Techniques, Case-Based Reasoning, Basic Concept of Neural Computing , Learning in Artificial Neural Networks, Developing Neural Network-Based Systems, Genetic Algorithms Fundamentals, Developing Genetic Algorithm Applications, Fuzzy Logic Fundamentals, Developing Integrated Advanced Systems.

TEXT

1. Efraim Turban and Jay E. Aronson, Decision Support System and Intelligent Systems, Prentice Hall International, 7th Edition 2007.

REFERENCES

1. Janakiraman V. S and Sarukesi K, Decision Support Systems, Prentice Hall of India, 6th Printing 2006.
2. Lofti, Decision Support System and Management, McGraw Hill Inc, International Edition, New Delhi 1996.
3. Marakas, Decision Support System, Prentice Hall International, Paperback Edition, New Delhi, 2003

WEB REFERENCES

ndwrcdp.werf.org/documents/WU-HT-03-35/DSS%20Tutorial.pdf
www.slideshare.net/sursayantan92/decision-support-systemdss
www.uky.edu/BusinessEconomics/dssakba/instmat.htm
<https://ceit.aut.ac.ir/~shiry/lecture/DSS/Introduction.ppt>

OPEN ELECTIVE

PAPER - 4

C. RESEARCH METHODS AND ETHICS

COURSE OBJECTIVES

- To demonstrate the knowledge of research processes (reading, evaluating, and developing);
- To perform literature reviews using print and online databases;
- To identify, explain, compare, and prepare the key elements of a research proposal/report;
- To compare and contrast quantitative and qualitative research

COURSE OUTCOMES

CO1 - Students are able to demonstrate knowledge of research processes (reading, evaluating, and developing);

CO2 - Students are able to perform literature reviews using print and online databases;

CO3 - Students are able to identify, explain, compare, and prepare the key elements of a research proposal/report;

CO4 - Students are able to compare and contrast quantitative and qualitative research

UNIT I: FOUNDATIONS OF RESEARCH

Meaning – Objectives – Motivation - Utility. Concept of theory – empiricism - deductive and inductive theory. Characteristics of scientific method –Understanding the language of research –Concept – Construct – Definition –Variable - Research Process.

UNIT II: PROBLEM IDENTIFICATION & FORMULATION

Research Question–Investigation Question –Measurement Issues –Hypothesis –Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing –Logic & Importance.

UNIT III: RESEARCH DESIGN

Concept and Importance in Research –Features of a good research design –Exploratory Research Design –concept, types and uses, Descriptive Research Designs –concept,types and uses. Experimental Design: Concept of Independent & Dependent variables.

UNIT IV: QUALITATIVE AND QUANTITATIVE RESEARCH

Qualitative research –Quantitative research –Concept of measurement, causality, generalization, replication. Merging the two approaches.

UNIT V: MEASUREMENT

Concept of measurement–what is measured? Problems in measurement in research –Validity and Reliability. Levels of measurement –Nominal, Ordinal, Interval, Ratio.

TEXT BOOK

1. C. R. Kothari: Research Methodology: Methods & Technology, New Age Int. Publ.

REFERENCES

1. Gupta Gupta : Research Methodology: Texts and cases with SPSS Application (2011 edn.), International Book House, New Delhi.
2. A.K.P.C.Swain : A Text Book of Research Methodology, Kalyani Publishers.

WEB REFERENCES

<https://libguides.wits.ac.za/c.php?g=693518&p=4914913>

<https://www.scribbr.com/dissertation/methodology/>

<https://www.intechopen.com/online-first/research-design-and-methodology>


ANNAMALAI UNIVERSITY

213 - BACHELOR OF COMPUTER APPLICATIONS (BCA)

Programme Structure and Scheme of Examination (under CBCS)
(Applicable to the candidates admitted in Affiliated Colleges
from the academic year 2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours/ Week	Credit	Maximum Marks		
					CIA	ESE	Total
SEMESTER - I							
22UTAML11	I	Language Course - I : Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I : Communicative English I	5	3	25	75	100
22UBCAC13	III	Core Course – I: Programming in C	5	4	25	75	100
22UBCAC14		Core Course – II : Digital Computer Fundamentals	5	4	25	75	100
22UBCAP15		Core Practical – I :Programming in C Lab	3	2	40	60	100
22UMAF01		Allied Course - I : Paper -1 Mathematical Foundations-I	5	4	25	75	100
22UENVS18	IV	Environmental Studies	2	2	25	75	100
Total			30	22			700
SEMESTER - II							
22UTAML21	I	Language Course - II : Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course - II : Communicative English II	5	3	25	75	100
22UBCAC23	III	Core Course – III :C++ & Data Structures	5	4	25	75	100
22UBCAC24		Core Practical – II :C++ & Data Structures Lab	3	2	40	60	100
22USMAA02		Allied Course - I : Paper -2 Statistical Methods and their Applications	5	4	25	75	100
22UBCAE26	IV	Internal Elective – I	3	3	25	75	100
22UVALE27		Value Education	2	1	25	75	100
22USOFS28		Soft Skill	2	1	25	75	100
Total			30	21			800

INTERNAL ELECTIVE COURSES

22UBCAE26-1	Internal Elective - I	Computer Organization and Architecture
22UBCAE26-2		Computer Graphics
22UBCAE26-3		Internet and its Applications

SEMESTER:I PART: III	22UBCAC13 : PROGRAMMING IN C	CREDIT:4 HOURS:5
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COURSE OBJECTIVES

1. To understand simple algorithms
2. To understand language constructs
3. To understand and develop programming skills in C.
4. To understand the basic concepts of decision making and looping statements.
5. To understand the concepts of arrays , structures, union, pointers and files.

UNIT I :CONCEPT OF C PROGRAMMING**Hours:15**

History, Introduction of C programming language, Structure of C program, C character set, Data types, Variables, Constants, Keywords and Identifiers, Expression statements in C language, Operators (Arithmetic, Logical, Relational, Assignment etc.).

UNIT II: CONDITIONAL PROGRAM**Hours:15**

Execution, IF statement, IF.....ELSE statements nested IF.....ELSE and ELSE IF ladder. Program Loops and Iteration, WHILE loop, DO loop and FOR loop, Nested Loops, Use of break, continue and GOTO statements, Switch statement, use of break and default with switch, Storage Class in C language.

UNIT III: FUNCTIONS**Hours:15**

Built-In and User Defined functions, Function Declaration, Definition and Function Calling, Parameter Passing (Call by Value and Call by Reference), Recursion, Pointers, Macros.

UNIT IV: ARRAYS**Hours:15**

Definition of array, declaration, Linear Arrays, Multidimensional Arrays, Passing Array to function, String, string handling functions, Dynamic Memory Allocation.

UNIT V: STRUCTURE AND UNION**Hours:15**

Definition, Programs using Structure and Union, Difference between Structure and Union. File Handling: Opening and Closing data files, Read and Write Functions, different modes of files.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. The Student will be able to understand the concepts of Constants, Variables, and Data Types, Operators and Expressions
2. The Student will be able to understand the concepts of Managing Input and Output Operations, Decision Making and Branching, Decision Making and Looping.
3. The Student will be able to understand the concepts of Arrays, Character Arrays and Strings, User Defined Functions.
4. The Student will be able to understand the concepts of Structure and

Unions, Pointers, File Management in C.

5. The Student will be able to understand the concepts of Fundamental Algorithms, Factoring Methods.

Text Books (In API Style)

1. BalaguruswamyE., TMH, “Programming in ANSI C”.
2. Kanitkar Yashwant, BPB, “Let Us C”.
3. Kanitkar Yashwant, BPB, “Working With C”.

Supplementary Readings

1. Shaum’s Series ,TMH, “Programming in C”.
2. Forouzan, Thomson, Cengase, “Computer Science”

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	1	2	2	3	1
CO3	3	3	3	3	2
CO4	1	3	2	2	1
CO5	1	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:I PART: III	22UBCAC14 : DIGITAL COMPUTER FUNDAMENTALS	CREDIT: 4 HOURS: 5
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COURSE OBJECTIVES

1. Develop an understanding of digital circuit design and analysis.
2. Learn design techniques for working with digital electronic devices, and their application to solving problems.
3. Learn analysis skills to effectively report on the design, analysis and data of projects so that others can understand their methodology and results.
4. Become familiar with digital design, analysis and simulation tools.
5. Develop effective written communication skills using various media tools.

UNIT-I: NUMBER SYSTEM AND CODES

Hours: 12

Decimal Numbers, Binary Numbers, Decimal to Binary Conversions, Binary Arithmetic, 1's and 2's complements of Binary Numbers, Signed Numbers, Arithmetic Operations with Signed numbers, Hexadecimal Numbers, Octal Numbers, Digital Codes, Error Detection Codes.

UNIT-II: LOGIC GATES

Hours :12

The Inverter, The AND gate, The OR gate, The NAND gate, NOR gate, The Exclusive-OR gate and Exclusive OR gate: Boolean Algebra and Logic Simplification-Boolean Operations and Expressions, Laws and Rules, De Morgan's Theorems, Boolean Expressions and Truth Tables, The Karnaugh Map, SOP minimizations.

UNIT - III: COMBINATIONAL LOGIC ANALYSIS

Hours: 12

Basic combinational Logic Circuits, Implementing Combinational Logic, The Universal Property of NAND and NOR Gates. Functions of Combinational Logic - Basic Adder, Parallel Binary Adders, Comparators, Decoders, Encoders, Code Converters, Multiplexers, Parity Generator/Checkers.

UNIT-IV: LATCHES AND FLIP-FLOPS

Hours : 12

Latches, Edge Triggered Flip-Flops, Flip-Flop Operating characteristics, Flip-Flop Applications, Registers, Counters.

UNIT-V: MEMORY AND STORAGE

Hours: 12

Memory Basics, The RAM, The ROM, Programmable ROMs, The Flash Memory, Memory Expansion, Special Types of Memories, Magnetic and Optical Storage.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Identify the logic gates and their functionality.
2. Perform number conversions from one system to another system.
3. Design basic electronic circuits (combinational circuits).
4. Perform a comparative analysis of the components of different memory units.
5. Perform number conversions.

Text Books

1. Floyd, Thomas L,1997, University Book Stall, 10thEdition“Digital Computer Fundamentals”.

Supplementary Readings:

1. Malvino, Paul Albert and Leach, Donald P, 2000,TMH, 4thEdition, “Digital Principles and Applications”.
2. Malvino, Paul Albert and Leach, Donald P,1995,TMH, 3rd Edition, “Digital Computer Fundamentals”.
3. Bartee, Thomas C,1995, TMH,6th Edition, “Digital Computer Fundamentals”.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	3	3	1	3
CO2	1	2	2	2	1
CO3	3	2	3	3	2
CO4	1	3	2	2	1
CO5	1	3	2	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER: I PART: III	22UBCACP15: PROGRAMMING IN C LAB	CREDIT: 2 HOURS: 3
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COURSE OBJECTIVES

1. Apply the specification of syntax rules for numerical constants and variables, data types.
2. Usage of Arithmetic operator, Conditional operator, logical operator and relational operators and other C constructs.
3. Write C programs using decision making, branching, looping constructs
4. Apply and Write C programs to implement one dimensional and two dimensional arrays
5. Writing programs using functions

LIST OF EXPERIMENTS

1. Write a program to find the largest number and smaller number by using if statement
2. Write a program to convert the decimal to binary conversion by using while statement.
3. Write a program to count the positive, negative & zero numbers.
4. Write a program to check whether a given number is a prime or not.
5. Write a program to display the Fibonacci series.
6. Write a program to concatenate two strings without using string library function.
7. Write a program to count the number of vowels, consonants, and digits in a line of Text.
8. Write a program to reverse a String.
9. Write a program to design the calculator functions as
 - a) Addition
 - b) Subtraction &
 - c) Multiplication function.
10. Write a program to find the factorial of a number using recursion.
11. Write a program for ascending order of given N Numbers.
12. Write a program to separate odd and even numbers using file.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Read, understand and trace the execution of programs written in C language.
2. Write the C code for a given algorithm.
3. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
4. Write programs that perform operations using derived data types.
5. Know concepts in problem solving

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
C01	2	3	3	2	2
C02	2	2	2	3	1
C03	2	3	3	3	2
C04	1	3	2	2	2
C05	1	2	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER: II PART: III	22UBCAC23: C++ AND DATA STRUCTURES	CREDIT:4 HOURS:5
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COURSE OBJECTIVES

1. To Understand the Principles of Object Oriented Programming
2. To understand the concepts of Classes and Objects
3. To Understand the Concepts of Inheritance
4. To Understand the Concepts of Data Structures
5. To Understand in developing C++ programs

UNIT I: BASICS OF OOP AND C++**Hours:15**

Object Oriented Programming Concepts – Benefits and Applications of OOP – C++ Program structure, Program Statements, Classes – Creating, Compiling and Linking Source file – Keywords, Identifiers and Constants – Data types: Basic, User defined and derived – Declaration and Dynamic Initialization of Variables, Reference Variables – Operators: Scope resolution, Member Dereferencing, Memory management and Type Cast - Manipulators – Expressions and their Types – Implicit Conversions, Operator Overloading, Operator Precedence.

UNIT II: CONTROL STRUCTURES & ARRAYS.**Hours:15**

Control Structures: If, If...else, switch, do..while, while, for statements, Functions – The Main function, Function Prototyping, Call by Reference, Return by Reference, Inline functions, Classes and Objects – Specifying a Class, Defining Member Functions, Making an Outside function Inline, Nesting of Member functions, Arrays within a Class, Arrays of Objects, Objects as function Arguments, Friendly functions, Returning Objects.

UNIT III: CONSTRUCTORS & FILES**Hours:15**

Constructors Parameterized Constructors, Multiple Constructors in a class, Copy constructor and Destructors -Defining Operator Overloading, Overloading Unary and Binary Operators, Overloading, String manipulation using Operators, Rules for overloading operators, Type Conversions. Inheritance: Defining derived classes.-Single, Multilevel , Hierarchical and multiple Inheritance-Pointers, Pointers to derived classes. Files: Opening and closing file, detecting End-of-files.

UNIT IV: FUNDAMENTALS OF DATA STRUCTURES**Hours:15**

Stack(Arrays)-Operations-Applications of Stack(Infix and Postfix)- Queue(Array)-operations-Linked list (Singly, circular, Doubly)- Applications of List(Polynomial Addition) Trees: Binary Trees –Binary Search Tree- Operations - Recursive Tree Traversals.

UNIT V: SORTING & SEARCHING**Hours:15**

Graph - Definition, Types of Graphs, Graph Traversal –Dijkstras shortest path-DFS and BFS-Sorting-Heaps-Quick sort-Merge sort-Bubble sort-searching-Binary search.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. To learn the basic concepts Object oriented programming.
2. To learn the control structures and arrays.
3. To implementing the constructors & File opening and closing.
4. To learn the fundamentals of stack & Queue operations.
5. To learn the concepts of graphs, sorting & searching methods.

TEXT BOOKS (In API Style)

1. E Balagurusamy , 2014,Tata McGraw Hill,6th Edition, “Object Oriented Programming with C++”.
2. Ellis Horowitz, Sartaj Sahni,2008, Galgotia Publications “ Fundamentals of Data Structure”.

SUPPLEMENTARY READINGS

1. Reema Thareja , 2015, Oxford University Press , “Object Oriented Programming with C++”.
2. Balagurusamy, Tata McGraw Hill Edition “C++ programming”.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	1	2
CO2	1	2	2	3	1
CO3	2	1	2	3	2
CO4	1	2	2	2	1
CO5	2	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II PART: III	22UBCAP24 : C++ & DATA STRUCTURE LAB	CREDIT: 2 HOURS: 3
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COURSE OBJECTIVES

1. To Impart Practical Training in C++ Programming Language

LIST OF EXPERIMENTS

- 1) Implementing classes, object, constructors and member functions for calculating area and perimeter of a circle.
- 2) Implementing function overloading(Find area/volume of rectangle, circle, sphere, cylinder, cone etc).
- 3) Implementing operator over loading(Addition, subtraction, multiplication of matrices)
- 4) Implementing single , multiple , hierarchical inheritance.
- 5) Implementing sequential file operations using error handling functions.
- 6) Implementing PUSH, POP operations of stack using Arrays.
- 7) Implementing add, delete operations of a queue using Arrays.
- 8) Implementing Infix to postfix conversion of an expression using stack.
- 9) Implementing Binary tree recursive traversals (in-order, pre-order, and post-order).
- 10) Implementing Polynomial addition using linked list.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	2	2	2	3	2
CO3	3	2	3	3	2
CO4	2	3	2	3	2
CO5	2	2	3	3	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II PART: III	INTERNAL ELECTIVE-I 22UBCAE26 :1 COMPUTER ORGANIZATION & ARCHITECTURE	CREDIT: 3 HOURS: 3
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COURSE OBJECTIVES

1. To understand the basic concepts of instruction and its essentials.
2. To Understand the concept of programmed control.
3. To learn how to implement micro operations & instruction formats..
4. To Explain the Input , output controls .
5. To understand the concept of memory concepts.

UNIT I : Basic Computer Organization and Design**Hours:9**

Instruction Codes: Stored program Organization, Indirect address – Computer Registers: Common bus system – Computer Instructions: Instruction set Completeness – Timing and Control – Instruction Cycle: Fetch and decode, Determine the type of Instruction, Register reference Instructions- Memory reference Instructions – Input Output and Interrupt: I/O Configuration, I/O Instructions, Program Interrupt, Interrupt Cycle.

UNIT II: Microprogrammed Control**Hours:9**

Control memory – Address sequencing: Conditional Branching, Mapping of Instruction, Subroutines – Microprogram Example: Computer Configuration, Microinstruction formats, Symbolic Microinstructions, The fetch routine, Symbolic Microprogram, Binary Microprogram – Design of Control UNIT: MicroProgram Sequences.

UNIT III: Central Processing UNIT**Hours:9**

General Register Organization: Control word, Examples of Microoperations – Instructionformats : Three-Address, Two-Address, One-Address and Zero-Address Instructions, RISC Instructions – Addressing Modes: Numerical Example.

UNIT IV: Input-Output Organization**Hours:9**

Peripheral Devices: ASCII Alphanumeric Characters – Input-Output Interface: I/O Bus and Interface modules, I/O versus Memory Bus, Isolated versus Memory Mapped I/O, Example of I/O Interface – Asynchronous Data Transfer: Strobe Control, Handshaking, Asynchronous Serial Transfer, Asynchronous Communication Interface, First-In, First-Out Buffer – Modes of Transfer – DMA, DMA Controller.

UNIT V: Memory Organization**Hours:9**

Memory Hierarchy, Main memory: RAM, ROM, Memory Address map, Memory Connection to CPU – Auxiliary Memory - Associative Memory – Cache & virtual Memory.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. To learn the computer instructions and bus system.
2. To learn about the addressing modes.
3. To learn about the Input and output controls.
4. To learn about the memory and its types.

Text Books (In API Style)

1. Morris Mano M. , 2011, Prentice Hall of India Private Limited,
“Computer System Architecture” New Delhi .

Supplementary Readings

1. William Stallings, 2010, Pearson publications, “Computer Organization and architecture”,

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	1	3	3	2	2
CO2	1	2	3	2	1
CO3	3	2	3	3	1
CO4	1	3	2	2	1
CO5	1	2	3	2	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II	INTERNAL ELECTIVE- I	CREDIT: 3
PART: III	22UBCAE26 : 2 COMPUTER GRAPHICS	HOURS: 3

COURSE OBJECTIVES

1. To understand the basic concepts of drawing algorithms.
2. To understand the concept of Attributes & 2D transformations
3. To understand clipping concepts & its types.
4. To understand the concepts of 3D transformations.
5. To understand the surface detection methods.

UNIT I : Overview of Computer Graphics

Hours: 9

Video Display Devices- Raster Scan System- Random Scan Systems- Hard Copy Deices- Graphic Software- Line Drawing Algorithms: DDA- Bresenham's Line -Circle Generating Algorithms

UNIT II: Attributes & Two Dimensional Transformations

Hours: 9

Line Attributes- Curve Attributes-Color And Gray Scale Level- Area Fill Attributes- Character Attributes- Inquiry Functions- Basic Transformations - Composite Transformation – Other transformation

UNIT III: Two Dimensional Viewing & Clipping

Hours: 9

The Viewing Pipeline- Window To Viewport Transformation –Clipping Operations- Point Clipping- Line Clipping: Cohen Sutherland- Liang Barsky-Sutherland Hodgeman Polygon Clipping- Text Clipping- Exterior Clipping- Logical Classification Of Input Devices- Interactive Picture Construction

UNIT IV: Three Dimensional Transformations & Clipping

Hours: 9

Translation-Rotation-Scaling-Viewing Pipeline- Viewing Coordinates- Projections - View Volumes and General Projection Transformation- Clipping

UNIT V: Visible Surface Detection Methods

Hours: 9

Classification of Visible Surface Detection Algorithms - Back Face Detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method- BSP Tree Method -Area Sub Division Method - Octree Methods - Ray Casting Method

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Learn about the basics of graphics drawings
2. To learn about the attributes & its transformations.
3. To learn about the clipping & its types.
4. To learn about the 3D transformations.
5. To learn about the surface detection methods.

Text Books

1. Donald Hearn and Hearn and M.Pauline ,2012, Pearson 2nd edition
“Computer Graphics(C version).

Supplementary Readings:

1. Edward Angel, Pearson Edition, 5th Edition, “Interactive Computer Graphics–A top down approach using Open GL”.
2. Peter Shirley , 2009, Steve Marschner, Cengage Learning, Indian Edition
“Computer Graphics”.

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
C01	2	3	3	3	2
C02	1	2	2	3	1
C03	3	3	3	3	2
C04	1	3	2	2	1
C05	1	3	3	3	1

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

SEMESTER:II PART: III	INTERNAL ELECTIVE-I 22UBCACE26:3 INTERNET AND ITS APPLICATIONS	CREDIT:3 HOURS: 3
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COURSE OBJECTIVES

1. Illustrate basic concepts of Internet.
2. Understand Apply the necessary of Internet Explorer.
3. Analyze, design and implement Email system.
4. Demonstrate the Hyper Text Markup languages
5. To learn the E-marketing & its usage.

UNIT – I: Fundamentals of Internet**Hours:9**

Introduction to Computers Programming Language types History of Internet Personal Computers, History of World Wide Web- Micro software .NET Java-Web resources.

UNIT – II: Web Browsers**Hours:9**

Web Browsers- Internet Explorer- connecting to Internet Features of Internet explorer6 Searching the Internet- online help and tutorials- File Transmission Protocol (FTP) Browser settings.

UNIT – III: E-Mail**Hours:9**

Attaching a file, Electronic mail Creating an E-mail id Sending and Receiving mails- attaching a file- Instance messaging- other web browsers.

UNIT – IV: HTML**Hours:9**

Introduction to HTML headers - Linking- Images-special characters and line breaks- unordered lists- simple HTML programs.

UNIT – V: E-Marketing**Hours:9**

E-marketing consumer tracking Electronic advertising search engine-CRM- credit card Payments- Digital cash – e wallets – smart card.

COURSE OUTCOMES

After completing the Course successfully, the student will be able to

1. Explain basic usages of internet and its applications.
2. Define and demonstrate the use of Web Browsers.
3. To Explain the E-Mail applications.
4. To demonstrate the HTML & its tags.
5. To Know the E-Marketing and its advertisements.

Text Books (In API Style)

1. P.J. Deital and A.B. Goldberg , PHI, third Edition “Internet and World Wide Web”.

Supplementary Readings

1. Harley hahn , Tata McGraw hill “The Internet- Complete Reference”.
2. P.Rizwan Ahmed, 2014, , Margham Publication, ” Internet and its Applications”

OUTCOME MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	2
CO2	1	2	2	2	1
CO3	3	1	3	1	3
CO4	2	3	3	3	3
CO5	1	3	3	1	3

1 – Low, 2 – Moderate, 3 – High (Preferably use 2 or 3 levels)

ANNAMALAI UNIVERSITY
BACHELOR OF COMPUTER APPLICATIONS
CBCS PATTERN

(With effect from 2021-2022)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	Communicative English I	25	75	100
3.	III	Core Theory	Paper-1	6	4	Programming in C	25	75	100
4.	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5.	III	Allied -1	Paper-1	7	3	Mathematical Foundations - I	25	75	100
6.	III	PE	Paper 1	6	3	Professional English I	25	75	100
7.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		36	22		175	525	700
SEMESTER II									
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	6	4	Communicative English II	25	75	100
10.	III	Core Theory	Paper-2	5	4	C++ & Data Structure	25	75	100
11.	III	Core Practical	Practical-2	2	2	C++ and Data Structures Lab	25	75	100
12.	III	Allied-1	Paper-2	7	5	Mathematical Foundations - II	25	75	100
13.	III	PE	Paper 1	6	3	Professional English II	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		36	25		200	600	800

SEMESTER III						CIA	Uni. Exam	Total	
16.	III	Core Theory	Paper-3	5	4	Programming in JAVA	25	75	100
17.	III	Core Theory	Paper-4	4	4	E-Commerce	25	75	100
18.	III	Core Theory	Paper-5	5	4	Operations Research	25	75	100

B.C.A. Computer Applications (CBCS)

19.	III	Core Practical	Practical-3	4	3	Programming in JAVA Lab	25	75	100
20.	III	ALLIED-2	Paper-3	7	3	Financial Accounting-I	25	75	100
21.	IV	Skill based Subject I	Paper-1	3	2	Web Technology	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
		Sem. Total		30	22		175	525	700
SEMESTER IV							CIA	Uni. Exam	Total
23.	III	Core Theory	Paper-6	5	4	Relational Database Management Systems	25	75	100
24.	III	Core Theory	Paper-7	4	4	Enterprise Resource Planning	25	75	100
25.	III	Core Theory	Paper-8	5	4	Wireless Data Communications	25	75	100
26.	III	Core Practical	Practical-4	4	3	RDBMS Lab	25	75	100
27.	III	ALLIED-2	Paper-4	7	5	Financial Accounting-II	25	75	100
28.	IV	Skill based Subject -II	Paper-2	3	2	Internet Of Things	25	75	100
29.	IV	Non-Major Elective	Paper-2	2	2	Internet Technology	25	75	100
		Sem. Total		30	24		175	525	700
SEMESTER V							CIA	Uni. Exam	Total
30.	III	Core Theory	Paper-9	6	4	Mobile Application Development	25	75	100
31.	III	Core Theory	Paper-10	6	4	Operating System	25	75	100
32.	III	Core Theory	Paper –11	4	2	Design and Analysis of Algorithms	25	75	100
33.	III	Core Practical	Practical-5	4	3	Mobile Applications Development-Lab	25	75	100
34.	III	Core Practical	Practical-6	4	3	Operating System-Lab	25	75	100
35.	III	Internal Elective I	Paper-1	3	3	(Choose any one) A. Data Mining B. Information Security C. Software Testing	25	75	100
36.	IV	Skill Based Subject III	Paper– 3	3	2	Software Engineering	25	75	100

III SEMESTER

CORE PAPER-3

PROGRAMMING IN JAVA

COURSE OBJECTIVES:

- Knowing about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Secured, well-suited for internet programming using applets and GUI-based

UNIT I

Declarations and Access Control: Identifiers and Keywords: Oracle's Java Code Conventions. Define Classes: Import Statements and the Java API - Static Import Statements. Use Interfaces: Declaring an Interface- Declaring Interface Constants. Declare Class Members: Access Modifiers - Non access Member Modifiers - Constructor Declarations - Variable Declarations. Declare and Use enums: Declaring enums. Object Orientation: Encapsulation - Inheritance and Polymorphism- Polymorphism - Overriding / Overloading: Overridden Methods -Overloaded Methods.

UNIT II

Object Orientation: Casting - Implementing an Interface - Legal Return Types: Return Type Declarations - Returning a Value. Constructors and Instantiation: Overloaded Constructors - Initialization Blocks. Statics: Static Variables and Methods. Assignments: Stack and Heap - Literals, Assignments, and Variables: Literal Values for All Primitive Types. Scope - Variable Initialization - Passing Variables into Methods: Passing Object Reference Variables - Passing Primitive Variables. Garbage Collection. Operators: Java Operators - Assignment Operators - Relational Operators - instanceof Comparison - Arithmetic Operators - Conditional Operator - Logical Operators.

UNIT III

Working with Strings, Arrays, and Array Lists: Using String and StringBuilder: The String Class - The StringBuilder Class - Important Methods in the StringBuilder Class. Using Arrays: Declaring an Array -Constructing an Array - Initializing an Array. Using ArrayList:ArrayList Methods in Action - Important Methods in the ArrayList Class. Flow Control and Exceptions: Using if and switch Statements -Creating Loops Constructs - Handling Exceptions - Catching an Exception Using try and catch - Using finally. String Processing, Data Formatting Resource Bundles: String, StringBuilder, and StringBuffer -Dates, Numbers, Currencies, and Locales.

UNIT IV

I/O and NIO: File Navigation and I/O: Creating Files Using the File Class - Using FileWriter and FileReader. File and Directory Attributes -DirectoryStream - Serialization. Generics and Collections: toString(), hashCode(), and equals(): The toString() Method - Generic Types -Generic Methods - Generic Declarations. Inner

B.C.A. Computer Applications (CBCS)

Classes: Method – Local. Inner Classes - Static Nested Classes - Threads: Defining, Instantiating, and Starting Threads - Thread States and Transitions - Synchronizing Code, Thread Problems - Thread Interaction. Concurrency: Concurrency with the java.util.concurrent Package - Apply Atomic Variables and Locks - Use java.util.concurrent Collections - Use Executors and ThreadPools.

UNIT V

Applets: Applet fundamentals - Applet class - Applet life cycle - Steps for developing an applet program - Passing values through parameters - Graphics in an applet - Event-handling. GUI Applications - Part 1: Graphical user interface - Creating windows - Dialog boxes - Layout managers - AWT component classes - Swing component classes. GUI Applications - Part 2: Event handling - Other AWT components - AWT graphics classes - Other swing controls.

TEXT BOOK(S):

1. Kathy Sierra, Bert Bates — OCA/OCJP Java SE 7 Programmer I & II Study Guide, Oracle Press. (Unit I,II,III,IV).
2. Sagayaraj, Denis, Karthik and Gajalakshmi, 2018, Java Programming - For Core and Advanced Learners, University Press (India) Private Limited, Hyderabad.(Unit V).

REFERENCE BOOKS:

1. Hebert Schild, 2002, The Complete Reference Java2, [Fifth Edition]. Tata McGraw-Hill, New Delhi.
2. John Hubbard, R.2004. Programming with Java. [Second Edition]. Tata McGraw-Hill, New Delhi.
3. Debasish Jana. 2005. Java and Object-Oriented Programming Paradigm, [Second Printing]. Prentice-Hall of India, New Delhi.
4. Sagayaraj, Denis, Karthik and Gajalakshmi 2018, Java Programming for core and advanced Learners, University Press India Pvt. Ltd., Hyderabad.

Course Outcomes:

- Students are able to know about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Students are able to Secured, well-suited for internet programming using applets and GUI-based

CORE PAPER-4

E-COMMERCE

Objectives:

- ✓ To provide the knowledge about commerce through electronic medium & information system.
- ✓ To understand the concepts of security.
- ✓ To understand the basic knowledge of E- Payments.
- ✓ To understand the concepts of EDI.
- ✓ To understand the concepts of Trading relationships.

UNIT I

15

Hours

Electronic Commerce Framework, Traditional Vs. Electronic Business Application, The Anatomy of E-Commerce Applications. Network infrastructure for E-Commerce – Components of the I-way – Global Information Distribution Networks – Public policy issues shaping the I – way. Network Access Equipment

UNIT II

15

Hours

The internet as a Network Infrastructure, Network Security and Firewalls – Client Server Network Security – Firewalls and Network Security – Data and Message Security – Encrypted Documents and Electronic Mail.

UNIT III

15

Hours

Electronic Commerce and World Wide Web, Consumer Oriented E-Commerce, Electronic Payment Systems

UNIT IV

15

Hours

Electronic Data Interchange (EDI), EDI application in business, EDI and E-commerce – EDI implementation. Intra-organizational Electronic Commerce - Supply Chain Management.

UNIT V

15

Hours

Corporate Digital Library – Advertising and marketing on the Internet – E-Commerce Catalogs or Directories- On demand Education and Digital Copyright – Applets, Browsers & Software Agents.

TEXTBOOK:

1. Frontiers of Electronic Commerce, R. Kalakota and Andrew. B. Whinston, Pearson , 11th Edition , 2011.

REFERENCES:

1. Understanding Electronic Commerce, DaidKosiur, Microsoft Press, 1997.
2. From EDI to Electronic Commerce, Soka, McGraw Hill, 1995.
3. Electronic Commerce Management, Saily Chan, John Wiley, 1998.

Course Outcomes:

- The Student will be able to understand the concepts of E-commerce and its different types and describe the network infrastructure for E-commerce.
- The Student will be able to understand the concepts of networks and fundamental of security concepts, security services to counter them, understand the fundamental properties of cryptography Techniques.
- The Student will be able to understand the concepts of electronic payment systems, online security and understand the fundamentals of create a E-commerce web site.
- The Student will be able to understand the concepts of the basic fundamentals of electronic document interchange EDI, supply chain management process.
- The Student will be able to understand the concepts of internet trading relationships including inter organization and intra-organizations.

CORE PAPER-5
OPERATION RESEARCH

Objectives:

- ✓ To understand the concepts of Linear Programming.
- ✓ To understand the concepts of Transportation, Assignment problem.
- ✓ To understand the concepts of sequence problem.
- ✓ To understand the concepts of PERT and CPM.
- ✓ To understand the concepts of Cost Flow Problem.

UNIT- I:

9 Hours

LINEAR MODELS: Basics of OR & Decision making - Role of computers in OR, Linear Programming Problem – Formulation, Graphical solution of two variables Canonical & standard form of LPP, Simplex method, Charne’s method of penalties.

UNIT- II:

9 Hours

TRANSPORTATION AND ASSIGNMENT PROBLEMS: Transportation algorithm - Degeneracy algorithm- Unbalanced Transportation problem Unbalanced assignment algorithm.

UNIT – III:

9

Hours

SEQUENCING PROBLEM: Processing of n jobs through two machines - Processing of n jobs through three machines- Processing of n jobs through m machines.

UNIT- IV:

9

Hours

PERT & CPM: Network - Fulkerson’s rule- Measure of activity- PERT computation- CPM computation.

UNIT –V:

9

Hours

NETWORK MODELS: Network definition- Minimal spanning tree problem- Shortest route problem- Maximal flow problem- Minimal cost capacitated flow problem.

TEXT BOOK

1. Hamdy A. Taha, Operations Research An Introduction, Eighth Edition, Pearson Education, Inc., 2008
2. Kantiswaroop, Gupta P.K and Manmohan, Operations Research, Sultan Chand & Sons, New Delhi, 2008

REFERENCES

1. Prem Kumar Gupta and D.S. Hira, Operations Research, S. Chand and Co., Ltd. New Delhi, 2008.
2. Gupta R. K., Linear Programming, Krishna Prakashan Media (P) Ltd. , 2009.

E - REFERENCES

1. Lecture Series on Fundamentals of Operations Research by Prof. G. Srinivasan, Department of Management Studies, IIT Madras. For more details on NPTEL visit <http://nptel.iitm.ac.in>

Course Outcomes:

- The Student will be able to understand the concepts of optimization and to formulate and Solve Linear Programming problems.
- The Student will be able to understand the concepts of Transportation problem and Assignment problem.
- The Student will be able to understand the concepts of sequencing problem.
- The Student will be able to understand the concepts of PERT-CPM and their applications in product planning control.
- The Student will be able to understand the concepts of Solve the Minimal Spanning Tree Problem, Shortest Route Problem, Maximal Flow Problem and Minimal Cost Capacitated Flow Problem.

CORE PRACTICAL - Practical-3

PROGRAMMING IN JAVA LAB

List of Practical's

1. Implementation of Classes and Objects
2. Implementation of Inheritance and Polymorphism
3. Implementation of Interface and Package concepts
4. Implementation of Flow, Border ,Grid Layouts
5. Implementation of Tic-Tac Toe Application Using Applets
6. Implementation of Frames, Menus, Dialog
7. Implementation of Swing concepts
8. Implementation of Exception Handling
9. Implementation of Multi Threading
10. Implementation of I/O Streams
11. Implementation of Java Networking concepts
12. Implementation of Java Servlets (Connecting Database)
13. Implementation of RMI
14. Implementation of Java Beans

ALLIED - 2

PAPER - 3

FINANCIAL ACCOUNTING– I

COURSE OBJECTIVES:

- The objective of this paper is to help the students to acquire conceptual knowledge of accounting.

COURSE OUTCOMES:

On the successful completion of the course, the student will be able

CO NUMBER	CO STATEMENT
CO1	To introduce the basic concepts and conventions to the students, this would help in development of accounting knowledge.
CO2	To understand the concept of Double entry system this helps in preparation of various books of accounts.
CO3	To develop the capability of students to prepare the Final Accounts of a Small Business Concern.
CO4	To introduce the concept of Single entry system of Accounting which helps them to prepare the accounts from incomplete records.
CO5	To enhance the Accounting Knowledge by introducing the practical uses of Average Due Date and Bank Reconciliation Statement.

Unit-I

INTRODUCTION TO ACCOUNTING

Meaning- Definition- Functions- Objectives- Users of Accounting Information- Accounting Concepts and Conventions – Advantages and Limitations of Accounting.

Unit-II

DOUBLE ENTRY SYSTEM OF ACCOUNTING

Meaning and concepts - Golden Accounting Rules- Journal Entries- Ledger- Trail Balance – Rectification of Errors (Simple Problems).

Unit-III

FINAL ACCOUNTS

Preparation of Trading Account, Profit and Loss Account and Balance Sheet- Adjustment Entries (Simple Problems).

Unit-IV

SINGLE ENTRY SYSTEM

Meaning - Features - Advantages - Limitations - Methods- Net Worth Method – Conversion Method (Simple Problems).

Unit-V

AVERAGE DUE DATE AND BANK RECONCILIATION STATEMENT

Average Due Date - Meaning -Uses – Problems - Bank Reconciliation Statement-Meaning- Reasons for Preparation- Procedures and Preparation of Bank Reconciliation statement (Simple Problems).

DISTRIBUTION OF MARKS: THEORY 20% AND PROBLEMS 80%

TEXT BOOK

S.No	Author	Title	Publisher	Year of Publication
1	T.S.Reddy and Murthy	Financial Accounting	Margham Publications	2018

REFERENCE BOOKS

S.No	Author	Title	Publisher	Year of Publication
1	M.C. Shukla and T.S. Grewal&co	Advanced Accounts	S. Chand & Co	2016
2	R.L. Gupta	Financial Accounting	Sultan chand	2014
3	S.P. Jain &K.L Narang,	Financial Accounting	Kalyani Publication	2017
4	R.S.N Pillai&V.Bagavathi	Fundamental of Advanced Accounting, Volume – I	S. Chand & Co	2013

SKILL BASED SUBJECT

PAPER-1

WEB TECHNOLOGY

Objective:

- ✓ This course introduces the concepts of HTML.ASP, VB Script,.
- ✓ This course introduces the concepts of control statements and looping statements in Java script.
- ✓ This course introduces the concepts of Java Script Cookies.
- ✓ This course introduces the concepts of ASP.NET
- ✓ This course introduces the concepts of OLEDB connection.

Unit I: **8**

Hours

Introduction to VBScript - Adding VBScript Code to an HTML Page - VB Script Basics - VBScript Data Types - VBScript Variables - VBScript Constants - VBScript Operators – mathematical- comparison-logical - Using Conditional Statements - Looping Through Code - VBScript Procedures – type casting variables - math functions –date functions – string functions –other functions - VBScript Coding Conventions - Dictionary Object in VBScript - Err Object

Unit-II: **8**

Hours

Introduction to Javascript – Advantages of Javascript – Javascript syntax - Data type –Variable - Array – Operator & Expression – Looping – control structures - Constructor Function – user defined function Dialog Box .

Unit III: **8**

Hours

Javascript document object model – Introduction – Object in HTML – Event Handling – Window object – Document object – Browser object – Form object – Navigator object – Screen object – Build in object – User defined object – Cookies.

Unit IV: **8 Hours**

ASP.NET Language Structure – Page Structure – Page event , Properties & Compiler Directives . HTML server controls – Anchor, Tables, Forms, Files . Basic Web server Controls – Label, Text box, Button, Image Links, Check & radio Button, Hyperlink, Data List Web Server Controls – Check box list. Radio button list, Drop down list, List box, Data grid, Repeater.

Unit V:

8

Hours

Request and Response Objects, Cookies, Working with Data – OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced issues – email, Application issues, working with IIS and page Directives , error handling. Security – Authentication, IP Address, Secure by SSL & Client Certificates.

TEXT BOOKS:

1. I.Bayross, 2000, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI, BPB Publications.
2. A.Russell Jones, Mastering Active Server Pages 3, BPB Publications.

REFERENCE BOOKS:

1. HathleenKalata, Internet Programming with VBScript and JavaScript, Thomson Learning
2. Mike McGrath, XML Harness the Power of XML in easy steps, Dreamtech Publications
3. T.A. Powell, 2002, Complete Reference HTML , TMH.
4. J.Jaworski, 1999, Mastering Javascript, BPB Publications.
5. Powell, Thomas; Schneider, Fritz, JavaScript: The Complete Reference, 2nd edition 2004, TMH

Course Outcomes:

- The Student will be able to understand the concepts of HTML.
- The Student will be able to understand the concepts of java scripts.
- The Student will be able to understand the concepts of user defined functions.
- The Student will be able to understand the concepts of Active Server Page.

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- The Student will be able to understand the concepts of – OLEDB connection class.

NON-MAJOR ELECTIVE

PAPER-1

Introduction to Information Technology

OBJECTIVES:

The subject aims to build the concepts regarding:

- Major components of Computer System and its working principles.
- Role of an Operating System and basic terminologies of networks.
- How the Information Technology aids for the Current Scenario.
- To understand the Computer Software.
- To understand internet applications

UNIT-I

Introduction: Characteristics of Computers-Technological Evolution of Computers-The Computer Generations-Categories of Computer. **Data and Information:** Introduction-Types of Data-A Simple Model of a Computer-Data Processing Using a Computer-Desktop Computer. **Acquisition of Number and Textual Data:** Introduction- Input Units-Internal Representation of Numeric Data-Representation of Characters in Computers-Error-Detecting Codes.

UNIT-II

Data Storage: Introduction-Memory Cell-Physical Devices Used as Memory Cells-Random Access Memory-Read Only Memory- Secondary Memory- Floppy Disk Drive-Compact Disk Read Only Memory (CDROM)-Archival Memory. **Central Processing Unit:** The Structure of a Central Processing Unit-Specification of a CPU-Interconnection of CPU with Memory and I/O Units.

UNIT-III

Computer Networks: Introduction-Local Area Network (LAN)- Applications of LAN-Wide Area Network (WAN)-The Future of Internet Technology. **Output Devices:** Introduction- Video Display Devices-Flat Panel Displays-Printers.

UNIT-IV

Computer Software: Introduction-Operating System-Programming Languages-A Classification of Programming Languages. **Data Organization:** Introduction-Organizing a Database-Structure of a Database- Database Management System-Example of Database Design.

UNIT-V

Some Internet Applications: Introduction- E-mail- Information Browsing Service- The World Wide Web- Information Retrieval from the World WideWeb-Other Facilities Provided by Browsers - Audio on the Internet.**Societal Impactsof Information Technology:** CareersinInformation Technology.

TEXTBOOKS:

1. *Rajaraman, V.* 2008. **IntroductiontoInformationTechnology**. [SixthPrinting].

PrenticeHall of India Pvt. Limited, New Delhi.(UNIT I toV)

2. *Nagpal, D.P.* 2010. **Computer Fundamentals**. [First Edition, Revised]. S. Chand & Company Ltd, New Delhi. (**UNIT I (Introduction: Characteristics of Computers to Categories of Computer)**)

REFERENCE BOOKS:

1. *ITL Educations Solution Limited.* 2009. **Introduction to Computer Science**. [Fourth Impression]. Pearson Education, New Delhi.
2. *Alexis Leon and Mathews Leon.* 1999. **Fundamentals of Information Technology**. [First Edition]. Leon TECHWorld, New Delhi.

COURSE OUT COMES :

- Students understand Major components of Computer System and its working principles.
- Students learn and understand the Role of an Operating System and basic terminologies of networks.
- Students understand how the Information Technology aids for the Current Scenario.
- Students understand the Computer Software.
- Students understand internet applications

**SEMESTER IV
CORE PAPER-6**

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Objective:

- ✓ The students are able to understand database concepts and database management system software and have a high-level understanding of major DBMS components and their function.
- ✓ The students are able to understand the E R model and relational model.
- ✓ The students are able to be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
- ✓ The students are able to Understand Functional Dependency and Functional Decomposition.
- ✓ The students are able to understand the architecture of database management system and also understand the various different architecture such as server system architecture, parallel systems and distributed database systems.

UNIT- I : DATABASE ARCHITECTURE AND ER DIAGRAM

12

Hours

Database system applications - Purpose of database systems - View of data- Database languages - Database architecture - Database users and administrators - History of database systems-Entity relationship modeling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, sub classes; super classes, inheritance, specialization and generalization

UNIT- II: RELATIONAL DATA MODEL

12 Hours

Relational model concepts, Relational constraints, Relational Languages : Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - SQL: Basic Structure-Set Operations- Aggregate Functions-Null Value- Nested Sub Queries-Views Complex Queries Modification Of Database-Joined Relations-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions- -Integrity and Security.

UNIT – III: DATA NORMALIZATION 12

Hours

Pitfalls in relational database design – Decomposition – Functional dependencies – Normalization – First normal form – Second normal form – Third normal form – Boyce-codd normal form – Fourth normal form – Fifth normal form

UNIT- IV: STORAGE AND FILE ORGANIZATION 12

Hours

Disks - RAID -Tertiary storage - Storage Access -File Organization – organization of files - Data Dictionary storage

UNIT- V: QUERY PROCESSING AND TRANSACTION MANAGEMENT 12

Hours

Query Processing - Transaction Concept - Concurrency Control –Locks based protocol Deadlock Handling -Recovery Systems

TEXT BOOK:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010.
2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition, 2002

REFERENCES

1. Bipin Desai, An Introduction to database systems, Galgotia Publications, 2010.
2. RamezElamassri, Shankant B-Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2015

E - REFERENCES

1. NPTEL, Introduction to database design, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. NPTEL, Indexing and Searching Techniques in Databases Dr. Arnab Bhattacharya, IIT Kanpur

Course Outcomes:

- Describe the database architecture and its applications Sketch the ER diagram for real world applications Uses various ER diagram for a similar concepts from various sources.
- Discuss about the relational algebra and calculus Construct various queries in SQL and PL/SQL Compiles various queries in SQL, Relational Calculus and Algebra.
- Describe the various normalization forms Apply the normalization concepts for a table of data Practices a table and implement the normalization concepts.
- Explain the storage and accessing of data.
- Illustrate the query processing in database management. Define the concurrency control and deadlock concept

CORE PAPER - 7

ENTERPRISE RESOURCE PLANNING

Objective:

- ✓ With the basic concepts of ERP systems the students are able to understand the business process, business function and differences between business process and business functions. They also came to know the key differences between raw data and raw materials.
- ✓ The students are able to understand the exchange of information between AF, SCM, HR and MS. And they also learn about CRM, budget and preparing balance sheets.
- ✓ The students are able to understand the key factors related to marketing and sales in the companies, and the differences among (Material Requirement Planning) MRP, MRP II, and ERP systems.
- ✓ They also understand the inter relationship between the other functional areas like SCM, AF, HR and customer. Concepts and techniques.
- ✓ The students are able to understand the power of human resources such as managing man power, job skills preparing paybills and taking legal actions to the compliances and hiring needs.

UNIT - I : INTRODUCTION

8

Hours

ERP: An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM

UNIT- II: ERP IMPLEMENTATION

8

Hours

ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contract with Vendors.

UNIT- III: THE BUSINESS MODULES

8

Hours

Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

UNIT- IV: ERP PACKAGES 8

Hours

ERP Market Place, SAP AG, PeopleSoft, Baan, JD Edwards, Oracle, QAD, SSA

UNIT- V: ERP –PRESENT AND FUTURE 8

Hours

Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions.

TEXT BOOK:

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000

REFERENCES

1. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, ThompsonCourseTechnology, USA, 2001.
2. Vinod Kumar Garg and Venkatakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI, New Delhi, 2003

E- REFERENCES

1. ERP, Prof. P. K. Biswas, Dept. of Electronics and Electrical Communication Engg., IIT, Kharagpur

Course Outcomes:

- Understanding the functionalities of Enterprise resource planning
- Understanding Characterize the ERP implementation procedures
- Understanding the elements of ERP
- Understanding the available ERP packages
- Understanding the models of ERP with other related technologies

CORE PAPER - 8

WIRELESS DATA COMMUNICATION

Objectives:

- ✓ This course introduces the concepts and theories of networking
- ✓ To apply them to various situations, classifying networks, analyzing performance and implementing new technologies.
- ✓ To implement the various new wireless technologies.
- ✓ To implement the various TCP/IP protocols.
- ✓ To implement the various security threads.

UNIT-1 BASIC CONCEPTS OF OSI LAYERS

9

Hours

Data Communication – Networks – Protocol and Standards – Line Configuration – Topology – Transmission Modes – Categories of Networks – Internetworks- OSI Models – Functions of OSI Layers.

UNIT-II SIGNALS AND TRANSMISSION MEDIA

9

Hours

Analog and digital – Periodic and Non Periodic signals – Analog Signals – Time And Frequency Domain - Composite Signals- Digital signals – Guided Media – UnGuided Media – Transmission Impairment – Performance.

UNIT-III ERROR DETECTION, CORRECTION AND DATA LINK CONTROL

9

Hours

Type of errors –Detection-Vertical Redundancy Check (VRC) -Longitudinal Redundancy Check (LRC) Cyclic Redundancy Check (CRC) – check sum – Error Corrections – Flow Control – Error Control.)**SWITCHING & NETWORK DEVICES:** Circuit Switching-Packet Switching-Message Switching Repeaters – Bridges – Routers – Gateways-other Devices - Routing Algorithms-Distance Vectors Routing- Link State Routing.

UNIT- IV: WIRELESS NETWORKS

9 Hours

Wireless LAN: Advantages and Disadvantages-Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks – Bluetooth- Wireless ATM:

Working Group Services- Reference Model – Functions – Radio Access Layer – Handover- Handover reference model- Requirements and Types.

UNIT-V TCP/IP PROTOCOL SUITE: PART I, PROTOCOLS & NETWORK SECURITY

9 Hours

Overview Of TCP/IP – Network Layer – Addressing – Subnetting – Other Protocols In The Network Layer – Transport Layer – Client/Server Model – Bootstrap Protocol and DHCP - Domain Name System (DNS) – Tel Net –File Transmission Protocol (FTP) – Simple Mail Transfer Protocol (SMTP) – SNMP Protocol – Hyper Text Transmission Protocol (HTTP) – World Wide Web (WWW) –Four Aspects of Security – Privacy – Digital Signature – PGP – Access Authorization.

Text Book:

1. Data Communication and Networking 2nd Edition Behrouz A. Forouzan, McGraw Hill Education 2014.
2. Stojmenovic and Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley, 2002, ISBN 0471419028.

Reference Books:

1. Data and Communication Network, William Stallings PHI 2014.
2. Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, 5th Edition, Prentice Hall. 2010

E REFERENCES

1. <http://nptel.ac.in/video.php?subjectId=117102062>

Course Outcomes:

- To understand the concepts of basic OSI layers.
- To understand the concepts of signals and transmission media.
- To understand the basic concepts of error detection and DLC
- To understand the Characterize of wireless transmission technologies
- To understand the concepts of Security.

Core Practical (Practical-4)

RDBMS LAB

Objectives:

- ✓ To understand the concepts of DDL/DML/DCL/TCL commands.
- ✓ To understand the concepts of Join queries.
- ✓ To understand the concepts of exception handling.
- ✓ To understand the concepts of cursors.
- ✓ To understand the concepts of packages.

LAB EXERCISES:

1. Execute a single line query and group functions.
2. Execute DDL Commands.
3. Execute DML Commands
4. Execute DCL and TCL Commands.
5. Implement the Nested Queries.
6. Implement Join operations in SQL
7. Create views for a particular table
8. Implement Locks for a particular table.
9. Write PL/SQL procedure for an application using exception handling.
10. Write PL/SQL procedure for an application using cursors.
11. Write a PL/SQL procedure for an application using functions
12. Write a PL/SQL procedure for an application using package

REFERENCE BOOK:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010.
2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition, 2002

Course Outcomes:

- Design and Implement a database schema for a given problem domain.

B.C.A. Computer Applications (CBCS)

- Populate and Query a database using SQL, DDL/DML Commands.
- Build well formed in String Date/Aggregate Functions.
- Design and Implement a database query using Joins, Sub-Queries and Set Operations.
- Program in SQL including Objects (Functions, Procedures, Triggers)

ALLIED - 2

PAPER - 4

FINANCIAL ACCOUNTING - II

COURSE OBJECTIVE:

- To develop the skills for recording the various kinds of Business Transactions.

COURSE OUTCOME

On successful completion of this course, the students will be able

**CO
NUMBER**

CO STATEMENT

- | | |
|------------|--|
| CO1 | To Understand the concept of Branch Accounting and enable the students to prepare Accounts for various types of Branches. |
| CO2 | To enhance the procedure for preparing Departmental Accounts. |
| CO3 | To Develop the skill of the students in preparing Hire Purchase Accounting, both in the books of Hire Purchaser and Hire Vendor. |
| CO4 | To Understand the Accounting procedure for Partnership in cases like Admission, Retirement, Death. |
| CO5 | To Understand the Accounting procedure for Dissolution and Insolvency of a Partner. |

Unit – I

BRANCH ACCOUNTS

Branch Accounts – Objectives – Types of Branches – Debtors System (at cost price and Invoice Price) – Independent Branch.

Unit – II

DEPARTMENTAL ACCOUNTS

Departmental Accounts – Objectives – Distinction between Departments and Branches – Allocation of common expenses – Expenses which cannot be allocated – Inter Department transfer at cost price and selling price.

Unit – III

HIRE PURCHASE SYSTEM

Hire Purchase system – Meaning – Journal Entries and Ledger Accounts in the books of Hire Purchaser and Hire Vendor – Default and Repossession -Complete Repossession only.

Unit – IV

PARTNERSHIP ACCOUNTS – I

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Partnership Accounts – Admission of Partner– Retirement of Partner – Death of a Partner
(Simple Problems)

Unit – V

PARTNERSHIP ACCOUNTS – II

Dissolution of Partnership Firm - Insolvency of a Partner -Insolvency of all Partners (Garner vs. Murray). (Simple Problems)

DISTRIBUTION OF MARKS: THEORY 20% AND PROBLEMS 80%

TEXT BOOK

S.No	Author	Title	Publisher	Year of Publication
1	T.S.Reddy and Murthy	Financial Accounting	Margham Publications	2018

REFERENCE BOOKS

S.No	Author	Title	Publisher	Year of Publication
1	M.C. Shukla and T.S. Grewal&co	Advanced Accounts	S. Chand & Co	2016
2	R.L. Gupta	Financial Accounting	Sultan chand	2014
3	S.P. Jain &K.L Narang,	Financial Accounting	Kalyani Publication	2017
4	R.S.N Pillai&V.Bagavathi	Fundamental of Advanced Accounting, Volume – I	S. Chand & Co	2013

SKILL BASED SUBJECT II

PAPER-2

INTERNET OF THINGS

Objectives

- ✓ To learn about the basics of IOT protocols
- ✓ To understand the fundamentals of Internet of Things
- ✓ To build a small low cost embedded system using Raspberry Pi.
- ✓ To apply the concept of Internet of Things in the real world scenario.
- ✓ To understand the real world application concepts.

UNIT I: INTRODUCTION TO IoT

9 Hours

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

UNIT II:IoT ARCHITECTURE

9

Hours

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNITIII: IoT PROTOCOLS

9

Hours

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP– Security.

UNIT IV: BUILDING IoT WITH RASPBERRY PI & ARDUINO

9

Hours

Building IOT with RASPBERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board

- Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

UNIT V: CASE STUDIES AND REAL-WORLD APPLICATIONS

9

Hours

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

TEXT /REFERENCES BOOKS:

1. ArshdeepBahga, Vijay Madiseti, —Internet of Things – A hands-on approach||, Universities Press, 2015
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things||, Springer, 2011.
3. Honbo Zhou, —The Internet of Things in the Cloud: A Middleware Perspective||, CRC Press, 2012.
4. Jan Ho' ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols||, Wiley, 2012

Course Outcomes:

- Analyze various protocols for IoT
- Develop web services to access/control IoT devices.
- Design a portable IoT using Raspberry Pi
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

NON-MAJOR ELECTIVE

PAPER-2

INTERNET TECHNOLOGY

OBJECTIVS

The subject aims to build the concepts regarding:

- Fundamentals of Internet, Connectivity and its Resource Requirements.
- To understand the Internet Technology and its applications
- To Understand WWW and Web Browsers.
- Mailing system and applications of Internet.
- To Understand relay chat

UNIT-I

Introduction to internet: What is Internet? Evolution and History of Internet- Growth of Internet-Owners of Internet- Internet Services- How does the Internet Works?-Anatomy of Internet-Internet Addressing-Internet vs Intranet-Impact of Internet- Governance of Internet.

UNIT-II

Internet

Technology and Protocol: ISO-OSI Reference Model-**Internet Connectivity:** Getting Connected- Different Types of Connections- Levels of Internet Connectivity- Internet Service Provider. **Internet Tools and Multimedia:** Current Trends on Internet- Multimedia and Animation.

UNIT-III

WWW and Web Browser: WWW-Evolution of Web-Basic Elements of WWW-Web Browsers- Search Engines- Search Criteria. **Web Publishing:** Web Publishing- Web Page Design.

UNIT-IV

Email: E-Mail Basics- E-Mail System-E-Mail Protocol-E-Mail Addresses-Structure of an E-Mail Message-E-Mail Clients&Servers-MailingList-E-MailSecurity.

UNIT-V

Usenet and Internet Relay Chat: What is Usenet?-Newsgroup Hierarchies-What is a Newsreader?- How do you Read Newsgroups?- Who Administers Usenet?- Common News reading Tasks- How to Read Articles from Network News?- Relationship between Netnews and E-Mail-What is IRC?-Channels-Nicknames- Microsoft NetMeeting. **Internet and Web Security:** Overview of Internet Security- Aspects and Need of Security-E-Mail Threats and Secure E-mail-Web Security and Privacy Concepts-Firewall.

TEXTBOOK:

1. *ISRD Group*. 2012. **Internet Technology and Web Design**. [Fourth reprint]. Tata

McGraw-Hill Education Private Limited., New Delhi.

REFERENCE BOOKS:

1. *Deitel, H.M. Dietel, P.J. and Goldberg A.B. 2008. Internet & Worldwide Web- How to Program.* [Third Edition]. PHL, New Delhi.
2. *Comdex. 2000. Teach yourself computers and the internet visually.* [First Edition]. IDG Book India (p) Ltd.
3. *Ramachandran, T.M. Nambissan. 2003. An Overview of internet and web development.* [First Edition]. T M-Dhruv Publications.

COURSE OUT COMES :

- Students understand the Fundamentals of Internet, Connectivity and its Resource Requirements.
- Students understand the Internet Technology and its applications
- Students Understand the basis of WWW and Web Browsers.
- Students learn how to Mailing system and applications of Internet.
- Students Understand relay chat that is how to read e- contents.

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17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	3	4	Programming in JAVA	25	75	100
19.	III	Core Practical	Practical-3	3	3	Programming in JAVA Lab	25	75	100
20.	III	ALLIED-2	Paper-3	7	3	Financial Accounting-I	25	75	100
21.	IV	Skill based Subject I	Paper-1	3	2	Web Technology	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
		Sem. Total		30	22		175	525	700
SEMESTER IV							CIA	Uni. Exam	Total
23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
24.	II	English	Paper-4	6	4	English	25	75	100
25.	III	Core Theory	Paper-6	3	4	Relational Database Management Systems	25	75	100
26.	III	Core Practical	Practical-4	3	3	RDBMS Lab	25	75	100
27.	III	ALLIED-2	Paper-4	7	5	Financial Accounting-II	25	75	100
28.	IV	NMSDC II : Digital Skills for Employability	Paper-2	2	2	Office Fundamentals	25	75	100
29.	IV	Non-Major Elective	Paper-2	2	2	Internet Technology	25	75	100
		Sem. Total		30	24		175	525	700
SEMESTER V							CIA	Uni. Exam	Total
30.	III	Core Theory	Paper-9	6	4	Mobile Application Development	25	75	100
31.	III	Core Theory	Paper-10	6	4	Operating System	25	75	100
32.	III	Core Theory	Paper –11	4	2	Design and Analysis of Algorithms	25	75	100
33.	III	Core Practical	Practical-5	4	3	Mobile Applications Development-Lab	25	75	100

B.C.A. Computer Applications (CBCS)

34.	III	Core Practical	Practical-6	4	3	Operating System-Lab	25	75	100
35.	III	Internal Elective I	Paper-1	3	3	(Choose any one) A. Data Mining B. Information Security C. Software Testing	25	75	100
36.	IV	Skill Based Subject III	Paper- 2	3	2	Software Engineering	25	75	100
		Sem. Total		30	21		175	525	700

SEMESTER VI							CIA	Uni. Exam	Total
37.	III	Core Theory	Paper-12	5	4	Open Source Software	25	75	100
38.	III	Core Theory	Paper-13	4	4	Python programming	25	75	100
39.	III	Core Practical	Practical-7	4	2	Python programming Lab	25	75	100
40.	III	Core Practical	Practical-8	4	2	Open Source Programming - Lab	25	75	100
41.	III	Core Project		5	5	Group/ Individual Project Work	25	75	100
42.	III	Internal Elective II	Paper-2	3	3	(Choose any one) 1. Big Data Analytics 2. Cryptography 3. Digital Image Processing	25	75	100
43.	III	Internal Elective III	Paper-3	3	3	(Choose any one) 1. Artificial Intelligence 2. System Software 3. Mobile Computing	25	75	100
44.	III	NMSDC III : Emerging Technology for Employability II	Paper-3	2	2	(Choose any one) • PBL Android App Development • Machine Learning	25	75	100
45.	V	Extension Activities		0	1		100	0	100
		Sem. Total		30	26		300	600	900
					142				4500

B.C.A. Computer Applications (CBCS)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	M	M	M	S	S	S	S	S
CO3	S	M	M	S	S	M	S	S	S	S
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	M	M	S	M	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V

Paper type: Core Theory Paper 9

Paper code:

Name of the Paper: Mobile Application Development

Credit: 4

**Total Hours per Week: 6
Hours:**

Lecture Hours: 78 .

Tutorial Hours:

Practical

.....
Course Objectives

1. To understand the basics concept of mobile applications
2. To understand the structure of mobile applications
3. To understand simple mobile applications
4. To understand the mobile application services
5. To understand the real life mobile application development.

Course Outcomes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand the basics of smart phones and android platforms.
2. After studied unit-2, the student will be able to understand the basic concepts of user interface related to app development.
3. After studied unit-3, the student will be able to understand the important of data persistence in mobile environment.

B.C.A. Computer Applications (CBCS)

4. After studied unit-4, the student will be able to understand the various services and network facilities provided by android platform.

5. After studied unit-5, the student will be able to understand the various apps deployed and developed on by mobile platform.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION

Teaching

Hours: 16 Hrs.

Introduction to Mobile Application Development – Various platforms– Smartphones– Android platform: features – Architecture – Versions–ART(Android Runtime)–ADB(Android Debug Bridge) –Development environment/IDE: Android studio and its working environment – Emulator setup –Application framework basics–XML representation and Android manifest file –Creating a simple application.

Unit-2: GUI

Teaching Hours: 15 Hrs.

GUI for Android: activities lifecycle–Android v7 support library –Intent: Intent object – Intent filters– Adding categories – Linking activities – User Interface design components– Basic Views – Picker Views – List View –Specialized Fragment– Gallery and Image View – Image Switcher – Grid View, Options Menu – Context Menu – Clock View –Web view– Recycler View.

Unit-3:DATA PERSISTENCE SCHEMES

Teaching Hours: 12 Hrs.

Different Data Persistence schemes: Shared preferences–File Handling–Managing data using SQLite database –Content providers: user content provider– Android in build content providers.

Unit-4: SERVICES

Teaching Hours:

19 Hrs.

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Services: Introduction to services – Local service – Remote service – Binding the service –Communication between service and activity –Intent Service – Multi-Threading: Handlers – Async Task– Android network programming: Http Url Connection– Connecting to REST-based –SOAP based Web services –Broad cast receivers: Local Broadcast Manager– Dynamic broadcast receiver – System Broadcast –Telephony Manager: Sending SMS and making calls.

Unit-5: LOCATION BASED SERVICES

Teaching Hours: 16 Hrs.

Location based services: Google maps V2 services using Google API–Animations and Graphics: Property Animation –View Animations –Drawable Animations –Media and Camera API: Working with video and audio inputs – camera API –Sensor programming: Motion sensors–Position sensors– Environmental sensors –Publishing Android Apps: Guide lines– policies and process of uploading Apps to Google play.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- cc. Book review and research paper review, syllabus and curriculum review.
- dd. Data collection and paper writing practices: books level, field study level. Using the course study for
- ee. society and nature development – exercise
- ff. Workshops, preparing technical term dictionaries from text books and reference books.
- gg. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- hh. Forming digital library: collecting text and reference books, course material.
- ii. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- jj. Extracurricular and cultural activities may be framed through the syllabus content.
- kk. Grouping students for self-discussion, self-learning process.
- ll. Following institution and intellectual and writing reports in the course field.
- mm. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- nn. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- oo. Extracurricular activities may be framed through their syllabus content.
- pp. Bring the industries to the campus. Bring the students to the industry.
- qq. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

B.C.A. Computer Applications (CBCS)

Textbooks:

1. “Head First: Android Development”, Dawn Griffiths, David Griffiths, OReilly, 1st Edition, 2015.
2. Barry Burd, “Android Application Development – All-in-one for Dummies”, 2nd Edition, Wiley India, 2016.

Reference Book:

1. “Professional Android™ Sensor Programming”, Greg Milette, Adam Stroud, John Wiley and Sons, Inc 2012.
2. “Android 6 for Programmers, App Driven approach”, Paul Deital, Harvey Deital, Alexander Wald, Prentice Hall, 2015.

Course Material: website links, e-Books and e-journals

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	S	S	L	M
CO2	S	S	M	M	S	M	S	S	L	M
CO3	S	S	S	S	M	S	S	M	M	S
CO4	S	S	S	L	S	S	S	M	S	S
CO5	M	S	M	M	S	S	S	M	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low (may be avoided)

B.C.A. Computer Applications (CBCS)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V

Paper type: Core Theory Paper - 10

Paper code:

Name of the Paper: Operating System

Credit: 4

Total Hours per Week: 6
Hours:

Lecture Hours: 78 . Tutorial Hours:

Practical

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Course Objectives

1. To understand the structure and functions of operating systems.
2. To understand the principles of scheduler, scheduler algorithms and Deadlock.
3. To learn various memory management schemes.
4. To understand the memory management services
5. To study I/O management, File system and Mass Storage Structure.

Course Out Comes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand the basics of smart phones and android platforms.
2. After studied unit-2, the student will be able to understand the basic concepts of user interface related to app development.
3. After studied unit-3, the student will be able to understand the important of data persistence in mobile environment.
4. After studied unit-4, the student will be able to understand the various services and network facilities provided by android platform.
5. After studied unit-5, the student will be able to understand the various apps deployed and developed on by mobile platform.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION

Teaching

Hours: 16 Hrs.

Basic Concepts of Operating System – Services of Operating System – Operating System Types – Computer System Operation – I/O Structure – Storage Structure – Memory Hierarchy – System Components – System Calls – System Programs – System Design and Implementation – Introduction to Process – Process State – Process Control Block – Process Scheduling – Operations on Process – Interprocess Communication – Communication in Client/Server Systems – Threads .

Unit-2: CPU SCHEDULER

Teaching

Hours: 15 Hrs.

Types of CPU Scheduler – Scheduling Criteria – Scheduling Algorithms – Semaphores – Classic Problems of Synchronization – Basic Concept of Deadlocks – Deadlock Characterization – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery of Deadlock.

Unit-3: MEMORY MANAGEMENT

Teaching

Hours: 12 Hrs.

Memory Management – Basics Concept of Memory – Address Binding – Logical and Physical Address Space – Memory Partitioning – Memory Allocation – Paging – Segmentation – Segmentation and Paging – Protection – Fragmentation – Compaction – Demand Paging – Page Replacement Algorithm – Classification of Page Replacement Algorithm .

Unit-4: FILE SYSTEM

Teaching

Hours: 19 Hrs.

File System Storage – File Concept– File Access Methods – Directory Structure – File Sharing – File Protection – File System Implementation – File System Structure – Allocation Methods – Free Space Management – Mass Storage Structure – Disk structure – Disk Scheduling and Management – RAID Levels.

Unit-5: UNIX SYSTEM

Teaching

Hours: 16 Hrs.

UNIX System – A Case Study – LINUX System – Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security .

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.

- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Text book:

- 1. “Operating System Concepts” –Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003.
- 2. “Operating System” – Willam Stalling, Fourth Edition, Pearson Education, 2003.

Reference Book:

- 1. “Operating systems – Internals and Design Principles”, W. Stallings, 6th Edition, Pearson.
- 2. “Modern Operating Systems”, Andrew S.Tanenbaum, Second Edition Addison Wesley, 2001.
- 3. “Fundamentals of Operating System”, Prof. R. Sridhar, Dynaram Publication, Bangalore Company.

Course Material: website links, e-Books and e-journals

B.C.A. Computer Applications (CBCS)

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	S	S	L	M
CO2	S	S	M	M	S	M	S	S	M	L
CO3	S	S	S	S	M	S	S	M	M	S
CO4	S	S	S	L	S	S	S	S	S	S
CO5	M	S	M	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V

Paper type: Core Theory Paper - 11

Paper code:

Name of the Paper: Design and Analysis of Algorithms

Credit: 2

Total Hours per Week: 4
Hours:

Lecture Hours: 52.

Tutorial Hours:

Practical

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Course Objectives

1. To learn about the basics various algorithms.
2. To understand the fundamentals of divide and conquer techniques.
3. To understand the basic algorithms that using greedy methods.
4. To apply the concept of traversal and searching algorithms.
5. To understand the concept of backtracking methods.

Course Outcomes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to Understanding various algorithm design techniques.
2. After studied unit-2, the student will be able to understand the basis of efficient algorithms for all kinds of problems.
3. After studied unit-3, the student will be able to use simple approach which tries to find the best solution at every step.
4. After studied unit-4, the student will be able to providing a general insight into the dynamic programming approach.
5. After studied unit-5, the student will be able to understand the algorithm design paradigm for discrete and combinatorial optimization problems.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION TO DATA STRUCTURE

Teaching Hours: 10 Hrs,

Elementary Data Structures: Stack – Queues – Trees – Priority Queue – Graphs –
What is an Algorithm? – Algorithm Specification – Performance Analysis: Space Complexity
– Time Complexity – Asymptotic Notation – Randomized Algorithms.

Unit-2: SEARCH AND SORTING **Hours: 11 Hrs.**

Teaching

General Method – Binary Search – Recurrence Equation for Divide and Conquer –
Finding the Maximum and Minimum— Merge Sort – Quick Sort – Performance
Measurement – Randomized Sorting Algorithm – Selection Sort – A Worst Case Optimal
Algorithm – Implementation of Select2 – Stassen’s Matrix Multiplications.

Unit-3: TREES **Hours: 11 Hrs.**

Teaching

The General Method – Container Loading – Knapsack Problem – Tree Vertex
Splitting – Job Sequencing with Deadlines – Minimum Cost Spanning Trees – Prim’s
Algorithm – Kruskal’s Algorithm – An optimal Randomized Algorithm – Optimal Storage on
Tapes – Optimal Merge Pattern – Single Source Shortest Paths.

Unit-4: GRAPHS **10 Hrs.**

Teaching Hours:

The General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary
Search Trees – String Editing – 0/1 Knapsack – Reliability Design – The Traveling
Salesperson Problem. Techniques for Binary Trees – Techniques for Graphs – BFS – DFS.

Unit-5: PROBLEM SOLVING METHODS

Teaching Hours:

10 Hrs.

The General Method – The 8– Queens Problem – Sum of Subsets– Graph Coloring –
Hamiltonian Cycles – Branch and Bound: General Method – LC Branch and Bound – FIFO
Branch and Bound.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

B.C.A. Computer Applications (CBCS)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Fundamentals of Computer Algorithms”, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Galgotia Publications, Second Edition 2015.
2. “Introduction to Algorithms”, Cormen T.H., Leiserson C.E. and Rivest R.L., PHI Publications, Third Edition, 1998.

Reference Book:

1. “Introduction to the Design and Analysis of Algorithms”, Anany Levitin, Pearson Education, 2nd Edition.
2. ”Introduction to Algorithms” Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Prentice Hall of India, New Delhi, Second Edition, 2007.
3. “Computer Algorithms – Introduction to Design & Analysis” Sara Baase and Allen Van Gelder, Pearson Education New Delhi, Third Edition, 2000.

Course Material: website links, e-Books and e-journals Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	L	M

B.C.A. Computer Applications (CBCS)

CO2	S	S	M	M	S	M	S	S	M	L
CO3	M	S	S	S	M	S	M	S	M	S
CO4	S	S	S	L	M	S	S	S	S	S
CO5	S	S	M	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V

Paper type: Core Practical - Practical - 5

Paper code:

Name of the Paper: Mobile Application Development Lab

Credit: 3

**Total Hours per Week: 4
Hours: 52**

Lecture Hours:

Tutorial Hours:

Practical

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Course Objectives

1. To learn about the basics of developing android applications.
2. To understand the usage of the controls in android application.
3. To understand the advanced controls that are used in android applications.
4. To understand how the alerts are worked in application.
5. To understand the concept of connecting a database into the application.

Course Outcomes:

- 1, Able to understand about the basic developments of android applications
2. Able to understand the usage of the controls in android application.
3. Able to understand the advanced controls that are used in android applications.
4. Able to understand how the alerts are worked in application.
5. Able Tt understand the concept of connecting a database into the application.

List of Practical Exercises:

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Intent and Activity.
3. Develop an application that uses Layout Managers and event listeners.
4. Develop an application that draws basic graphical primitives on the screen.

5. Develop an application that makes use of RSS Feed.
6. Develop an application that implements Multithreading.
7. Develop an application that create alarm clock.
8. Develop an application Using Widgets.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Develop an application that makes use of database.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Course Material: website links, e-Books and e-journals

B.C.A. Computer Applications (CBCS)

1. www.tutorialpoint.com
2. www.developer.android.com
3. www.toptal.com

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	L	M
CO2	S	S	M	M	S	M	S	S	M	L
CO3	M	S	S	S	S	S	M	S	M	S
CO4	S	S	M	L	S	S	S	S	S	M
CO5	S	S	M	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V **Paper type: Core Practical - Practical - 6**

Paper code: **Name of the Paper: Operating System Lab** **Credit: 3**

Total Hours per Week: 4 **Lecture Hours:** **Tutorial Hours:** **Practical Hours: 52**

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Course Objectives

1. To learn about the basics of UNIX commands and shell programming.
2. To understand the programming knowledge of scheduling algorithms.
3. To understand the working of semaphores in operating system.
4. To understand how to code various algorithm used in operating system.
5. To understand how to code and working procedure of file management concepts in operating system.

Course Outcomes:

1. Able to understand the basics of UNIX commands and shell programming.
2. Able to understand the programming knowledge of scheduling algorithms.
3. Able to understand the working of semaphores in operating system.
4. Able to understand how to code various algorithm used in operating system.
5. Able to understand how to code and working procedure of file management concepts in operating system.

List of Practical Exercises:

1. Basics of UNIX commands.
2. Shell Programming.
3. Implement the following CPU scheduling algorithms
 - a) Round Robin
 - b) SJF
 - c) FCFS
 - d) Priority

4. Implement all file allocation strategies
 - a) Sequential b) Indexed c) Linked
5. Implement Semaphores
6. Implement all File Organization Techniques
 - a) Single level directory b) Two level c) Hierarchical d) DAG
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement all page replacement algorithms
 - a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study.

B.C.A. Computer Applications (CBCS)

Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.

- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Course Material: website links, e-Books and e-journals

1. www.tutorialpoint.com
2. www.javapoint.com
3. www.w3school.com

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	L	M
CO2	S	S	M	M	S	M	S	S	M	L
CO3	M	S	S	S	S	S	M	S	M	S
CO4	S	S	M	L	S	S	S	S	S	M
CO5	S	S	M	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V **Paper type: Internal Elective 1** **Paper-1**

Paper code: **Name of the Paper: Data Mining**
Credit: 3

Total Hours per Week: 3 **Lecture Hours: 39.** **Tutorial Hours:** **Practical Hours:**

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Course Objectives

1. To learn about the basics of data and data mining concepts.
2. To understand the fundamentals of analytical and data warehousing concepts
3. To understand the techniques that are followed in data mining.
4. To understand the basics of outlier detection and clustering concepts
5. To understand the tools that are used in data mining.

Course Out Comes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand about the basics of data mining and data.
2. After studied unit-2, the student will be able to understand about the methods of Data Warehousing
3. After studied unit-3, the student will be able to understand about the techniques of Data Mining
4. After studied unit-4, the student will be able to understand about the importance of Cluster and outlier detection
5. After studied unit-5, the student will be able to improve the student’s knowledge with recent trends and tools

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes

B.C.A. Computer Applications (CBCS)

2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	No	No
5	Yes	Yes	Yes	No	Yes	Yes

Unit-1: INTRODUCTION

Teaching

Hours: 8 Hrs.

What is Data Mining– Kinds of Data – Kinds of patterns – Technologies used for Data Mining– Major Issues in Data Mining– Data –Data Objects and Attribute types– Data Visualization– Measuring Data Similarity and Dissimilarity–Data Preprocessing– overview– Data Cleaning– Data Integration– Data Reduction– Data Transformation and Data Discretization?

Unit-2: CONCEPTS OF DATA WARHOUSE

Teaching Hours: 7 Hrs.

Data Warehouse– Basic concepts–Data Warehouse Modelling: Data Cube and OLAP– Data Warehouse Design and Usage– Data Warehouse Implementation– Data Generalization by Attribute–Oriented Induction– Data Cube Technology– Data Cube Computation Methods– Exploring Cube Technology–Multidimensional Data Analysis in cube space.

Unit-3: CONCEPTS OF PATTERN

Teaching Hours: 9 Hrs.

Patterns– Basic concepts– Pattern Evaluation Methods–Pattern Mining: Pattern Mining in Multilevel– Multidimensional space–Constraint–Based Frequent Pattern Mining– Mining High Dimensional Data and Colossal patterns– Mining compressed or Approximate patterns– Pattern Exploration and Application. Classification–Decision tree Induction– Bayes Classification methods– Rule based Classification– Model Evaluation and selection– Techniques to Improve Classification Accuracy– Other Classification methods.

Unit-4: CLUSTERS

Teaching

Hours: 8 Hrs.

Cluster Analysis– Partitioning Methods – Hierarchical Methods – Density – Based Methods– Grid – Based Methods – Evaluation of Clustering.– Clustering High – Dimensional Data–Clustering Graph and Network Data – Clustering with Constraints – Web Mining – Spatial Mining. Outlier Detection – Outliers and Outliers Analysis – Outlier Detection Methods–Outlier Approaches – Statistical – Proximity–Based – Clustering–Based– Classification Based – High–Dimensional Data.

Unit-5: DATA MININ METHODOLOGIES

Teaching Hours: 7 Hrs.

Other Methodologies of Data Mining – Data Mining Applications – Data Mining Trends – Recent Data Mining Tools – Rapid miner – Orange – Weka–Knlime–Sisense –SsdT (SQL Server Data Tools) – Oracle – Rattle – Data melt – Apache Mahout.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Data Warehousing Fundamentals”, PaulrajPonnaiah, Wiley Publishers, 2001.
2. “Data Mining: Concepts and Techniques”, Jiawei Han, MichelineKamber, Morgan Kaufman Publishers, 2006.
3. “Introduction to Data mining with case studies”, G.K. Gupta, PHI Private limited, New Delhi, 2008. 2nd Edition, PHI, 2011

Reference Book:

1. “Advances in Knowledge Discover and Data Mining”, Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth RamasamyUthurusamy, the M.I.T. Press, 2007.
2. “The Data Warehouse Toolkit”, Ralph Kimball, Margy Ross, John Wiley and Sons Inc., 2002
3. “Building Data Mining Applications for CRM”, Alex Berson, Stephen Smith, Kurt Thearling, Tata McGraw Hill, 2000.

B.C.A. Computer Applications (CBCS)

4. “Data Mining: Introductory and Advanced Topics”, Margaret Dunham, Prentice Hall, 2002.
5. “Discovering Knowledge in Data: An Introduction to Data Mining”, Daniel T. Larose John Wiley & Sons, Hoboken, New Jersey, 2004

Course Material: website links, e-Books and e-journals

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	L	M
CO2	S	S	M	M	S	M	S	S	M	L
CO3	M	S	S	S	S	S	M	S	M	S
CO4	S	S	S	L	S	S	S	S	S	S
CO5	S	S	M	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V **Paper type: Internal Elective 1 Paper - 1**

Paper code: **Name of the Paper: Information Security** **Credit: 3**

Total Hours per Week: 3 **Lecture Hours: 39 .** **Tutorial Hours:** **Practical Hours:**

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Course Objectives

1. To learn about the basics of information security.
2. To understand the fundamentals of information security.
3. To understand the risk management techniques.
4. To understand the current techniques that are used in information security.
5. To understand the concept of networking concept and techniques.

Course Out Comes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand the basic concepts of Information Security
2. After studied unit-2, the student will be able to understand the legal, ethical and professional issues in Information Security
3. After studied unit-3, the student will be able to know about risk management
4. After studied unit-4, the student will be able to understand the technological aspects of Information Security
5. After studied unit-5, the student will be able to understand the concepts of Cryptography and Hacking methods

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	No	No	Yes
2	Yes	No	Yes	Yes	No	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	No	Yes

Unit-1: INFORMATION SECURITY BASICS

Teaching

Hours: 6 Hrs.

Introduction –History – What is Information Security? – Critical Characteristics of Information – NSTISSC Security Model – Components of an Information System – Securing the Components – Balancing Security and Access – The SDLC – The Security SDLC.

Unit-2: SECURITY INVESTIGATION

Teaching

Hours: 7 Hrs.

Security – Business Needs – Threats – Attacks – Legal – Ethical and Professional Issues – Relevant U.S. Laws – International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations

Unit-3: SECURITY ANALYSIS

Teaching

Hours: 9 Hrs.

Risk Management – Introduction – An Overview of Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a Risk Control Strategy –Quantitative versus Qualitative Risk Control Practices – Risk Management Discussion Points

Unit-4: SECURITY MODELS

Teaching

Hours: 10 Hrs.

Logical Design – Blueprint for Security – Information Security Policy – Standards and Practices– ISO 17799/BS 7799– NIST Models– VISA International Security Model – Design of Security Architecture – Planning for Continuity – Security Physical Design –Firewalls – Security Technology – IDS – IPS – Honey Pots – Honey Nets – Padded cell Systems Scanning and Analysis Tools – Access Control Devices.

Unit-5: CRYPTOGRAPHY AND ETHICAL HACKING

Teaching Hours: 7 Hrs.

Cipher methods – Cryptographic Algorithms and Tools – Attacks on Cryptosystems– Hacking – Effects of Hacking – Hacker – Types of Hacker– Ethical Hacker –Hacktivism– Networking & Computer Attacks – Malicious Software (Malware) – Protection Against Malware – Intruder Attacks on Networks and Computers – Wireless Hacking– Windows Hacking – Linux Hacking Session.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- o. Book review and research paper review, syllabus and curriculum review.
- p. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- q. Workshops, preparing technical term dictionaries from text books and reference books.
- r. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- s. Forming digital library: collecting text and reference books, course material.
- t. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- u. Extracurricular and cultural activities may be framed through the syllabus content.
- v. Grouping students for self-discussion, self-learning process.
- w. Following institution and intellectual and writing reports in the course field.
- x. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- y. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- z. Extracurricular activities may be framed through their syllabus content.
- aa. Bring the industries to the campus. Bring the students to the industry.
- bb. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Principles of Information Security”, Michael E Whitman and Herbert J Mattord, 5th Edition, Vikas Publishing House, New Delhi, 2003.
2. “Fundamentals of Information Systems Security”, David Kim, Michael G. Solomon, 3rd Edition, Jones & Bartlett Learning, October 2016.
3. “The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy”, Patrick Engebretson, 2nd Edition, Syngress Basics Series – Elsevier, 2011.
4. “Hands-On Ethical Hacking and Network Defense”, Michael T. Simpson, Kent Backman, James E. Corley, Second Edition, CENGAGE Learning, 2010.

Reference Book:

1. “Handbook of Information Security Management”, Micki Krause, Harold F. Tipton, sixth Edition, CRC Press LLC, 2004.
2. “Hacking Exposed”, Stuart McClure, Joel Scrambray, George Kurtz, Tata McGraw–Hill, 2003.
3. “Computer Security Art and Science”, Matt Bishop, 2nd Edition, Pearson/PHI, 2002.

Course Material: website links, e-Books and e-journals

Mapping with Programme Outcomes

B.C.A. Computer Applications (CBCS)

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	L	M
CO2	S	S	M	M	S	M	S	S	M	L
CO3	M	S	S	S	S	S	M	S	M	S
CO4	S	S	M	L	S	S	S	S	S	M
CO5	S	S	M	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V

Paper type: Internal Elective 1 Paper - 1

Paper code:

Name of the Paper: Software Testing

Credit: 3

**Total Hours per Week: 3
Hours:**

Lecture Hours: 39 . Tutorial Hours:

Practical

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Course Objectives

1. To understand about the basics of software testing.
2. To understand the fundamentals of software development models.
3. To understand the structural testing methods.
4. To understand the current techniques that are used in object oriented testing models.
5. To understand the concept of software testing quality details.

Course Out Comes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand the concept of software testing, and software quality
2. After studied unit-2, the student will be able to learn to inspect and detect errors by going through each and every code segment
3. After studied unit-3, the student will be able to gain knowledge of various functional and structural testing techniques
4. After studied unit-4, the student will be able to understand basic concept of Software Management tools and object oriented testing
5. After studied unit-5, the student will be able to understand basic concept of Software quality and software quality assurance

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No

5	Yes	Yes	Yes	Yes	Yes	Yes
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Unit-1: INTRODUCTION TO SOFTWARE TESTING

Teaching

Hours: 6 Hrs.

Fundamentals of software testing – need for software testing– Psychology of testing – various approaches – characteristics of testing – principles of testing – testing strategies – verification and validation – Defect and Prevention strategies.

Unit-2: SOFTWARE DEVELOPMENT MODEL AND TESTING

Teaching Hours: 7 Hrs.

Water fall model– V–model– Spiral model– Agile model – Life cycle of testing– Static Testing – dynamic testing – White box testing – Block box testing – Regression testing – Integration Testing – System and Performance Testing – Usability Testing

Unit-3: FUNCTIONAL AND STRUCTURAL TESTING

Teaching

Hours: 9 Hrs.

Boundary Value Analysis – Equivalence Class Testing – Decision Table – Based Testing – Cause Effect Graphing Technique – Path testing –Cyclomatic Complexity – Graph Metrics – Data Flow Testing – Slice based testing

Unit-4: TEST MANAGEMENT AND TOOLS

Teaching

Hours: 10 Hrs.

Test planning – cost–benefit analysis of testing – monitoring and control– test reporting – test control – Specialized testing – Object Oriented Testing – Automated Tools for Testing – Tool Selection and Implementation – Challenges in test automation– GUI Testing

Unit-5: SOFTWARE QUALITY AND SOFTWARE QUALITY ASSURANCE

Teaching Hours: 7 Hrs.

Introduction to software quality and software quality assurance – basic principles about the software quality and software quality assurance – Planning for SQA – various models for software product quality and process quality – SCM – RAD – System Documentation

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise

B.C.A. Computer Applications (CBCS)

- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Software Testing– A Craftsman’s Approach” – Paul C. Jorgensen – Second Edition – CRC Press 2008
2. “Software Testing”, – Ron Patton, Second Edition –Sams Publishing, Pearson Education, 2007.
3. “Software Testing– A Craftsman’s Approach” – Paul C. Jorgensen, Second Edition – CRC Press, 2008

Reference Books:

1. “Software Testing and Analysis: Process, Principles and Techniques” – Mauro Pezze, Michal Young – Wiley India , 2008
2. “Software Engineering” – K.K. Aggarwal&Yogesh Singh – New Age International Publishers – New Delhi, 2003.
3. “Software Testing – Principles and Practices” –SrinivasanDesikan and Gopaldaswamy Ramesh, Pearson Education, 2006.

Course Material: website links, e-Books and e-journals

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	M	S	M	S	S	L	M
CO2	S	S	M	M	S	M	S	S	M	S

B.C.A. Computer Applications (CBCS)

CO3	M	S	S	S	S	S	M	S	S	S
CO4	S	S	S	L	S	S	S	S	S	M
CO5	S	S	S	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: V Paper type: Skill Based Subject III Paper - 3

Paper code: Name of the Paper: Software Engineering Credit: 2

Total Hours per Week: 3 Lecture Hours: 39. Tutorial Hours: Practical Hours:

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Course Objectives

1. To understand about the basic method to develop a software.
2. To understand the fundamentals for choosing requirements of the project.
3. To understand the concept of software engineering.
4. To understand the methods involve in software testing.
5. To understand the basic knowledge in software project management.

Course Out Comes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to the concepts and methods required for the construction of large software intensive systems.
2. After studied unit-2, the student will be able to Gets the idea of choosing the Requirements in Software Engineering.
3. After studied unit-3, the student will be able to Gives an understanding the concept of Data Engineering.
4. After studied unit-4, the student will be able to impart knowledge on Testing and Debugging.
5. After studied unit-5, the student will be able to enable the students to learn the basic of Project Management & Scheduling.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION TO EVOLVING SOFTWARE

Teaching

Hours: 6 Hrs.

Evolving Role of Software – Nature of Software – Software Engineering – The Software Process– Software Engineering Practices – Software Myths – A Generic View of Process Model – Process Assessment and Improvement – Process Models : Waterfall Model – Incremental Process Models – Evolutionary Process Models – Concurrent Models.

Unit-2: REQUIREMENTS ENGINEERING

Teaching

Hours: 7 Hrs.

Requirements Engineering: Establishing the Groundwork – Initiating the Requirements Engineering Process – Eliciting Requirements – Collaborative Requirements Gathering – Quality Function Deployment – Usage Scenarios – Elicitation work Products – Building the Requirements Model – Elements of Requirements Model – Analysis Pattern – Requirements Analysis – Data Modeling Concepts.

Unit-3: DATA ENGINEERING

Teaching Hours: 9 Hrs.

Data Engineering: Design Process and Design Quality – Design Concepts – The Design Model - Creating an Architectural Design – Software Architecture – Data Design – Architectural style – Architectural Design – Architectural Mapping Using Data Flow – Performing User Interface Design – Golden Rules.

Unit-4: TESTING STRATEGIES

Teaching

Hours: 10 Hrs;

Testing Strategies: Strategic Approach to Software Testing – Strategic Issues – Test Strategies for Conventional and Object Oriented Software – Validation Testing – System Testing – Art of Debugging. Software Testing Fundamentals – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Model Based Testing.

Unit-5:PROJECT MANAGEMENT

Teaching Hours: 7 Hrs.

Project Management: Management Spectrum – People – Product – Process – Project – Critical Practices – Estimation: Project Planning Process – Software Scope and Feasibility – Resources – Software Project Estimation – Project Scheduling – Quality Concepts – Software Quality Assurance – Elements of Software Quality Assurance – Formal Technical Reviews.

B.C.A. Computer Applications (CBCS)

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. "Software Engineering – A Practitioner's Approach", Roger S Pressman, McGraw Hill International Edition, New York: 2005, Seventh Edition.
2. "Software Engineering", Mall Rajib, PHI Learning, 2009, 3 Third Edition.

Reference Book:

1. "Software Engineering", Ian Somerville, Pearson Education, 2006, 7th Edition.
2. "Software Engineering Concepts" Richard Fairley, Tata McGraw–Hill Education, 2011.
3. "Software Engineering: Theory and Practice ", Pfleeger and Lawrence, Pearson Education, 2001, Second Edition.

Course Material: website links, e-Books and e-journals
Mapping with Programme Outcomes

B.C.A. Computer Applications (CBCS)

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	S	M	S	S	L	M
CO2	M	M	M	M	S	M	S	S	M	S
CO3	M	S	S	S	S	M	M	S	S	S
CO4	S	S	S	L	S	S	S	S	S	M
CO5	S	M	S	M	S	S	S	S	M	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI

Paper type: Core Theory Paper - 12

Paper code:

Name of the Paper: Open Source Software

Credit: 4

Total Hours per Week: 4
Hours:

Lecture Hours: 52.

Tutorial Hours:

Practical

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Course Objectives

1. To understand about use pre-existing code to improve the software and even come up with their own innovations.
2. To understand the fundamentals of LINUX operating system.
3. To understand the concept of scripting code for a website.
4. To understand the fundamentals of PHP language combined with HTML.
5. To understand the fundamentals of PERL languages.

Course Outcomes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand the concept of HTML, HTML5 and CSS.
2. After studied unit-2, the student will be able to learn to inspect and detect errors by going through each and every code segment.
3. After studied unit-3, the student will be able to understand basic concept of Java Script and MySQL.
4. After studied unit-4, the student will be able to understand basic concept of PHP
5. After studied unit-5, the student will be able to understand basic concept of PERL

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION TO HTML, CSS

Teaching

Hours: 10 Hrs.

Need of Open Source –Advantages of Open source –Application of Open Source – HTML – HTML tags –Dynamic Web content– HTTP Request and Response Procedure– Introduction to HTML5– HTML5 Canvas – HTML5 Audio and Video–Introduction to CSS– CSS Rules–Style Types–CSS Selectors– CSS Colors.

Unit-2: LINUX

Teaching

Hours: 11 Hrs.

Introduction: Linux Essential Commands – Kernel Mode and user mode –File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions Creation – Shell Introduction – String Processing – Investigation and Managing Processes – Network Clients – Installing Application.

Unit-3: JAVA SCRIPT AND MYSQL

Teaching

Hours: 10 Hrs.

Java script :Advantages of JavaScript –JavaScript Syntax–Data type– Variable– Array – Operators and Expressions– Loops – functions – Dialog box– MySQL – The show Databases and Table – The USE command –Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement.

Unit-4: PHP

Teaching Hours:

11 Hrs.

PHP Introduction – General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control Statement – Array – Functions – Basic Form Processing – File and Folder Access – Cookies – Sessions – Database Access with PHP.

Unit-5:PERL

Teaching

Hours: 10 Hrs.

PERL : Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules– Working with Files – Data Manipulation.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.

- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

- 1. “The Complete Reference Linux”, Peterson, Tata McGraw HILL–2010
- 2. “Perl: The Complete Reference”, Martin C. Brown, Tata McGraw Hill Publishing Company Limited, Indian Reprint 2009.
- 3. “MYSQL: The Complete Reference”, VikramVaswani, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009
- 4. “PHP: The Complete Reference”, Steven Holzner, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.
- 5. “Complete Reference HTML”, T. A. Powell, 3rd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2002.
- 6. “Mastering Java script” –J. Jaworski, BPB Publications, 1999

Reference Books:

- 1. “Fundamentals of Open Source Software”, by M.N. Rao, PHI publishers.
- 2. “MySQL Bible”, Steve Suchring, John Wiley, 2002
- 3. “The Linux Kernel Book”, Remy Card, Eric Dumas and Frank Mevel, Wiley Publications, 2003
- 4. Ivan Byross, HTML, DHTML, Javascript, Perl, BPB Publication

Course Material: website links, e-Books and e-journals

B.C.A. Computer Applications (CBCS)

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	S	M	S	S	L	M
CO2	M	M	M	M	S	M	S	S	M	S
CO3	M	S	S	S	S	M	M	S	S	S
CO4	S	S	S	L	S	S	S	S	S	M
CO5	S	M	S	M	S	S	S	S	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI

Paper type: Core Theory Paper - 13

Paper code: CCA51

Name of the Paper: PYTHON Programming

Credit: 4

Total Hours per Week: 4
Hours:

Lecture Hours: 52.

Tutorial Hours:

Practical

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Course Objectives

1. To understand the basic building blocks for PYTHON programming.
2. Build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions
3. Work with user input to create fun and interactive programs
4. To acquire Object Oriented Skills in Python
5. To develop the skill of designing Graphical user Interfaces in Python

Course Outcomes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand the basic building blocks for creating PYTHON programming in details.
2. After studied unit-2, the student will be able to understand the control statements and basic methods used in PYTHON programming
3. After studied unit-3, the student will be able to understand the basic build in functions.
4. After studied unit-4, the student will be able to understand the some advanced methods to use in PYTHON
5. After studied unit-5, the student will be able to understand the concept of objects used in PYTHON

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION

Teaching Hours: 6 Hrs.

Identifiers – Keywords - Statements and Expressions – Variables – Operators – Arithmetic operators – Assignment operators – Comparison operators – Logical operators – Bitwise operators - Precedence and Associativity – Data types - Number – Booleans – Strings - Indentation – Comments – Single line comment – Multiline comments - Reading Input – Print Output – Type Conversions – int function – float function – str() function – chr() function – complex() function – ord() function – hex() function – oct() function - type() function and Is operator – Dynamic and Strongly typed language.

Unit-2: CONTROL FLOW STATEMENTS

Teaching Hours: 7 Hrs.

Control Flow Statements – If statement – If else statement – If elif else statement – nested if statement - while loop – for loop – continue and break statements – catching exceptions using try and except statement – syntax errors – exceptions – exception handling – Strings – str() function - Basic string operations – String comparison – Built in functions using strings – Accessing characters in string – String slicing – String joining – split() method – string traversing.

Unit-3: FUNTIONS

Teaching Hours: 9 Hrs.

Functions – Built in functions – function definition and calling - return statement – void function – scope and lifetime of variables – args and kwargs – command line arguments - Tuples – creation – basic tuple operations – tuple() function – indexing – slicing – built-in functions used on tuples – tuple methods – packing – unpacking – traversing of tuples – populating tuples – zip() function - Sets – Traversing of sets – set methods – frozenset.

Unit-4: LISTS

Hours: 9 Hrs.

Teaching

Lists: Using List- List Assignment and Equivalence – List Bounds- Slicing - Lists and Functions- Prime Generation with a List. List Processing: Sorting-Flexible Sorting- Search-List Permutations- Randomly Permuting a List- Reversing a List.

Unit-5:OBJECTS

Hours: 8 Hrs.

Teaching

B.C.A. Computer Applications (CBCS)

Objects: Using Objects- String Objects- List Objects. Custom Types: Geometric Points- Methods- Custom Type Examples- Class Inheritance. Handling Exceptions: Motivation- Exception Examples- Using Exceptions - Custom Exceptions.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Text book:

1. **Gowrishankar S, Veena A, “Introduction to Python programming”, 1st Edition, CRC Press/Taylor & Francis, 2008. (Units 1-3)**
2. **Learn to Program with Python, 3th Edition, Richard L. Halterman, Southern Adventist University. (Units 4-5)**

Reference Book:

1. **Core Python Programming, 2thEdition, Wesley J. Chun, Prentice Hall.**

2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for working with Data", 1st edition, O'Reilly Media, 2016.

**Course Material: website links, e-Books and e-journals
Mapping with Programme Outcomes**

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	M	S	M	S	S	L	M
CO2	M	M	M	M	S	M	S	S	M	S
CO3	M	S	S	S	S	M	M	S	S	S
CO4	S	S	S	L	S	S	S	S	S	M
CO5	S	M	S	M	S	S	S	S	M	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(Bachelor of Computer Science) – 2022-2023 onwards

Semester: VI **Paper type: Core – Practical -7**

Paper code: **Name of the Paper: Python Programming**

Lab **Credit: 2 Total Hours per Week: 4 Hrs.**

Lecture Hours:.. Tutorial Hours: Practical Hours: 52 Hrs.

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Course Objectives

1. To know about basic data types, operators in Python.
2. To understand Loops in Python.
3. To understand the concepts of Arrays.
4. To understand how to handle string.
5. To know about functions.

Course Outcomes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to write a program using operators.
2. After studied unit-2, the student will be able to develop a program using loops.
3. After studied unit-3, the student will be able to implement program using Arrays.
4. After studied unit-4, the student will be able to implement the concept of String functions.
5. After studied unit-5, the student will be able to build application with basic expressions.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creativity
1	No	No	No	No	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes

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3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

LIST OF PRACTICAL EXERCISES

1. Develop a Python program to find the area and perimeter of a circle.
2. Develop a Python program to generate Fibonacci series.
3. Develop a Python program to compute the GCD of two numbers.
4. Develop a Python program to generate first n prime numbers.
5. Develop a Python program to find the sum of squares of n natural numbers.
6. Develop a Python program to find the sum of the elements in an array.
7. Develop a Python program to find the largest element in the array.
8. Develop a Python program to check if the given string is a palindrome or not.
9. Develop a Python program to store strings in a list and print them.
10. Develop a Python program to find the length of a list, reverse it, copy it and then clear it.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be

implemented in the practices and report can be written for documentation, further discussion and research.

- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	S	M	S	S
CO2	S	S	M	M	S	M	S	M	S	S
CO3	S	M	M	M	S	M	S	M	S	S
CO4	S	S	S	M	S	S	S	S	M	S
CO5	S	M	S	S	S	S	S	S	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)

**THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
(Bachelor of Computer Science) – 2022-2023 onwards**

Semester: VI **Paper type: Core - Practical - Practical - 8**

Paper code: **Name of the Paper: Open Source Programming**

Lab **Credit: 2 Total Hours per Week: 4 Hrs. Lecture**

Hours: Tutorial Hours: .. Practical Hours: 52 Hrs.

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Course Objectives

1. To understand the basic HTML Tags.
2. To understand the types of CSS.
3. To learn Javascript functions.
4. To know about PHP form elements.
5. To learn PHP with MYSQL database connectivity.

Course Outcomes

1. After studied unit-1, the student will be able to design static web pages.
2. After studied unit-2, the student will be able to link common style to the web pages using CSS.
3. After studied unit-3, the student will be able to validate form controls using javascript.
4. After studied unit-4, the student will be able to design dynamic webpages using PHP.
5. After studied unit-5, the student will be able to develop PHP program with MYSQL database connection.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	No	No	No	No	No	No

B.C.A. Computer Applications (CBCS)

2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

LIST OF PRACTICAL EXERCISES

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets).
3. Develop a shell program to find the factorial of an integer positive number.
4. Develop a shell program to find the details of a user session.
5. Create a simple calculator in JavaScript.
6. Develop a JavaScript program to scroll your name in the scrollbar.
7. Develop a program and check message passing mechanism between pages.
8. Application for Email Registration and Login using PHP and MySQL.
9. Program to Create a File and write the Data into it using PHP.
10. Program to perform the String Operation using Perl.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for

B.C.A. Computer Applications (CBCS)

practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.

- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.

B.C.A. Computer Applications (CBCS)

- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S
CO3	S	M	M	S	M	M	S	M	M	S
CO4	S	S	M	M	M	S	S	S	S	S
CO5	S	S	S	S	M	M	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI

Paper type: Internal Elective II Paper - 2

Paper code:

Name of the Paper: Big Data Analytics

Credit: 3

**Total Hours per Week: 3
Hours:**

Lecture Hours: 39.

Tutorial Hours:

Practical

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Course Objectives

1. To explore the fundamental concepts of big data analytics.
2. To learn to use various techniques for mining data stream.
3. To learn the Big data Business Perspective
4. To understand the applications using Map Reduce Concepts.
5. To introduce programming tools HIVE in Hadoop ecosystem.

Course Outcomes

1. After studied unit-1, the student will be able to understand the key issues in big data management.
2. After studied unit-2, the student will be able to outline big data planning, processing.
3. After studied unit-3, the student will be able to Acquire fundamental enabling techniques and scalable.
4. After studied unit-4, the student will be able to examine various big data tools and techniques.
5. After studied unit-5, the student will be able to achieve adequate perspectives of Big Data Analytics in various Applications like recommender system, Social Media Applications and etc.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No

5	Yes	Yes	Yes	Yes	Yes	Yes
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Unit-1: INTRODUCTION TO BIG DATA

Teaching Hours: 8 Hrs.

Introduction to big data: Introduction to Big Data Platform – Challenges of Conventional Systems – Intelligent data analysis – Nature of Data – Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – Volume, Velocity, Variety – Other Characteristics of Data – Need for Big Data–Analytic Processes and Tools – Analysis vs. Reporting.

Unit-2: MINING DATA STREAMS

Teaching

Hours: 8 Hrs.

Mining data streams: Introduction To Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams –Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis– Stock Market Predictions.

Unit-3: BIG DATA FROM DIFFERENT PERSPECTIVES

Teaching Hours: 7 Hrs.

Big data from business Perspective: Introduction of big data–Characteristics of big data–Data in the warehouse and data in Hadoop– Importance of Big data– Big data Use cases– Patterns for Big data deployment. Big data from Technology Perspective:–Application Development in Hadoop–Getting your data in Hadoop.

Unit-4: HADOOP AND MAP REDUCE

Teaching

Hours: 9 Hrs.

Hadoop: The Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop– Scaling Out–Hadoop Streaming– Design of HDFS–Java interfaces to HDFS Basics– Developing a Map Reduce Application–How MapReduce Works–Anatomy of a Map Reduce Job run–Failures–Job Scheduling–Shuffle and Sort – Task execution – Map Reduce Types and Formats– Map Reduce Features–Hadoop environment.

Unit-5:FRAMEWORKS

Teaching Hours: 7

Objective: To introduce programming tools HIVE in Hadoop ecosystem.

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive – fundamentals of HBase and ZooKeeper– IBM Info Sphere Big Insights and Streams.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- o. Book review and research paper review, syllabus and curriculum review.
- p. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- q. Workshops, preparing technical term dictionaries from text books and reference books.
- r. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- s. Forming digital library: collecting text and reference books, course material.
- t. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- u. Extracurricular and cultural activities may be framed through the syllabus content.
- v. Grouping students for self-discussion, self-learning process.
- w. Following institution and intellectual and writing reports in the course field.
- x. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- y. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- z. Extracurricular activities may be framed through their syllabus content.
- aa. Bring the industries to the campus. Bring the students to the industry.
- bb. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Text book:

1. **“Intelligent Data Analysis”, Michael Berthold, David J. Hand, Springer, 2007.**
2. **“Hadoop: The Definitive Guide “, Tom White Third Edition, Oreilly Media,**

2012.

Reference Book:

1. **“Big Data and Analytics” Seema Acharya, Subhasini Chellappan, Wiley 2015.**
2. **“Mining of Massive Datasets”, Anand Rajaraman and Jeffrey David Ullman, CUP, 2012.**
3. **“Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data” .Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, McGrawHill Publishing, 2012.**
4. **“Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Bill Franks, John Wiley & sons, 2012.**
5. **“Making Sense of Data”, Glenn J. Myatt, John Wiley & Sons, 2007.**

B.C.A. Computer Applications (CBCS)

Course Material: website links, e-Books and e-journals
Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	S	M	S	S	S
CO2	S	S	S	S	M	S	M	M	S	S
CO3	S	S	S	S	S	S	M	M	S	S
CO4	S	M	M	S	M	S	M	M	S	S
CO5	S	M	M	M	M	S	M	M	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI

Paper type: Internal Elective II Paper - 2

Paper code:

Name of the Paper: Cryptography

Credit: 3

**Total Hours per Week: 3
Hours:**

Lecture Hours: 39. Tutorial Hours:

Practical

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Course Objectives

1. Understand OSI security architecture and classical encryption techniques.
2. Understand the different cryptographic operations of symmetric cryptographic algorithms.
3. Understand the different cryptographic operations of Public key cryptographic algorithms.
4. To make use of application protocols to design and manage a secure system.
5. To learn the configuration and manage E–mail and WLAN Security.

Course Outcomes

1. After studied unit-1, the student will be able to know the security attacks and services.
2. After studied unit-2, the student will be able to understand the concept of Encryption Standards.
3. After studied unit-3, the student will be able to understand public key cryptographic algorithms.
4. After studied unit-4, the student will be able to learn the concept of hash functions.
5. After studied unit-5, the student will be able to understand the Email security.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: COMPUTER AND NETWORK SECURITY

Teaching

Hours: 8 Hrs.

Computer Security Concepts –OSI security architecture –Security trends–Security attacks – Security Services– Security Mechanisms –Fundamental Security Design Principles – Attack Surfaces and Attack Trees – Model for Network Security – Network Standards.

Unit-2: SYMMETRIC CRYPTOGRAPHY

Teaching

Hours: 8 Hrs.

Symmetric Cipher – Classical Encryption Technique – Symmetric Cipher Model – Substitution Techniques, Transposition Technique – Steganography – Block Cipher and the Data Encryption Standard – The Data Encryption Standard – Differential and Linear Cryptanalysis – Block Cipher Principles. Advanced Encryption Standard – AES Structure – AES Transformation Function.

Unit-3: PUBLIC KEY CRYPTOGRAPHY

Teaching

Hours: 7 Hrs.

Public Key Cryptography and RSA Principles– RSA Algorithm, Key Management and other Public Key Cryptosystems Key Management, Diffie–Hellman Key Exchange, Elliptic Curve Arithmetic – Elliptic Curve Cryptography – Pseudorandom Number Generation.

Unit-4: HASH FUNCTIONS AND DIGITAL SIGNATURES

Teaching Hours:

9 Hrs.

Cryptographic Hash Functions – Application of Hash Functions – Two Simple Hash Functions – Secure Hash Algorithm(SHA) –Message Authentication Codes –Authentication requirement – Authentication function – MAC – HMAC – CMAC – Digital signature and authentication protocols – Digital Signature Standards –Digital Signatures Schemes– Digital Certificate – Key Management and Distribution.

Unit-5:SECURITY APPLICATIONS

Teaching

Hours: 7 Hrs.

Objective: To learn the configuration and manage E–mail and WLAN Security.

Intrusion Detection System– Password Management – Introduction to Firewall– Firewall Generations– Web Security – Wireless network Security – Electronic Mail Security– Internet Mail Architecture–S/MIME – Pretty Good Privacy (PGP).

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- cc. Book review and research paper review, syllabus and curriculum review.
- dd. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- ee. Workshops, preparing technical term dictionaries from text books and reference books.
- ff. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- gg. Forming digital library: collecting text and reference books, course material.
- hh. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- ii. Extracurricular and cultural activities may be framed through the syllabus content.
- jj. Grouping students for self discussion, self learning process.
- kk. Following institution and intellectual and writing reports in the course field.
- ll. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- mm. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- nn. Extracurricular activities may be framed through their syllabus content.
- oo. Bring the industries to the campus. Bring the students to the industry.
- pp. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Text book:

1. “Cryptography and Network security Principles and Practices”, William Stallings, Pearson/PHI, Seventh Edition, 2017.
2. “CRYPTOGRAPHY & NETWORK SECURITY” – Principles and Practices, William Stallings, Pearson Education, Third Edition.

Reference Book:

1. “Modern Cryptography Theory and Practice”, Wenbo Mao, Pearson Education, 2004.
2. “Cryptography and Network Security “, Behourz Forouzan, Debdeep Mukhopadhyay, Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. “Quantum Cryptography and Secret–Key Distillation”, Gilles van Assche, Cambridge University Press, 2010.

B.C.A. Computer Applications (CBCS)

Course Material: website links, e-Books and e-journals
Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	M	S	S	S
CO2	S	S	S	M	M	M	M	S	M	S
CO3	S	M	M	M	M	M	M	S	S	S
CO4	S	S	M	M	M	S	S	S	M	S
CO5	S	S	S	M	M	M	M	M	S	M

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI

Paper type: Internal Elective II Paper - 2

Paper code:

Name of the Paper: DIGITAL IMAGE PROCESSING

Credit: 3

Total Hours per Week: 3

Lecture Hours: 39.

Tutorial Hours:

Practical

Hours:

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Course Objectives

1. To know the basics of Digital image and techniques.
2. To understand various Image enhancement ideas.
3. To understand Image restoration techniques.
4. To understand degrees of image resolution and compression methods.
5. To understand concepts of image representation and recognition.

Course Outcomes

1. After studied unit-1, the student will be able to understand the concepts like Mat Lab, DIP, electromagnetic spectrum and etc.
2. After studied unit-2, the student will be able to analyze smoothing and sharpening techniques.
3. After studied unit-3, the student will be able to know about image filters.
4. After studied unit-4, the student will be able to gain knowledge about compression techniques.
5. After studied unit-5, the student will be able to know about image representation.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: FUNDAMENTALS

Teaching

Hours: 8 Hrs.

Introduction – Origin – Steps in Digital Image Processing – Components – Applications of DIP – Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Images in Matlab– Pixels – Color models – Digital Image Processing in Multimedia.

Unit-2: IMAGE ENHANCEMENT

Teaching Hours: 8 Hrs.

Spatial Domain – Gray level transformations – Histogram Quantization – Histogram matching and processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering – Introduction to Fourier Series – Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal – Butterworth and Gaussian filters

Unit-3: IMAGE RESTORATION AND SEGMENTATION

Teaching

Hours: 7 Hrs.

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation– Active Contour Models – Snakes – Fuzzy Connectivity – Morphological processing– erosion and dilation.

Unit-4: WAVELETS AND IMAGE COMPRESSION

Teaching Hours:

9 Hrs.

Wavelets – Sub band coding – Multi resolution expansions – Compression: Fundamentals – Image Compression models – Error Free Compression – Predictive Compression Methods – Vector Quantization – Variable Length Coding – Bit–Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards

Unit-5:IMAGE REPRESENTATION AND RECOGNITION

Teaching

Hours: 7 Hrs.

Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems – Chain Code – Polygonal approximation, signature, boundary segments – Shape number – Fourier Descriptor moments – Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- qq. Book review and research paper review, syllabus and curriculum review.
- rr. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- ss. Workshops, preparing technical term dictionaries from text books and reference books.
- tt. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- uu. Forming digital library: collecting text and reference books, course material.
- vv. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- ww. Extracurricular and cultural activities may be framed through the syllabus content.
- xx. Grouping students for self-discussion, self-learning process.
- yy. Following institution and intellectual and writing reports in the course field.
- zz. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- aaa. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- bbb. Extracurricular activities may be framed through their syllabus content.
- ccc. Bring the industries to the campus. Bring the students to the industry.
- ddd. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Text book:

1. **"Digital Image Processing," Rafael C. Gonzalez, Richard E. Woods, Prentice Hall, Third Edition, 2008.**
2. **"Digital Image Processing and Computer Vision," Sonka, Hlavac, Boyle, Cengage Learning, 2009**
3. **"Fundamentals of Digital Image Processing", Anil Jain K, PHI Learning Pvt. Ltd., 2011.**

Reference Book:

1. **"Digital Image Processing", S. Sridhar, Oxford University Press; Second edition, 2016.**
2. **"Digital Image Processing", Gonzalez & woods, Pearson Education India, 2016.**

Course Material: website links, e-Books and e-journals
Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	M	M	M	S	S
CO2	S	S	M	M	M	M	S	M	S	S
CO3	S	S	M	M	M	S	S	S	M	S
CO4	S	M	S	M	S	M	M	S	S	S
CO5	S	M	M	M	S	M	M	M	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI

Paper type: Internal Elective III Paper - 3

Paper code:

Name of the Paper: ARTIFICIAL INTELLIGENCE

Credit: 3

**Total Hours per Week: 3
Hours:**

Lecture Hours: 39.

Tutorial Hours:

Practical

.....
Course Objectives

1. To know the basics of Artificial Intelligence.
2. To Understand the Methods and algorithms in AI.
3. To learn to represent knowledge in solving AI problems.
4. To Understand Statistical logics and know about Software agents.
5. To learn how Machine learning is related to AI.

Course Outcomes

1. After studied unit-1, the student will be able to recall the fundamentals of artificial intelligence
2. After studied unit-2, the student will be able to understand the techniques used for AI
3. After studied unit-3, the student will be able to know about knowledge representation.
4. After studied unit-4, the student will be able to gain knowledge about fuzzy logic.
5. After studied unit-5, the student will be able to evaluate the design of new artificial intelligence and machine learning applications

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE:

Teaching Hours: 8 Hrs.

History of AI – Artificial Narrow Intelligence (ANI) – Artificial General Intelligence (AGI) – Artificial Super Intelligence (ASI) – Characteristics – Types of AI – Domains – Programming Languages of AI – Applications of AI – Future of AI.

Unit-2: AI – PROBLEM SOLVING METHODS:

Teaching Hours: 8 Hrs.

Problem solving Methods – Search Strategies: Uninformed – Informed – Heuristics – Generate and test – hill climbing – Best first search – problem reduction – Local Search Algorithms and Optimization – Game Playing mini-max procedure – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

Unit-3: AI – KNOWLEDGE REPRESENTATION:

Teaching Hours: 7 Hrs.

Procedural Versus declarative knowledge – logic programming – Forward Versus backward reasoning – Matching – Control knowledge – Ontological Engineering– Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoning with Default Information.

Unit-4: STATISTICAL REASONING AND AGENTS:

Hours: 9 Hrs.

Teaching

Probability and Bayes Theorem – Certainty factors – Probabilistic Graphical Models – Bayesian Networks – Markov Networks – Fuzzy Logic. Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

Unit-5: MACHINE LEARNING AND APPLICATIONS

Hours: 7 Hrs.

Teaching

Types of Machine Learning – Neural Networks – Deep Learning – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. **“Artificial Intelligence”, Elaine Rich, Kevin Knight, Tata McGraw Hill, II Edition.**
2. **"Artificial Intelligence: A Modern Approach," Stuart Russell, Peter Norvig, Third Edition, Prentice Hall of India, New Delhi, 2010.**
3. **“Prolog: Programming for Artificial Intelligence”, I. Bratko, Addison – Wesley Educational Publishers Inc., Fourth edition 2011.**

B.C.A. Computer Applications (CBCS)

Reference Book:

1. “Machine Learning for Beginners 2019”, Matt Henderson, This Is Charlotte, 2019
2. “Introduction to Artificial Intelligence and Expert Systems”, Dan W. Patterson, Pearson, 2015

Course Material: website links, e-Books and e-journals

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	M	M	S	S
CO2	S	M	S	S	M	M	S	M	S	S
CO3	S	S	M	M	S	M	M	S	S	S
CO4	S	M	S	M	M	M	M	S	S	S
CO5	S	S	M	M	S	S	M	M	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI

Paper type: Internal Elective III Paper - 3

Paper code:

Name of the Paper: SYSTEM SOFTWARE

Credit: 3

**Total Hours per Week: 3
Hours:**

Lecture Hours: 39.

Tutorial Hours:

Practical

.....
Course Objectives

1. To understand the basic concepts of system software
2. Ability to trace the path of a source code to object code and to executable file
3. To design and implementation of loaders and linkers
4. To understand the concepts of macro processor
5. Ability to analyze the functions of compilers

Course Outcomes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to analyze CISC and RISC machines.
2. After studied unit-2, the student will be able to know how assemblers are working.
3. After studied unit-3, the student will be able to distinguish Linker and Loader.
4. After studied unit-4, the student will be able to learn macro processor.
5. After studied unit-5, the student will be able to understand the functions of compilers.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: INTRODUCTION TO SYSTEM SOFTWARE

Hours: 8 Hrs.

Teaching

System software vs. Application software – Different types of system software – SIC& SIC/XE Architecture – traditional (CISC) machines – RISC machines.

Unit-2: ASSEMBLERS
Hours: 8 Hrs.

Teaching

Basic assembler functions– Machine dependent and independent assembler features– Assembler design options–One pass assemblers–Multi pass assemblers– MASM assembler.

Unit-3: LOADERS AND LINKERS
Hours: 7 Hrs.

Teaching

Basic loader functions–Simple bootstrap loaders – Machine dependent and independent loader features–Linkage editors– Dynamic linking

Unit-4: MACRO PROCESSOR
9 Hrs.

Teaching Hours:

Basic macro processor functions–Machine dependent and independent macro processor features–Macro processor design options.

Unit-5:COMPILERS
Hours: 7 Hrs.

Teaching

Basic compiler functions–Machine dependent compiler features–Machine independent compiler features–Compiler design options the YACC compiler–Compiler.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- o. Book review and research paper review, syllabus and curriculum review.
- p. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- q. Workshops, preparing technical term dictionaries from text books and reference books.
- r. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- s. Forming digital library: collecting text and reference books, course material.
- t. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- u. Extracurricular and cultural activities may be framed through the syllabus content.
- v. Grouping students for self-discussion, self-learning process.
- w. Following institution and intellectual and writing reports in the course field.

B.C.A. Computer Applications (CBCS)

- x. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- y. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- z. Extracurricular activities may be framed through their syllabus content.
- aa. Bring the industries to the campus. Bring the students to the industry.
- bb. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. **“System Software–An introduction to system programming”, Leland L. Beck & D. Manjula, Pearson Education, 3rd edition, 2007.**
2. **“Compilers – Principles, techniques and tools”, A.V. Aho, Ravi Sethi, J.D. Ullman, 2ndEdition, Pearson Education, 2011.**

Reference Books:

1. **““Systems Programming and Operating Systems”, D.M. Dhamdhare, Second Revised Edition, Tata McGraw Hill, 2000.**
2. **“Systems Programming”, John J. Donovan, Tata McGraw Hill Edition, 2000.**
3. **“Systems Programming”, Srimanta Pal, Oxford University Press, 2011.**

Course Material: website links, e-Books and e-journals Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	S	M	M	S
CO2	S	S	M	M	S	M	S	M	S	S
CO3	S	M	M	S	M	S	M	M	S	S
CO4	S	M	S	S	M	S	M	S	S	S
CO5	S	M	M	M	M	M	M	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI

Paper type: Internal Elective III Paper - 3

Paper code:

Name of the Paper: MOBILE COMPUTING

Credit: 3

**Total Hours per Week: 3
Hours:**

Lecture Hours: 39.

Tutorial Hours:

Practical

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Course Objectives

1. To understand basic concepts of mobile computing.
2. To learn the basics of mobile telecommunication system
3. To comprehend wireless LAN and cellular systems.
4. To understand protocols at network and transport layer.
5. To learn development of applications in mobile computing platform.

Course Outcomes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand basic concepts of mobile computing.
2. After studied unit-2, the student will be able to learn the basics of mobile telecommunication system
3. After studied unit-3, the student will be able to comprehend wireless LAN and cellular systems.
4. After studied unit-4, the student will be able to understand protocols at network and transport layer.
5. After studied unit-5, the student will be able to learn development of applications in mobile computing platform.

Matching Table (Put Yes / No in the appropriate box)

B.C.A. Computer Applications (CBCS)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: WIRELESS COMMUNICATION FUNDAMENTALS

Teaching

Hours: 8 Hrs.

Introduction–Applications–A short History of wireless Communications–Wireless Transmission – Frequencies for Radio transmission–Signals–Antennas–Signal Propagation–Multiplexing–Modulations–Amplitude shift keying–Frequency shift keying–Phase shift keying–Spread Spectrum.

Unit-2: MEDIUM ACCESS CONTROL AND TELECOMMUNICATION SYSTEM

Tea

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Hours: 8

Hrs..

SDMA–FDMA–TDMA–Fixed TDM–Classical Aloha–CDMA–Global System for Mobile Communications –GPRS–Satellite Systems –Basics –Applications–Broadcast Systems – Digital Audio Broadcasting – Digital Video Broadcasting. learn development of applications in mobile computing platform.

Unit-3: WIRELESS NETWORKS

Teaching Hours: 7 Hrs.

Infrared vs. Radio Transmission– Infrastructure Networks–Ad hoc Networks – IEEE 802.11 –System Architecture–Protocol Architecture–Bluetooth–User scenarios–Bluetooth Architecture–Introduction to Wireless ATM –Services–Location Reference Model.

Unit-4: MOBILE NETWORK LAYER

Teaching

Hours: 9 Hrs.

Mobile IP–Goals– Assumption–Entities and Terminology– IP Packet delivery – Agent advertisement and discovery–Registration–Tunnelling and encapsulation–Optimizations–Dynamic Host Configuration Protocol (DHCP) –Routing –DSDV–DSR – Alternative Metrics.

Unit-5: WIRELESS APPLICATION PROTOCOL

Teaching Hours: 7 Hrs.

Introduction–Protocol Architecture–Wireless Markup Language (WML)–WML Script– Applications–Wireless Telephony Application (WTA) – Wireless Telephony Application Architecture.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- a. Book review and research paper review, syllabus and curriculum review.
- b. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- c. Workshops, preparing technical term dictionaries from text books and reference books.
- d. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- e. Forming digital library: collecting text and reference books, course material.
- f. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- g. Extracurricular and cultural activities may be framed through the syllabus content.
- h. Grouping students for self-discussion, self-learning process.
- i. Following institution and intellectual and writing reports in the course field.
- j. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- k. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- l. Extracurricular activities may be framed through their syllabus content.
- m. Bring the industries to the campus. Bring the students to the industry.
- n. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Textbooks:

1. “Mobile Communications”, Jochen Schiller –PHI/Pearson Education, Second Edition, 2003.
2. “ Mobile Computing”, Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal –Tata McGraw Hill Publications, Second edition, 2010.

Reference Books:

1. “Principles of Wireless Networks”, KavehPahalavan, PrasanthKrishnamoorthy, PHI/Pearson Education, 2003.

B.C.A. Computer Applications (CBCS)

2. “Fundamentals of Mobile and Pervasive Computing”, Frank Adelstein, SandeepK.S.Gupta, Golden G.Richard III, Loren Schwiebert –Tata McGraw Hill Publications, 2005.
3. “Wireless Communications and Networks”, Williams Stallings–Pearson Education, Second Edition, 2009.

Course Material: website links, e-Books and e-journals Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	S	M	M	S
CO2	S	S	M	M	S	M	S	M	S	S
CO3	S	M	M	S	M	S	M	M	S	S
CO4	S	M	S	S	M	S	M	S	S	S
CO5	S	M	M	M	M	M	M	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115

(BCA) – 2022-2023 onwards

Semester: VI Paper type: Skill Based Subject IV Paper - 4

**Paper code: Name of the Paper: OBJECT ORIENTED ANALYSIS AND DESIGN
Credit: 2**

**Total Hours per Week: 3 Lecture Hours: 39. Tutorial Hours: Practical
Hours:**

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Course Objectives

1. Learn the UML analysis and design diagrams.
2. Apply appropriate object model and design patterns.
3. Create object code from design Patterns
4. Learn to map design to code, Compare and contrast various testing techniques.
5. At the end of the course, the student should be able to Design and implement projects using OO concepts.

Course Outcomes (five outcomes for each units should be mentioned)

1. After studied unit-1, the student will be able to understand UML analysis and design diagrams.
2. After studied unit-2, the student will be able to Apply appropriate object model and design patterns.
3. After studied unit-3, the student will be able to ccreate object code from design Patterns
4. After studied unit-4, the student will be able to design to code, Compare and contrast various testing techniques.
5. After studied unit-5, the student will be able to Design and implement projects using OO concepts.

Matching Table (Put Yes / No in the appropriate box)

B.C.A. Computer Applications (CBCS)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	No	Yes	No	Yes
2	Yes	No	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes	No
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1: UML DIAGRAMS

Teaching Hours: 8 Hrs.

Introduction to OOAD – Role of Analysis and Design in Software Development – Meaning of Object Orientation – Overview of Various OOAD Methodologies – Unified Process – UML diagrams Goals of UML – Use Case – Actors and Use Cases – Use Case Relationships – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

Unit-2: OBJECT MODEL AND DESIGN PATTERNS

Teaching Hours: 8

The Object Model – The Evolution of the Object Model – Foundations of the Object Model – Elements of the Object Model – Applying the Object Model. GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioural – Strategy – observer.

Unit-3: APPLYING DESIGN PATTERNS

Teaching Hours: 7 Hrs.

The Nature of an Object – Relationships among Objects – The Nature of a Class – Relationships among Classes – The Interplay of Classes and Objects – On Building Quality Classes and Objects –System sequence diagrams – Relationship between sequence diagrams and use cases diagrams –Notations: The Unified Modelling Language – Package Diagrams – Component Diagrams – Deployment Diagrams – Activity Diagrams – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns.

Unit-4: CLASSIFICATION, CODING AND TESTING

Teaching

Hours: 9 Hrs.

Classification: The importance of proper classification – Identifying classes and objects – Key abstractions and Mechanisms – Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

Unit-5: CASE STUDY

Teaching Hours: 7 Hrs.

Case study – the Next Gen POS system, Inception –Use case Modelling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition.

Internal Assessment Methods: (The following items may be brought under test, seminar and assignment framework)

- o. Book review and research paper review, syllabus and curriculum review.
- p. Data collection and paper writing practices: books level, field study level. Using the course study for society and nature development – exercise
- q. Workshops, preparing technical term dictionaries from text books and reference books.
- r. Preparing question paper by the candidates: objective type, descriptive type, training can be given by the teacher
- s. Forming digital library: collecting text and reference books, course material.
- t. Villages, institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- u. Extracurricular and cultural activities may be framed through the syllabus content.
- v. Grouping students for self-discussion, self-learning process.
- w. Following institution and intellectual and writing reports in the course field.
- x. Bloom Taxonomy may be introduced for teaching, learning and evaluation process within the framework of question setting pattern and internal assessment pattern.
- y. For application oriented study: Villages, Institutions, various people groups may be adopted by the departments of the colleges for practicing their theoretical study. Innovative methods may be implemented in the practices and report can be written for documentation, further discussion and research.
- z. Extracurricular activities may be framed through their syllabus content.
- aa. Bring the industries to the campus. Bring the students to the industry.
- bb. Ph.D. Research Methodology is applicable to write project report and any kind of research reports like assignment, seminar papers, case study reports, etc.

Text book:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object–Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.
2. Mahesh P. Matha, "Object – Oriented Analysis and Design Using UML" , PHI Learning Private Limited, New Delhi, 2008.
3. Grady Booch Robert A. Maksimchuk Michael W. Engle Bobbi J. Young, Ph.D. Jim Conallen Kelli A. Houston "Object–Oriented Analysis and Design with Applications" Third Edition, Pearson Education, Inc.,April 2007.

Reference Book:

1. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object–Oriented Software", Addison–Wesley, 1995.
2. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third edition, Addison Wesley, 2003.
3. Paul C. Jorgensen, "Software Testing:– A Craftsman's Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2008.

Course Material: website links, e-Books and e-journals

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	S	M	M	S
CO2	S	S	M	M	S	M	S	M	S	S
CO3	S	M	M	S	M	S	M	M	S	S
CO4	S	M	S	S	M	S	M	S	S	S
CO5	S	M	M	M	M	M	M	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low (may be avoided)


ANNAMALAI UNIVERSITY
108 - B.Com. (GENERAL)

Programme Structure and Scheme of Examination (under CBCS)
 (Applicable to the candidates admitted in Affiliated Colleges from the academic year
 2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours/Week	Credit	Maximum Marks		
					CIA	ESE	Total
SEMESTER - I							
22UTAML11	I	Language Course - I : Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I : Communicative English I	5	3	25	75	100
22UCOMC13	III	Core Course - I : Financial Accounting I	4	4	25	75	100
22UCOMC14		Core Course - II : Business Organisation	4	4	25	75	100
		Core Practical - I : Computer Application in Business	4	-	-	-	-
		Allied Course - I	4	3	25	75	100
22UCOMS16		Skill Based Course I: Principles of Marketing	2	2	25	75	100
22UENVS18	IV	Environmental Studies	2	2	25	75	100
Total			30	21			700
SEMESTER - II							
22UTAML21	I	Language Course - II : Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course - II : Communicative English II	5	3	25	75	100
22UCOMC23	III	Core Course - III : Financial Accounting II	5	4	25	75	100
22UCOMP24		Core Practical - I : Computer Application in Business	4	3	40	60	100
		Allied Course - II	4	3	25	75	100
22UCOMS26		Skill Based Course II: Advertising and Salesmanship	2	2	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28	IV	Soft Skill	1	1	25	75	100
NMSDC01		Language Proficiency for Employability: EFFECTIVE ENGLISH	2	2	25	75	100
Total			30	22			900

List of Allied Courses
(Choose 1 out of 3 in each Semester)

Semester	Course Title	H/W	C	CIA	ESE	Total
I	Business Economics – I	4	3	25	75	100
	Business Mathematics	4	3	25	75	100
	Consumerism	4	3	25	75	100
II	Business Economics – II	4	3	25	75	100
	Brand Management	4	3	25	75	100
	Investment Management	4	3	25	75	100

PROGRAMME OUTCOMES

1. To enables learners to get theoretical and practical exposure in the commerce sector which includes Accounts, Commerce, Marketing, Management, Economics, Environment etc.
2. To provide Professional, inter personal and entrepreneurial skill for economic and social growth.
3. This program could provide Industries, Banking Sectors, Insurance Companies, Financing companies, Transport Agencies, Warehousing etc., well trained professionals to meet the requirements.
4. Students will be able to do their higher education and can make research in the field of finance and commerce and can independently start up their own Business
5. To strengthen their capacities in varied areas of commerce and industry aiming towards holistic development of learners.

SEMESTER: I CORE: I PART: III	22UCOMC13: FINANCIAL ACCOUNTING - I	HOURS: 4 CREDIT: 4
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COURSE OBJECTIVES

- 1) To acquaint a strong basic knowledge on Principles and practical applications of Double entry system of accounting.
- 2) To gain expertise in the preparation of the Final Accounts as per the Accounting Standards
- 3) To provide knowledge on accounting for Depreciation
- 4) To inculcate the knowledge on Bills of Exchange and Bank Reconciliation Statement
- 5) To give insights about the preparation of Single-Entry System and its conversion into double entry system of accounting

Unit I: Introduction

Hours: 12

Introduction – Accounting concepts and conventions – Accounting Rules - Accounting Standards – Meaning - Double entry system – Journal, Ledger, Subsidiary books, Trial Balance- Rectification of Errors

Unit II: Final Accounts

Hours:12

Meaning of Final Accounts– preparation of trading, profit & loss account and balance sheet of sole proprietorship concern – adjustments in preparation of final accounts.

Unit III: Depreciation

Hours:12

Meaning of depreciation – causes– need– Methods of calculating depreciation: straight line method and written down value method (change in method of depreciation is excluded) – Methods of recording depreciation

Unit IV: Bill of Exchange and Bank Reconciliation Statement

Hours:12

Bills of Exchange - Trade and Accommodation bills - Renewals –Dishonor due to insolvency - Retiring the bill. Bank Reconciliation Statement – Meaning - Objectives – Structure – Bank Pass Book – Transactions between the Business Firm and the Bank – Distinction between Cash Book and Pass Book – Causes of Difference – Preparation of Bank Reconciliation Statement.

Unit V: Single Entry System

Hours: 12

Meaning of single entry system – features and limitations of single entry system – Distinction between single entry system and double entry system - Methods of calculation of profit, Statement of affairs method and Conversion method – Distinction between statement of affairs and balance sheet.

COURSE OUTCOMES

After the completion of the course, the learner would be able to:

- 1) Recall the basic principles, concepts and fundamentals of Double Entry System Accounting
- 2) Apply analytical and technical skills in the preparation of Final Accounts
- 3) Identify and familiarize the different methods of depreciation accounting
- 4) Grasp the accounting treatments of Bills and preparation of Bank Reconciliation Statement
- 5) Acquire knowledge on preparing the accounts in Single Entry system (Murthy, 2019)

Text Books

- 1) Jain, S., & Narang, K. (2020). (2020) *Financial Accounting*. New Delhi, India: Kalyani publishers.
- 2) Reddy, T.S. & Murthy A., , (2020) *Financial Accounting* . Chennai, India: Margham Publications,
- 3) Maheswari S.N. & Maheswari, S.K. (2005), *Financial Accounting*, New Delhi, India: Vikas Publishing House Pvt Ltd.

Supplementary Readings

- 1) Gupta . R.L. & V.K. Gupta, (2006), *Financial Accounting*. New Delhi, India: Sultan Chand& Sons,
- 2) Gupta R.L. & M. Radhaswamy, (2006), *Advanced Accountancy Volume I*, New Delhi, India: Sultan Chand & Sons.
- 3) Jain S.P. & K.L. Narang, (2004), *Advanced Accountancy Volume I*, New Delhi, India: Kalyani Publishers.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	3	3	2	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

PO – Programme Outcome, CO – Course outcome

1 – Low, 2.– Moderate, 3 – High

SEMESTER: I PART:III	22UCOMC14: BUSINESS ORGANISATION	HOURS: 4 CREDIT: 4
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COURSE OBJECTIVES

- 1) To understand the concept of business and profession
- 2) To identify the different forms of business organization
- 3) To analyse the factors influencing the business location.
- 4) To appraise the working of chamber of commerce and trade associations
- 5) To evaluate the difference between IC, MNC, GC and TNCs)

Unit I: Introduction

Hours: 15

Business–Meaning–Characteristics–Objectives- Criteria for Success in Modern Business –Classification of Business - Profession- Meaning - Distinction between Business and Profession

UNIT–II: Forms of Business Organization

Hours: 15

Sole Trader– Partnership firm–concepts of Limited Liability Partnership firm, Cooperative Societies–Joint Stock Company–Definition–Meaning–Characteristics–Advantages– Limitations– kinds of companies.

UNIT-III: Location of Industry

Hours: 15

Meaning - Theories of Location - Factors Influencing Location - Plant Layout- Definition -Meaning – Objectives - Characteristics of Good Layout - Size of Firm.

UNIT-IV: Business Combination

Hours: 15

Definition - Meaning – Advantages and Limitations – Types of Combination – Chamber of Commerce – Meaning – Advantages and functions – Trade Associations – Features and functions.

UNIT-V: Multinational Corporations (MNC's)

Hours: 15

Definition- Distinction among IC, MNC, GC and TNC-Characteristics of MNC's-cultural impact of MNC's - Factors contributed for the growth of MNC's– Advantages and Disadvantages of MNC's–Control over MNC's–Organization Design and Structure of MNC's.

COURSE OUTCOMES

After the completion of the course, the student would be able to:

- 1) Familiarize with Modern Business and Profession.
- 2) Identify different forms of business organizations viz; Sole Proprietorship, Partnership, Joint stock companies & Co-operative Organizations.
- 3) Acquire knowledge about the locational advantages.
- 4) Understand different forms of business combination and their relative merits.
- 5) Distinguish and outline the characteristics of MNCs, GC and TNCs.

Text Books

- 1) Dinkar Pagare (2020) *Business Organization & Management*, New Delhi, India: Sultan Chand & Sons,.
- 2) Gupta, C.B. (2020) *Business Organization & Management*, New Delhi, Sultan Chand & Sons,
- 3) Reddy P.N & SS Gulshan, *Business Organization*, New Delhi: Eurasia Publishing House (Pvt) Ltd,

Supplementary Readings

- 1) Balaji C D & D. G. Prasad, (2020) *Business Organisation*, Chennai, Margham Publications.
- 2) Kathiresan & Dr Radha, (2021) *Business Organisation*, Chennai, Prasana Publishers.
- 3) Y.K. Bhushan, (2021) *Fundamentals of Business Organisation*, New Delhi, Sultan Chand & Sons.

OUTCOME MAPPING

COs	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

SEMESTER: I CORE PRACTICAL: I PART:III	COMPUTER APPLICATION IN BUSINESS	HOURS: 4
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COURSE OBJECTIVES

- 1) To acquire and apply the computer applications in different aspects of business
- 2) To get an insight knowledge on Ms-office, Ms-excel.
- 3) To know the database maintenance in every type of applications.
- 4) To analyse the various types of charts in Ms.Excel
- 5) To develop the programs in Ms-word and Ms-excel.

LIST OF PROGRAMMES**MS-WORD**

- 1) Text Manipulations.
- 2) Usage of Numbering, Bullets, Tools and Headers.
- 3) Usage of Spell Check and Find and Replace.
- 4) Text Formatting.
- 5) Picture Insertion and Alignment.
- 6) Creation of Documents Using Templates.
- 7) Creation of Templates.
- 8) Mail Merge Concept.
- 9) Copying Text and Picture From Excel.
- 10) Creation of Tables, Formatting Tables.

MS-EXCEL

- 1) Creation of Worksheet and Entering Information.
- 2) Aligning , Editing Data in Cell .
- 3) Excel Function (Date , Time, Statistical, Mathematical, Financial Functions).
- 4) Changing of Column Width and Row Height (Column and Range of Column).
- 5) Moving, copying, Inserting and Deleting Rows and Columns.
- 6) Formatting Numbers and Other Numeric Formats.
- 7) Drawing Borders Around Cells.
- 8) Creation of Charts Raising Moving
- 9) Changing Chart Type.
- 10) Controlling the Appearance of a Chart.

COURSE OUTCOMES

After the completion of course, the students would be able to:

- 1) Work with the required skills in Ms Office for office administration.
- 2) Work with the required set in MS Excel.
- 3) Use various math functions of MS Excel in business calculation.
- 4) Work with draw graphs using MS Excel.
- 5) Extract data using filter option in MS Excel.

OUTCOME MAPPING

COs	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	2	2	3	3	3
CO3	3	3	2	3	3
CO4	3	2	3	2	3
CO5	3	3	3	3	3

PO – Programme Outcome, CO – Course outcome

1 – Low, 2 – Moderate, 3 – High

SEMESTER: I SKILL BASED: I PART III	22UCOMS16: PRINCIPLES OF MARKETING	CREDIT: 2 HOURS: 2
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COURSE OBJECTIVES

- 1) To conceptualize an idea about marketing and related terms
- 2) To provide insight about various forms and types of marketing
- 3) To analyze various components of Promotion
- 4) To understand various concepts relating to Pricing
- 5) To introduce the components of marketing mix

Unit I :Introduction

Hours: 6

Meaning of market – classification of markets- meaning and definition of marketing features of marketing – importance of marketing – difference between marketing and selling – Evolution of marketing concepts - functions of marketing

Unit II: Market Segmentation

Hours:6

Meaning and definition of market segmentation – different patterns of market segmentation – Bases for segmenting consumer markets – benefits and limitations of market segmentation

Unit III: Marketing Mix

Hours:6

Definition and components of marketing mix - four P's of marketing mix - definition of product - features of a product - classification of products - stages in new product development - product life cycle

Unit IV: PRICING

Hours:6

Price - Meaning - Pricing- Importance - Objectives- Factors affecting pricing decisions Pricing Policies- Procedure for price determination- Kinds of Pricing.

Unit V: PROMOTION

Hours:6

Sales Promotion - Personal Selling - Meaning - Purpose - Types - Advantages - Limitations - Factors to be considered on Personal Selling. Advertising- Meaning and definition- Medias - Advantages- Limitations -Advertising copy -Definition - Elements of an Advertisement copy - Introduction to Cinema Advertising, Social Media Advertising, Web Advertising, and Mobile Advertising.

COURSE OUTCOMES

On Successful completion of the course, student will be able to

- 1) Know the basic principles and practices of marketing.
- 2) Understand about market segmentation
- 3) Understand the pricing mechanism of marketing.
- 4) Understand the types of pricing
- 5) Understand the concepts of Sales Promotion

Text Books

- 1) Modern Marketing principles & practices, R.S.N.Pillai&Bagavathi, S. Chand & co ltd., New Delhi.
- 2) Marketing, Dr.Rajan Nair &SanjithR Nair, S. Chand & co ltd, New Delhi
- 3) Marketing an Introductory Text, Dr. N. Rajan Nair, Sultan Chand & Sons, New Delhi

Supplementary Readings

- 1) Marketing Management, Philip Kotler, Prentice Hall of India, and New Delhi.
- 2) Fundamentals of Marketing, Stanton William CherlesFutrell, TataMc Grew Hill, New Delhi.
- 3) L. Natarajan, Marketing, Margham Publications, Chennai

OUTCOME MAPPING

COs	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3

PO – Programme Outcome, CO – Course outcome

1 – Low, 2.– Moderate, 3 – High

SEMESTER: II CORE: III PART:III	22UCOMC23: FINANCIAL ACCOUNTING - II	HOURS:5 CREDIT:4
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COURSE OBJECTIVES

- 1) To give an insight about Account Current and Average Due Date
- 2) To understand the branch accounts and its types
- 3) To have practical knowledge in the preparation departmental accounting
- 4) To familiarize with accounting procedure on Partnership – Admission and Retirement
- 5) To acquire practical knowledge in Partnership accounts on Dissolution

Unit I : Average Due Date and Account Current

Hours: 15

Average Due Date - meaning of Average due date-Uses of Average due date-basic problems in average due date-calculation of interests. Account Current-counting of days-methods of calculating interests-simple problems

Unit II: Branch Accounts

Hours: 15

Branch – Meaning - Types of branches - Department branches – difference between branch and Department – Preparation of trading account of branches under debtor system – Stock and debtors’ system – whole sale branch system and Final account systems.

Unit III: Departmental Accounts

Hours: 15

Introduction – Allocation of expenses – Calculation of department purchase Interdepartmental transfers at cost price – Selling price – Preparation of Trading and Profit & Loss account of the department.

Unit IV: Partnership - Admission and Retirement

Hours: 15

Accounting Treatments - Admission of partner – Retirement of Partner – Death of Partner. Adjustments Regarding profit sharing Ratio, Good will and Capital (Simple Problems)

Unit V: Partnership – Dissolution

Hours: 15

Dissolution of firm – Modes of dissolution – insolvency of a partner - Garner Vs. Murray rule - Insolvency of all partner – Piecemeal distribution – proportionate capital method - Maximum loss Method (simple problems)

COURSE OUTCOMES

At the completion of course, the learners would be able to:

- 1) Understand the concept and gain the knowledge on Average Due Date and Account Current.
- 2) Be familiar with the nuances of different systems of accounting followed in Branches.
- 3) Acquire the knowledge about Departmental Accounts.

- 4) Be acquainted with the accounting treatments required for admission, retirement and death of partners in Partnership firms.
- 5) Understand the accounting procedures involved in the Dissolution of firm under different situations.

Text Books

- 1) Jain, S.P., Narang, K.L., (2020). *Financial Accounting*. New Delhi: India: Kalyani publishers,.
- 2) Reddy, T.S. & Murthy A., (2020) *Financial Accounting*. Margham Publications, Chennai, India
- 3) Maheswari S.N. & Maheswari, S.K. (2005), *Financial Accounting*, Vikas Publishing House Pvt Ltd. New Delhi, India

Supplementary Readings

- 1) Gupta & V.K. Gupta, (2006), *Financial Accounting*. New Delhi, India: Sultan Chand & Sons,
- 2) Gupta . R.L. & M. Radhaswamy, (2006), *Advanced Accountancy Volume I*, New Delhi, India: Sultan Chand & Sons.
- 3) Jain S.P. & K.L. Narang, (2004), *Advanced Accountancy Volume I*, New Delhi, India: Kalyani Publishers.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	2	3	2	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	2	3	3	3	2

PO – Programme Outcome, CO – Course outcome
 1 – Low, 2.– Moderate, 3 – High

SEMESTER : II CORE PRACTICAL: I PART: III	22UCOMP24: COMPUTER APPLICATION IN BUSINESS	CREDITS : 4 HOURS : 75
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**Lab Assignment for Computer Application in Business (Practical Only) Lab
Assignment for MS Word (Model Questions)**

- 1) Use mail merge feature of word processor to do the following: Write a letter to invite some of your friend to attend a seminar on your college.
- 2) Make a resume or Bio Data
- 3) Prepare a company letter head using logo
- 4) Draft covering letter for a job along with your resume
- 5) Design a certificate for your college seminar in landscape mode along with border in MS word
- 6) Design an invoice bill using MS Word
- 7) Create the following documents: A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
- 8) Prepare a table in MS word containing Serial no, Name of the Students, Subject Name, and Total
- 9) Copy a document to a new document and align paragraph, line spacing, font size on the new document

Lab Assignment for MS EXCEL (Model Questions)

- 1) Create a student worksheet containing roll numbers, name, sex, address email and phone number
- 2) Create an invoice design using MS Excel
- 3) Create a worksheet for students contain Name, Subject Name, Total Average mark for a student and overall percentage of Subject.
- 4) Create a table in worksheet

Name	Quantity	Price	Gross	Discount 5%	Net
Rice	500	40			
Wheat	500	35			
Oil	250	170			
Sugar	300	40			

Use the formula and drag for other cells

- 5) Enter the data in worksheet

Department	Marks
English	80%
Commerce	90%
Maths	85%
Computer Science	70%

Based on these data draw chart (Pie, Bar, Line etc)

6) Create the following in Worksheet

Roll No.	Employee Name	Basic	DA	Gross Salary

Use Formula for the calculation of DA and Gross Salary

Sort the items in descending order depending upon the gross salary Create a Bar chart to show Name and Gross Salary

7) Create the following Spreadsheet

Roll No.	Name	Marks	Grade

Assign Grade using conditioning – “if”

8) Principal Amount: 2, 00,000 Rate of interest : 5% Time period : 10 years
Amount to be paid: ?

From the above, calculate the amount payable per annum and also show the effect on amount by changing: a) Rate of Interest to 3% and 8%; b) Time period to 5 Years and 3 Years.

9) Draw a Bar diagram for your class showing number of pass and fail for each subject.

Lab Assignment for MS POWERPOINT (Model Questions)

- 1) Prepare a power point slide for your department including Vision mission Objectives of the department, Students Strength, Faculty Profile, Alumni of the department
- 2) Prepare a power point slide for Unit 1
- 3) Prepare a power point slide for college including Vision mission Objectives of the College, Students Strength, Faculty Profile, Alumni Details, Facilities, Library
- 4) Prepare a PowerPoint slide based on your resume.
- 5) Prepare a PowerPoint slide for your subject based on teachers' discretion.

Lab Assignment for INTERNET (Model Questions)

- 1) Download a File on “Internet” from a website by using a search engine
- 2) Book Online Tickets to Chennai. (Train and Bus)
- 3) Using Search Engine, download information on Benefits of Yoga.
- 4) Open an email account in your names
- 5) Write e-mail to Pradip by marking a blind copy to ramu
- 6) Select two electronics items by e-shopping.
- 7) Register yourself on job portal (nakuri.com)
- 8) Download a Three PDF for any of your subject on internet
- 9) Download information about greatness of Himalayas for tourism interest

University Examination: Practical Only

Question Pattern : Internal (40 Marks) External (60 Marks)

SEMESTER: II SKILL BASED: II PART:III	22UCOMS26: ADVERTISING AND SALESMANSHIP	CREDIT: 2 HOURS: 2
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COURSE OBJECTIVES

- 1) To understand the concept of advertising
- 2) To enable the students to have practical knowledge about advertising agencies
- 3) To familiarize about recent trends in advertising
- 4) To have knowledge on fundamental concept of salesmanship
- 5) To understand the duties and responsibilities of salesmanship

Unit I : Introduction**Hours: 6**

Definition of Advertising- Origin and Development of Advertising -Objectives - Nature-Scope of Advertising- -Functions -Types -Benefit

Unit II: Advertising-Media-Agencies**Hours:6**

Advertisement copy - Advertising media- Advertising Agencies.

Unit III: Trends in Advertising**Hours:6**

Recent trends in advertising - Economic aspects of Advertising- Social and Ethical aspects of Advertising.

Unit IV: Meaning and Objectives of Salesmanship**Hours:6**

Definition of Salesmanship -Features -Objectives- Recruitment of a salesman- Qualities of Good Salesman

Unit V: Duties and Responsibilities of Salesmanship**Hours: 6**

Advantages of Salesmanship- Distinction between Salesmanship and Advertising- Types of Salesmanship- Functions, Duties and Responsibilities of a Salesmanship.

COURSE OUTCOMES

On Successful completion of the course, student will be able to

- 1) Impart knowledge on advertising.
- 2) Get familiarized about advertising agencies.
- 3) Get familiarized about recent trends in advertising.
- 4) Acquire knowledge on fundamental concept of salesmanship.
- 5) Impart knowledge on duties & responsibilities of salesmanship.

Text Books

- 1) Advertising (Principles and Practices), Chunawalla K.C. Sethiax.
- 2) Advertising Marketing and Sales Management, G.R. Basotia N. K Sharama, Mangal Deep Jaipur.
- 3) Essentials of Marketing, Dr. K. Sundar, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Supplementary Readings

- 1) Advertising Management, Dr. M.M. Varma, R. K. Agarwal, Forward 300K Depot, New Delhi.
- 2) Advertising Management, Mahendra Mohan, Tata Mcgraw-hill Publishing Company
- 3) Modern Marketing (Principles and Practices)- R.S.N. Pillai&Bagavathi- S. Chand & Co New Delhi

OUTCOME MAPPING

COs	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3

PO – Programme Outcome, CO – Course outcome

1 – Low, 2.– Moderate, 3 – High

		Course Title	hrs /week			CIA	Uni. Exam	Total	
SEMESTER III						CIA	Uni. Exam	Total	
16.	III	Core Theory	Paper-5	6	5	Corporate Accounting I	25	75	100
17.	III	Core Theory	Paper-6	5	4	Legal Aspects of Business	25	75	100
18.	III	Core Theory	Paper-7	4	3	Business Correspondence	25	75	100
19.	III	Core Theory	Paper-8	4	3	Business Statistics and Operation Research	25	75	100
20.	III	ALLIED-2	Paper-3	6	3	Business Economics I	25	75	100
21.	IV	Skill based Subject	Paper-1	3	2	Computer Applications in Business	25	75	100
22.	IV	Non-major elective	Paper-1	2	2	General commercial Knowledge	25	75	100
				30	22		175	525	700
SEMESTER IV						CIA	Uni. Exam	Total	
23.	III	Core Theory	Paper-9	5	4	Corporate Accounting II	25	75	100
24.	III	Core Theory	Paper-10	5	4	Business Management	25	75	100
25.	III	Core Theory	Paper-11	5	3	Company Law	25	75	100
26.	III	Core Theory	Paper-12	4	3	Modern banking	25	75	100
27.	III	ALLIED-2	Paper-4	6	5	Business Economics II	25	75	100
28.	IV	Skill based Subject	Paper-2	3	2	e- Commerce	25	75	100
29.	IV	Non-major elective	Paper-2	2	2	Advertisement and Salesmanship	25	75	100
				30	23		175	525	700
SEMESTER V						CIA	Uni. Exam	Total	
	III	Core Theory	Paper-13	6	4	Cost accounting I	25	75	100
	III	Core Theory	Paper-14	5	4	Practical Auditing	25	75	100
	III	Core Theory	Paper-15	6	5	Management Accounting	25	75	100
	III	Core Theory	Paper-16	6	4	Income Tax Law and Practice I	25	75	100
	III	Elective	Paper-1	4	3	(to choose 1 out of 3) 1. Entrepreneurial Development 2. Business Environment 3. Management Information System	25	75	100
	IV	Skill based Subject	Paper-3	3	2	Principles of marketing	25	75	100
				30	22		150	450	600
SEMESTER VI						CIA	Uni. Exam	Total	
34	III	Core	Paper-17	5	4	Cost accounting II	25	75	100

SEMESTER III

CORE PAPER - 5

CORPORATE ACCOUNTING -I

Objectives:

1. To help the students to understand the basic concepts relating to issue and redemption of shares.
2. To enable the students to prepare company final accounts and to understand accounting treatment on acquisition of business.

UNIT - I

ISSUE OF SHARES

Issue of Shares - Introduction -Meaning and types of shares- Features and Kinds of Companies-Under Subscription and Over Subscription-Issue of shares at par ,premium and at discount-Calls-in-arrears-Calls-in-advance-Forfeiture of Shares - Reissue of Forfeited shares-Balance Sheet (Revised Schedule VI).

UNIT - II

REDEMPTION OF PREFERENCE SHARES

Introduction - Meaning - Provision of the Companies Act Section 80 and 80A -Steps Involved in Redemption of Preference Shares - Balance Sheet (Revised Schedule VI).

UNIT- III

ACQUISITION OF BUSINESS

Introduction-Meaning- Accounting treatment for acquisition of business in the books of vendor and purchaser -When new set of books are opened- Debtors and Creditors taken over on behalf of vendors-When same set of books are continued-When Debtors and Creditors are not taken over.

UNIT - IV

PROFITS PRIOR TO INCORPORATION

Introduction - Meaning-Methods of Ascertaining profit or loss prior to incorporation-Basis of Apportionment of Expenses.

UNIT - V

FINAL ACCOUNTS OF COMPANIES

Introduction -Preparation of statement of profit and loss (Part II of Revised Schedule VI) - Preparation of Balance Sheet (Part I of Revised Schedule VI)-Managerial Remuneration.

TEXTBOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
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1.	R.L.Gupta and M.Radhaswamy	Advanced Accountancy (Volume I)	Sultan Chand & Sons- New Delhi.
2.	Shukla MC, Grewal TS & Gupta SC	Advanced Accounts, Vol. II,	S. Chand & Company Ltd, New Delhi

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	S.P.Jain and K.L.Narang,	Corporate Accounting (Volume I)	Kalyani Publishers- Ludhiana.
2.	T.S.ReddyandA.Murthy	Corporate Accounting (Volume I)	Margham Publications- Chennai.
3.	S.P.Iyengar	Advanced Accountancy (Volume I),	Sultan Chand & Sons- New Delhi.
4.	Dr .R. Rangarajan and Dr. V. Chandrasekaran, S.Viswanathan	Corporate Accounting	(Printers and Publishers) Pvt. Ltd.,- Chennai.

E-Material

1.www.universityofcalicut.info > syl > bcomiisem197

Course Out Comes

Units	CO Statement
Unit - I After studied unit-1, the student will be able to	Understand the basic concepts relating to issue of shares and make accounting entries.
Unit - II After studied unit-2, the student will be able to	Make accounting entries for and redemption of preference shares.
Unit - III After studied unit-3, the student will be able to	Be acquainted with accounting treatment for acquisition of business.
Unit - IV After studied unit-4, the student will be able to	Understand the accounting procedures related to Profits Prior to Incorporation
Unit - V After studied unit-5, the student will be able to	Prepare Company Final Accounts & Company Balance Sheet.

CORE PAPER - 6

LEGAL ASPECTS OF BUSINESS

Objectives

1. To make the students to gain the Basic Knowledge in Business Law.
2. To enable the students to understand and deal with various contracts in his day-to-day life, be it for his business or profession.

UNIT -I

INDIAN CONTRACT ACT 1872(INTRODUCTION AND ESSENTIAL ELEMENTS)

Law - Meaning - Objectives - Need for the Knowledge of Law. Law of Contract - Contract- Definition - Agreement and its Enforceability - Consensus Ad Idem - Essential Elements of a Valid Contract - Classification of Contracts.Offer and Acceptance - Legal Rules as to Offer and Acceptance - Communication of Offer, Acceptance and Revocation.

UNIT -II

INDIAN CONTRACT ACT 1872(OTHER ESSENTIAL ELEMENTS)

Consideration - Definition - Meaning - Legal Rules as to Consideration - Valid Contracts without Consideration. Capacity to Contract - Agreements with Minor - Minor's Liability for Necessaries Free Consent - Coercion - Undue Influence - Fraud - Misrepresentation - Mistake. Agreements Opposed to Public Policy.

UNIT -III

INDIAN CONTRACT ACT 1872 (SPECIAL CONTRACTS)

Contingent Contract-Modes of Discharge of Contract -Remedies for Breach of Contract - Quasi ContractSpecial Contracts: Bailment and Pledge - Indemnity and Guarantee-

UNIT -IV

SALE OF GOODS ACT 1930

Goods-Classification of Goods-Contract of Sale-Sales and Agreement to Sell-Conditions and Warranties -Performance of Contract of Sale-Doctrine of Caveat Emptor” - Rights of Unpaid Seller.

UNIT -V

CONSUMER PROTECTION ACT, 1986

Introduction- Objectives of the Act-Definitions-Deficiency in services-Role of Central and State Consumer Protection Council - Consumer Disputes Redressal Agencies: District Forum, State Commission and National Commission: Jurisdiction - Composition - Appeal.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	N.D.kapoor	Business Law	Sultan Chand, New Delhi.
2.	R.S.N. Pillai and Bagavathi	Business Law	Chand & co, New Delhi.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	P.C. Tulsian	Business Law	Tata McGraw Hill, New Delhi.
2.	P. Saravanavel& S. Sumathi	Legal Aspects of Business	Himalaya publication, New Delhi.
3.	M.R. Sreenivasan	Business Law	Margham publication, Chennai.
4.	AkhilashwarePathek	Legal Aspects of Business	Tata MCGraw Hill, , New Delhi.
5.	M.C. Kuchal	Business Law	Vikas Publication, , New Delhi.

E-Material

1. https://www.icai.org/post.html?post_id=13821 - e material
2. https://www.dphu.org/uploads/attachements/books/books_3498_0.pdf- e material
3. <https://www.youtube.com/watch?v=8zaTVt0Qf9c>- Indian Contract Act, 1872 by CA ShivangiAgrawal- e content
4. <https://www.youtube.com/watch?v=HIuiDzdIIInM>-sale of goods act 1930 full lecture

Course Out Comes:

Units

CO Statement

Unit - I	After studied unit-1, the student will be able to	Know the framework of Indian Contract Act 1872.
Unit - II	After studied unit-2, the student will be able to	Understand the other essential elements of Indian Contract 1872.
Unit - III	After studied unit-3, the student will be able to	Aware the provisions of Special Contracts and Modes of Discharge.
Unit - IV	After studied unit-4, the student will be able to	Acquire Knowledge of Sale of Goods Act 1930.
Unit - V	After studied unit-5, the student will be able to	Consciousness on Consumer Protection Act 1986 .

CORE PAPER - 7

BUSINESS CORRESPONDENCE

Course Objectives

1. To acquire knowledge about basic concepts of business Correspondence
2. To quire knowledge about business communication.
3. To understand structure and layout business letter
4. To acquire the knowledge of types of business letter
5. To gain knowledge about the Letters of Application with CV, Resume.
6. To enable the business report and its types

UNIT-I

INTRODUCTION

Features of business communication - Importance of effective communication in business - classification of communication - characteristics and Guidelines of effective business communication.

UNIT-II

BUSINESS LETTERS-(LAY OUT)

Preparation of business letters - Basic principles in drafting - Appearance, structure and layout - letter style

UNIT-III

TYPES OF BUSINESS LETTERS

Various Types of Business Letters - Letters of Enquiry - Offers, Quotations, orders, and complaints

UNIT-IV

Letters of Application

Letters of application - Essential Qualities - Letters of Application with CV, Resume - Application in response to an advertisement.

UNIT-V

BUSINESS REPORT

Business Reports - Importance - Characteristics - Types - Reports by individuals and committees

Text Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Ramesh and Pattanchetti.R	Business Communication	Chand&Co
2.	Rajendra Pal and J.S.Korlahall	Essentials of Business communication	
3.	Dr.K.Sundar and Dr.A.Kumara raj	Business Communication	Vijay Nicoles Imprints Pvt., Ltd.,
4.	Herta Murphy	Effective business Communication	McGraw Hill Education
5.	MadhukantJha	Business Communication	Gyan books.

Course Out Comes

Units	CO Statement
Unit - I After studied unit-1, the student will be able to	The student will be able to understand the basic concepts of business correspondence.
Unit - II After studied unit-2, the student will be able to	The students will be able to prepare the business letter and letter style.
Unit - III After studied unit-3, the student will be able to	The students will be able to know the different types of business letter's, offers, orders and complaints.
Unit - IV After studied unit-4, the student will be able to	The students will able to acquire the knowledge of preparing letters of application with cv, resume etc.
Unit - V After studied unit-5, the student will be able to	The students will be able to understand the types and characteristics of business report.

CORE PAPER - 8

BUSINESS STATISTICS AND OPERATIONAL RESEARCH

Course Objectives

1. To develop skills in analysis and interpretation of data.
2. How to measure Central Tendency and their application in business.
3. To measure the degree and direction of relationship between the variables in business.
4. Index Numbers and Time series are the most important widely used statistical device, students get familiarize
5. To solve challenging problems by using appropriate statistical tools.

UNIT-I

Statistics -Definitions -Scope and Limitations -Collection of Data -Primary and Secondary Data -Questionnaire -Classification and Tabulation -Diagrammatic and graphical representation of data- Measures of Central tendency -Mean -Median -Mode -Combined Mean.

UNIT-II

Measures of Dispersion -Range -Quartile deviation -Mean Deviation -Standard Deviation - Coefficient of Variation-Lorenz Curve - Measures of Skewness -Karl Pearson's and Bowley's Coefficient of Skewness- Kurtosis -Characteristics of Kurtosis -Measures - Calculation.

UNIT-III

Correlation -Definition - Karl Pearson's Coefficient of Correlation - Rank Correlation - Regression Analysis - Simple regression- Regression equations.

UNIT-IV

Index Number -Definition -Uses -Weighted Index -Laspeyre's Paasche, Drobish Bowley's - Marshall Edge worth, Fisher Ideal Index -Time and Factor Reversal Test -Cost of Living Index - Time Series -Definition and Uses -Components -Semi Average, Moving Average - Method of Least Square -Seasonal Variation -Simple Average Method.

UNIT-V

Linear programming- Formation of LPP- Graphical method - Simplex method- Maximization Function- Minimization Function (Simple Problems only)- Transportation problems- North West Corner Method - Least Cost Method- Vogel's Approximation Method - Assignment problem- Balanced Hungarian Assignment Method.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr. S.P. Gupta	Business Statistics & Operation Research	Sultan Chand.
2.	PA. Navanitham	Business Statistics & Operation Research	Jai Publications, Trichy.
3.	S.P. Rajagopalan& R. Sattanathan	Business Statistics & Operation Research 3 rd Edition	Vijay Nicole Publications, Chennai.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr. S.P. Gupta	Statistical Methods	Sultan Chand.
2.	R.S.N. Pillai&Bhagavathi	Statistics.	
3.	J.K. Sharma	Business Statistics	Pearson Education.
4.	B. Agarwal	Basic Statistics	Wiley Eastern.

E MATERIALS

www.southampton.ac.uk

www.quora.com

www.pondiuni.edu.in

Course Out Comes

Units	CO Statement
Unit - I After studied unit-1, the student will be able to	Acquired skills in analysis and interpretation of data.
Unit - II After studied unit-2, the student will be able to	Gained knowledge on measures of Central Tendency and their application in business
Unit - III After studied unit-3, the student will be able to	Learned about Correlation and Regression
Unit - IV After studied unit-4, the student will be able to	Get familiarized about Index Numbers and Time series
Unit - V After studied unit-5, the student will be able to	Solved challenging problems by using appropriate statistical tools.

ALLIED - 2

PAPER - 3

BUSINESS ECONOMICS – I

Course Objectives

1. The main objective of this paper is to apply in business decision making, demand, utility, demand forecasting and production.
2. The students understand the role and responsibilities of Business.
3. Understands Utility concept.
4. The students acquires the knowledge of the Demand forecasting and methods of Forecasting.
5. Gains knowledge of production function and returns to scale.

UNIT: I Introduction

Introduction to Business Economics - Objectives of Business - Profit maximization – Importance of Business – Scope of Business - Social responsibility of Business.

UNIT: II Demand Analysis

Demand analysis – Demand Function - Demand schedule - Demand curve - Different types of Elasticity of demand - Measurement - Importance of elasticity of demand.

UNIT: III Utility Analysis

Utility analysis - Cardinal - Ordinal - The law of diminishing marginal utility - Equi-Marginal utility - Indifference curve analysis.

UNIT: IV Demand Forecasting

Demand Forecasting – Meaning – Objectives – Purpose – Steps involved in Demand Forecasting - Types of Demand Forecasting.

UNIT: V Production

Production - Production function - The law of variable proportions - Economies of scale - Law of returns to scale.

Text Books

Unit-I: S. Sankaran, Business Economics, Margham Publications, Chennai

Unit-II: S. Sankaran, Business Economics, Margham Publications, Chennai.

Unit-III: S. Sankaran, Business Economics, Margham Publications, Chennai.

Unit-IV: S. Sankaran, Business Economics, Margham Publications, Chennai

Unit-V: S. Sankaran, Business Economics, Margham Publications, Chennai

Reference Books:

1. K.P.M Sundaram and E.N. Sundaram, Business Economics, Sultan & Chand, New Delhi.
2. H.L. Ahuja, Business Economics, S.Chand, New Delhi.

3. Mote; Samuel Paul and G.S.Gupta, Managerial Economics, Concepts & Cases, Tata McGraw Hill.
4. Cauvery. , Managerial Economics, S. Chand & Co. New Delhi.
5. H.L.Ahuja, Managerial Economics,S Chand and Co ltd,NewDelhi.Sankaran,. S, Managerial Economics, Margham Publication.

E - Resources

1. www.tutorialspoint.com/managerial_economics/...
2. www.yourarticlelibrary.com/managerial-economics/...
3. economicsconcepts.com/managerial_economics.htm
4. www.tutorialspoint.com/managerial_economics/...
5. www.economicdiscussion.net/managerial-economics/notes...
6. www.simplynotes.in/managerial-economics/characteristics...
7. www.managerial-economics-club.com/managerial...
8. www.ebookphp.com/managerial-economics-epub-pdf
9. www.simplynotes.in/importance-managerial-economics
10. www.scholarpol.com/nature-and-scope-of-managerial-economics

Course Out Comes

1. After studied unit-1, the student will be able to understand the concept of Business Economics, Objectives and scope.
2. After studied unit-2, the student will be able to gain knowledge of the demand and elasticity of demand.
3. After studied unit-3, the student will be able to gain knowledge on Utility concept .
4. After studied unit-4, the student will be able to acquire Knowledge of Demand forecasting and Demand Forecasting methods.
5. After studied unit-5, the student will be able to gain knowledge of Production Function and Returns to scale

SKILL BASED SUBJECT
PAPER -1
COMPUTER APPLICATIONS IN BUSINESS

Course Objectives

1. Identify computer concepts terminology and concepts, basic operating system functionality and terminology
2. To apply basics and advanced formatting techniques, skills to produce word processing documents
3. Demonstrate basic skills involving working with MS excel sheet functions, create formulas, charts and graphs, manipulate data and generate reports
4. Develop a database; create and format tables, queries and reports; enter and modify table data.
5. Develop and deliver business presentations using presentation

UNIT -I

Introduction to computer- characteristics of computer- history of computer- computer generation -hardware - software- system software and application software.

UNIT - II

MS - word processing: starting MS word- ms word environment - working with word documents.

UNIT - III

Ms excel -ms excel sheet-ms excel environment - working with excel workbook - worksheet- formulas and functions - inserting charts - printing in excel - free worksheet(ms excel)- ms power point - starting ms power point -ms power point environment- working with power point - working with different views - designing , presentation & printing in power point.

UNIT - IV

Programming under a DBMS environment - the concept of the data base management system; data field, records, and files, sorting and indexing data; searching records. Designing queries, and reports; linking of data files ; understanding programming environment in DMBS ; developing menu drive applications in query languages(MS- Access).

UNIT - V

Electronic commerce - types -advantages and disadvantages - electronic data interchange (EDI) working of EDI- EDI benefits & limitation - future of EDI - FEDI- smart card - smart card application.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Anathishehasaayee	Computer Application in Business and Management	Margam Publication.
2.	leon& Leon	Computer Applications in Business	VjayNicholes imprint pvt.ltd- Chennai.

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.K.Taxali,	Pc Software for Windows Made Simple	Tata Mcgraw Hill publications - India 2010
2.	Hebert Schildt	Windows 2000 Programming from the ground up	Tata McGraw Edition 2000
3.		ComadexComputer Course Kit, Training Kit For Windows 98/me , word , excel, access 2000 and internet dream tech press.	

E- MATERIALS

www.ggu.ac.in

www.ddegjust.ac.in

www.scribd.com

Course Out Comes

Units	CO Statement
Unit - I After studied unit-1, the student will be able to	Gainedbasic knowledge about computer concept and terminology
Unit - II After studied unit-2, the student will be able to	Acquired skills to produce word processing documents
Unit - III After studied unit-3, the student will be able to	Demonstrated basic skills involving MS excel sheet
Unit - IV After studied unit-4, the student will be able to	Acquired skills on data base
Unit - V After studied unit-5, the student will be able to	Enhanced knowledge on business presentation by using presentation software.

NON-MAJOR ELECTIVE PAPER -1

Course Objective

1. To enable the students of gain basic knowledge of Trade,Commerce and Industry.

UNIT - I

Business - Commerce -Industry- Trade - Profession - Meaning-Scope - Importance-Kinds- Economic Basis of Commerce.

UNIT - II

Forms of Business organization - Sole Trade- Partnership Firm-Features-Merits-Demerits - Co-Operative Societies -Features-Types-Advantages.

UNIT - III

Joint stock Company-Features-Memorandum and Articles-Contents-Prospectus.

UNIT - IV

Stock Exchange - Function - Types - Regulation of Stock Exchanges in India.

UNIT-V

Trade association - Chamber of commerce - Functions - Objectives - Working in India.

Note: Questions in Sec. A, B & C - 100 % Theory.

Text Books:

S.no	Authors	Title	Publishers
1	Ghosh and Bhushan	General Commercial Knowledge	Sultan Chand & Sons, New Delhi.
2.	R.N. Gupta	Business organization & Management	S. Chand & Co. New Delhi.

Reference Books:

S.No	Authors	Title	Publishers
1.	P.N.Reddy&S.S.Gulshan	Commerce - Principles & Practice	S. Chand & Co. New

Delhi.

2. C.D.Balaji&Dr.G.Prasad Business organization Margham Publications,
Chennai.

Reference journals:

1. Arabian Journal of Business and Management Review,
2. International Public Management Journal,
3. International Small Business Journal,
4. Journal of Business and Psychology,
5. journal of International Management,

E-Materials:

1. E-book Business organization by H. E Morgan
2. Business Organisation - sbpd publication

Course Out Comes

Units	CO Statement
Unit - I After studied unit-1, the student will be able to	To gain knowledge about Commerce, Trade, Industry.
Unit - II After studied unit-2, the student will be able to	To learn about Forms of Business organization.
Unit - III After studied unit-3, the student will be able to	To acquire knowledge about Company.
Unit - IV After studied unit-4, the student will be able to	To know about Stock Exchange
Unit - V After studied unit-5, the student will be able to	To impart effective knowledge about Trade association and Chamber of commerce

SEMESTER IV

CORE PAPER - 9

CORPORATE ACCOUNTING -II

Objectives:

1. To enable the students to acquire knowledge in valuation of shares and goodwill.
2. To enable the students to understand the Liquidation, accounting procedure and various business combinations.

UNIT - I**VALUATION OF GOODWILL AND SHARES**

Goodwill-Introduction-Meaning-Definition-Need-Factors Affecting Value of Goodwill-Methods-Average profit method-Weighted Average-Super profit method-Annuity method-Capitalization Method. Shares-Introduction-Meaning-Definition-Need-Factors affecting valuation of shares-Methods-Net asset method-Yield method-Fair value method.

UNIT- II**ALTERATION OF SHARE CAPITAL AND INTERNAL RECONSTRUCTION**

Introduction-Meaning-Different kinds of alteration of share capital-Capital reduction-Procedure for reduction of share capital.

UNIT- III**AMALGAMATION, ABSORPTION AND EXTERNAL RECONSTRUCTION**

Amalgamation-Introduction-Meaning (Accounting Standard 14)-Types of amalgamation-Amalgamation in the nature of Merger-In the nature of Purchase-Computation of Purchase Consideration- Entries in the books of the transferor and transferee-Absorption-Meaning-Accounting treatment-External Reconstruction- -Meaning-Accounting treatment (Intercompany holding excluded).

UNIT - IV**HOLDING COMPANIES**

Meaning and definition of Holding and Subsidiary - Capital Profit-Revenue profit-Minority Interest-Goodwill/Capital reserve-- Elimination Of Common Transactions -Unrealised profit - Revaluation of Assets and Liabilities - Bonus Shares -Preparation of consolidated balance sheet (As per Revised Schedule VI).

UNIT - V**BANKING COMPANY ACCOUNTS**

Accounts of Banking Companies - Rebate on bill discounted-Non - Performing assets and their treatment - Provision for doubtful debts- Preparation of profit and loss accounts (Form 'B' of Schedule III) and Balance Sheet (Form 'A' of Schedule III).

TEXTBOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.L.Gupta and M.Radhaswamy	Advanced Accountancy	Sultan Chand & Sons- New Delhi.
2.	Shukla MC, Grewal TS & Gupta SC	Advanced Accounts, Vol. II	S. Chand & Company Ltd, New Delhi

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	S.P.Jain and K.L.Narang	Corporate Accounting (Volume II)	Kalyani Publishers- Ludhiana.
2.	T.S.ReddyandA.Murthy	Corporate Accounting (Volume II)	Margham Publications- Chennai.
3.	S.P.Iyengar	Advanced Accountancy (Volume I),	Sultan Chand & Sons- New Delhi.
4.	Dr .R. Rangarajan and Dr. V. Chandrasekaran, S.Viswanathan	Corporate Accounting	(Printers and Publishers) Pvt. Ltd.,- Chennai.

E-Material

1.www.universityofcalicut.info > syl > bcomiiisem197

Course OutComes

Units	CO Statement
Unit - I After studied unit-1, the student will be able to	Impart the knowledge of valuing shares and goodwill of the company.
Unit - II After studied unit-2, the student will be able to	Understand the accounting procedures related to Alteration of share capitaland Internal Reconstruction.
Unit - III After studied unit-3, the student will be able to	Be acquainted with accounting procedures for Mergers and acquisitions.
Unit - IV After studied unit-4, the student will be able to	Prepare consolidated financial statements of Holding company and its subsidiary companies.
Unit - V After studied unit-5, the student will be able to	Know the accounting procedures related to preparation of bank accounts.

CORE PAPER - 10

BUSINESS MANAGEMENT

Objectives:

1. To familiarize the students with the concepts and principles of management.
2. To provide opportunities to apply the general functions of management in day.

UNIT - I

INTRODUCTION TO MANAGEMENT

Meaning, Definition, Importance, Nature, Management and administration, Functions of Management. Levels of management, roles of manager, Management as a Science or Art, Contribution to management by F.W.Taylor, Henry Fayol, Elton Mayo, Peter F. Drucker and C. K. Prahalad.

UNIT- II

PLANNING

Planning - Meaning, Definition, importance, process, types, methods (Objectives- Policies- Procedures - Strategies & Programmes). Obstacles to effective planning. Decision making - Steps, Types, Decision Tree.

UNIT -III

ORGANISING AND STAFFING

Organization - Importance - Principles of Organisation. Delegation & Decentralization - Departmentation - Span of Management. Organizational structure: line & staff and functional - organizational charts and manual-making organizing effective-Staffing-recruitment - selection-Training, promotion and appraisal.

UNIT- IV

DIRECTING AND MOTIVATING

Function of directing - Motivation - Theories of motivation (Maslow, Herzberg and Vroom's theories) Motivation techniques. Communication - Function - Process - Barriers to effective communication. Leadership-Definition-Theories and approach to leadership-styles of leadership-Types

UNIT - V

CO-ORDINATION AND CONTROL

Meaning, Definition, Nature - Problems of effective coordination. Control - Nature - Basic control process - control techniques (traditional and non-traditional)-Use of Computers in managing information - Concepts of keizen- six sigma.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	C. B Gupta	Business Management	Sultan Chand & Sons, New Delhi.
2.	Dinkarpagare	Principles of management,	Sultan Chand and sons, New Delhi.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
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1.	Koontz, O'Donnell, Weirich	Essentials of Management	Tata McGraw Hill Publishing Company Ltd., New Delhi.
2.	Sherlekar&Sherlekar	Principles of Business Management	Himalaya Publishing House, New Delhi.
3.	L.M.Prasad	Principles and Practices of Management	Sultan Chand and sons, New Delhi.

Course Outcomes

Units	CO Statement
Unit - I After studied unit-1, the student will be able to	Knowledge pertaining to Fundamentals of management
Unit - II After studied unit-2, the student will be able to	Knowledge pertaining to develop planning
Unit - III After studied unit-3, the student will be able to	Understand organising and staffing
Unit - IV After studied unit-4, the student will be able to	Knowledge pertaining to motivation structures.
Unit - V After studied unit-5, the student will be able to	Advanced Programming techniques using control and coordination

CORE PAPER - 11

COMPANY LAW

Course Objective

1. To enlighten the students on the Provisions governing the Company Law.
2. To make the students aware on the recent amendments to Companies Act.

UNIT-I

Introduction - Meaning and Definition of a Company - Characteristics of a Company - Advantages - Limitations - Types of Companies - Distinction between a Private Ltd. Company and a Public Ltd. Company.

UNIT-II

Formation of a Company - Memorandum of Association - Meaning - Contents - Purpose - Articles of Association - Meaning - Contents - Distinction between Memorandum and Articles.

UNIT-III

Prospectus - Meaning - Requirements of a Prospectus - Objects of Issuing a Prospectus - Contents - Civil and Criminal Liability for mis-statement of prospectus -Statement in Lieu of Prospectus.

UNIT-IV

Members of a Company - Meaning and Definition - Who can become a Member?- Rights of the Members - Liabilities of the Members - Termination of Membership.

UNIT-V

Directors of a Company - Definition - Eligibility to become a Director - Number of Directorships - Appointment of Directors - First Directors - Subsequent Directors -Removal of Directors - Powers, Duties and Liabilities of Directors - Winding up of a Company - Meaning - Methods of Winding up.

Note: Questions in Sec. A, B & C - 100 % Theory.

Text Books:

S.no	Authors	Title	Publishers
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1	N.D.Kapoor	Company Law	Sultan & Chand, New Delhi.
2.	P.P.S.Gogna	Company Law	S. Chand, New Delhi

Reference Books:

S.No	Authors	Title	Publishers
1.	Dr.N. Premavathy	Company Law	Sri Vishnu Publications, Chennai
2.	Gaffoor and Thothadri	Company Law, 2nd Edition	Vijay Nicholes Imprint Pvt. Ltd., Chennai.
3.	Kathiresan and Radha	Company law	Prasanna Publishers, Chennai.

Related Journals:

1. Intellectual Property Rights,
2. Political Sciences & Public Affairs,
3. Sociology and Criminology,
4. Journal of Corporate Law Studies,
5. Australian Journal of Corporate Law,
6. India Business Law Journal,
7. Corporate and Commercial Law Journals,
8. Journal of Business Law

E-Materials:

1. [ndkapoor company law free download](#)
2. [company law icsi 2019](#)
3. [company law pdf 2017](#)
4. [general principles of company law](#)
5. [company law lpu](#)
6. [mc kuchhal corporate law](#)

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To learn about Nature, Scope and Kinds of Company
Unit - II	After studied unit-2, the student will be able to	To gain effective knowledge about Formation of a Company
Unit - III	After studied unit-3, the student will be able to	To effectively impart knowledge about Prospectus of company
Unit - IV	After studied unit-4, the student will be able to	To know about Members of Company
Unit - V	After studied unit-5, the student will be able to	To learn about Directors of Company and Winding up of Company

CORE PAPER - 12

MODERN BANKING

Course Objectives

1. To understand the basic Concepts banking
2. To have knowledge about Central Banking
3. Toknown the SBI
4. To acquire knowledge in development Bank.
5. To acquire the recent trend in e-banking

UNIT- I

INTRODUCTION

Brief history of banking - Unit banking - branch banking - structure of Indian financial system - Mixed banking - functions and importance of commercial banks - credit creation of commercial banks

UNIT- II

CENTRAL BANKING

Central banking (special reference to India) - functions - measures / methods of credit control - Quantitative and Qualitative credit control measures

UNIT- III

STATE BANK OF INDIA

State bank of India - Organization - functions - management - Regional Rural Banks (RRBS)

UNIT - IV

DEVELOPMENT BANKING

Development Banking - Industrial Finance Corporation of India (IFC) - Industrial Credit and Investment Corporation of India (ICICI) - Industrial Development of Bank of India(IDBI)

UNIT- V

E-Banking

Electronic Banking: Traditional Banking Vs E-Banking-Facets of E-Banking -E-Banking transactions -Automatic Teller Machine(ATM) at home -Electronic Fund Transfer(EFT)-uses -computerization in clearing houses- Tele banking- Banking on home computers -Electronic Money Transfer -uses of EMT.

Text Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.S.Gurusamy	Banking Theory Law and Practice	Vijay Nicole Imprints Pvts Ltd.,
2.	Dr.V.Balu	Banking and Financial System,	Sri Venkateswara Publications,
3.	B.Santhanam	Banking and Financial System	Sri Margham Publications.
4.	K.P.M.Sundaram and E.N.Sundaram	Modern Banking	Sultan Chand and Sons.
5.	Dr.Gupta	Banking Law and Practice in India	SahityaBhawan Publication.

Reference Items:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	O.P.Agarwal,	Modern Banking	Himalaya Publishing house
2.	K.C.Shekher	Banking Theory and Practice,	Vikas Publishing.
3.	A.Gajendran	Banking Law and practice	Vrinda Publications (P) Ltd
4.	D.Muraleedharan	Modern Banking Theory and Practice,	Prentice hall India Learning Private Limited.
5.	S.Natarajan and R.Parameswaran	Indian Banking	S.Chand.

Course Out Comes

Units	CO Statement
Unit - I After studied unit-1, the student will be able to	The students will be able to acquire the knowledge of different types of banking.
Unit - II After studied unit-2, the student will be able to	The students will be able to know the measures and methods of credit control in central bank.
Unit - III After studied unit-3, the student will be able to	The students will be able to understand the concept of SBI.
Unit - IV After studied unit-4, the student will be able to	The students will be able to study the different types of development banking in India.
Unit - V After studied unit-5, the student will be able to	The students will be able to acquire the new concepts of E-Banking.

ALLIED - 2
PAPER - 4
BUSINESS ECONOMICS - II

Course Objectives

1. The main objective of this paper is to apply in business Cost and Revenue analysis.
2. The students understand the pricing of perfect competition, monopoly and monopolistic competition.
3. Understands Distribution and Theories of Distribution.
4. The students acquires the knowledge of the capital budgeting.
5. Gains knowledge on the decision making under certainty and uncertainty.

UNIT: I Cost and Revenue Analysis

Cost and Revenue analysis - Different types of cost and their relations to each other - Average cost - Marginal cost - Various types of revenue curves short term and long term - Diagrammatic representation.

UNIT: II Market Structure and Pricing

Market structure and pricing - Pricing under perfect computation – Assumptions of perfect competition - Pricing under monopoly – Assumptions of monopoly - Pricing under monopolistic competition – Assumption of monopolistic competition.

UNIT: III Distribution

Distribution – Meaning – Marginal Productivity theory of Distribution – Modern theory of Distribution - Theories of profits.

UNIT- IV – Capital Budgeting

Capital Budgeting: Need for Capital Budgeting- Forms of Capital Budgeting- Nature of Capital Budgeting Problem.

UNIT- V – Decision Making

Decision Making: Risk and Uncertainty- Elements of Decision Theory- Classification of Managerial Decision Problem- Decision Taking Under Certainty and Uncertainty.

Text Books

Unit-I: S. Sankaran, Business Economics, Margham Publications, Chennai

Unit-II: S. Sankaran, Business Economics, Margham Publications, Chennai.

Unit-III: S. Sankaran, Business Economics, Margham Publications, Chennai.

Unit-IV: S. Sankaran, Business Economics, Margham Publications, Chennai

Unit-V: S. Sankaran, Business Economics, Margham Publications, Chennai

Reference Books:

1. K.P.M Sundaram and E.N. Sundaram, Business Economics, Sultan & Chand, New Delhi.
2. H.L. Ahuja, Business Economics, S.Chand, New Delhi.
3. Mote; Samuel Paul and G.S.Gupta, Managerial Economics, Concepts & Cases, Tata McGraw Hill.
4. Cauvery. , Managerial Economics, S. Chand & Co. New Delhi.

E - Resources

1. www.tutorialspoint.com/managerial_economics/...
2. www.yourarticlelibrary.com/managerial-economics/...
3. economicsconcepts.com/managerial_economics.htm
4. www.tutorialspoint.com/managerial_economics/...
5. www.economicdiscussion.net/managerial-economics/notes...
6. www.simplynotes.in/managerial-economics/characteristics...
7. www.managerial-economics-club.com/managerial...
8. www.ebookphp.com/managerial-economics-epub-pdf
9. www.simplynotes.in/importance-managerial-economics
10. www.scholarpol.com/nature-and-scope-of-managerial-economics

Course Out Comes

1. After studied unit-1, the student will be able to understand the Cost and Revenue analysis in Business.

2. After studied unit-2, the student will be able to gain knowledge of the pricing of perfect competition, monopoly and monopolistic competition.
3. After studied unit-3, the student will be able to gain knowledge of Theories of Distribution.
4. After studied unit-4, the student will be able to acquire Knowledge on the capital budgeting.
5. After studied unit-5, the student will be able to gain knowledge decision making under certainty and uncertainty

**SKILL BASED SUBJECT
PAPER - 2
E-COMMERCE**

Objectives:

- To impart the students with knowledge of web technology and their role in doing business.
- To help the students to Gain an understanding of the legal frame work of E-commerce.

UNIT- I

E-COMMERCE - INTRODUCTION

Introduction to E-Commerce - E-Trade - E-Business -E-Market -Advantages and Disadvantages of E-Commerce - E-Business Models - Introduction to Mobile Commerce.

UNIT- II

E-MARKETING

E- Marketing -Meaning - Channels- E-Marketing Mix - Web Salesmanship - online shopping avenues- Advertising on Network.

UNIT - III

E-PAYMENT SYSTEM

E-Payment System- Types- Business Issues and Economic implications - Components of an effective E-Payment System.

UNIT- IV

ELECTRONIC DATA INTERCHANGE

EDI - Definition - Objectives- Standards -Applicability - Approving authority- Cross Index and related documents.

UNIT- V

LEGAL FRAMEWORK

Legal Framework for E-Commerce - Net Threats - Cyber Laws - Aims and Salient Features of Cyber Laws in India- Cyber Crimes.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	L.T.Joseph	E-Commerce A managerial perspective	Printice Hall Publications, 2004.
2.	Addison Wesley	Frontiers of E-Commerce	Pearson Publications, 2004.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	David Whitley	E-Commerce Strategy, Technology and Application	Tata McGraw Hill Publications, 2004.
2.	Dennis P.Curtin	E-Commerce Principles and Introduction Technology	Tata McGraw Hill Publication, 2004
3.	Greenstein, Feinman	E-Commerce	Tata McGraw Hill Publications, 2001

Course Out Comes

Units	CO Statement
Unit- I After studied unit-1, the student will be able to	To understand the knowledge of E-Commerce.
Unit - II After studied unit-2, the student will be able to	Gaining knowledge on E-Marketing.
Unit - III After studied unit-3, the student will be able to	Know the E-Payment systems.
Unit - IV After studied unit-4, the student will be able to	Knowledge on Electronic Data Interchanges (EDI)
Unit - V After studied unit-5, the student will be able to	Conceive an idea of legal framework for E-Commerce.

NON-MAJOR ELECTIVE PAPER - 2

ADVERTISING AND SALESMANSHIP

Course Objectives

1. To understand the concept of advertising
2. To enable the students to have practical knowledge about advertising agencies
3. To familiarize about recent trends in advertising
4. To have knowledge on fundamental concept of salesmanship
5. To understand the duties and responsibilities of salesmanship

UNIT-I

Definition of Advertising- Origin and Development of Advertising -Objectives -Nature- Scope of Advertising- -Functions -Types -Benefits.

UNIT-II

Advertisement copy - Advertising media- Advertising Agencies.

UNIT-III

Recent trends in advertising - Economic aspects of Advertising- Social and Ethical aspects of Advertising.

UNIT-IV

Definition of Salesmanship -Features -Objectives- Recruitment of a salesman- Qualities of Good Salesman

UNIT-V

Advantages of Salesmanship- Distinction between Salesmanship and Advertising- Types of Salesmanship- Functions, Duties and Responsibilities of a Salesmanship.

TextBooks:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.S.N. Pillai&Bagavathi	Modern Marketing (Principles and Practices)	S. Chand & Co. New Delhi
2.	S Rajkumar, V Rajagopalan	Sales and Advertisement Management	S. Chand & Company Pvt. Ltd.
3.	Sahu and Raut	Salesmanship and Sales Management	Vikas Publishing House, Chennai.
4.	CL Tyagi&Arun Kumar	Sales Management	Atlantic publishers.

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Chunawalla K.C. Sethia	Advertising (Principles and Practices)	Chunawalla K.C. Sethiax

- | | | | |
|----|-------------------------------|--|--|
| 2. | Dr. M.M. Varma, R. K. Agarwal | Advertising Management | Forward 300K Depot, New Delhi. |
| 3. | Mahendra Mohan | Advertising Management | Tata Mcgraw-hill Publishing Company Limited, New Delhi, India. |
| 4. | G.R. Basotia N. K Sharama | Advertising Marketing and Sales Management | Mangal Deep Jaipur. |
| 5. | Dr. K. Sundar | Essentials of Marketing | Vijay Nicholes Imprint Pvt. Ltd., Chennai. |

E- MATERIALS

www.slideshare.net

www.himpub.com

www.ves.ac.in

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Impart knowledge on advertising
Unit - II	After studied unit-2, the student will be able to	Get familiarized about advertising agencies
Unit - III	After studied unit-3, the student will be able to	Get familiarized about recent trends in advertising
Unit - IV	After studied unit-4, the student will be able to	Acquired knowledge on fundamental concept of salesmanship
Unit - V	After studied unit-5, the student will be able to	Impart knowledge on duties & responsibilities of salesmanship

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER III							CIA	Uni. Exam	Total
17.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
18.	II	English	Paper-3	6	4	English	25	75	100
19.	III	Core Theory	Paper-5	4	4	Corporate Accounting I	25	75	100
20.	III	Core Theory	Paper-6	3	3	Legal Aspects of Business	25	75	100
21.	III	ALLIED-2	Paper-3	6	3	Business Economics I	25	75	100
22.	IV	Skill based Subject	Paper-1	3	2	Computer Applications in Business	25	75	100
23.	IV	Non-major elective	Paper-1	2	2	General commercial Knowledge	25	75	100
				30	22		175	525	700
SEMESTER IV							CIA	Uni. Exam	Total
24.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
25.	II	English	Paper-4	6	4	English	25	75	100
26.	III	Core Theory	Paper-9	4	4	Corporate Accounting II	25	75	100
27.	III	Core Theory	Paper-10	4	2	Business Management	25	75	100
28.	III	ALLIED-2	Paper-4	6	5	Business Economics II	25	75	100
29.	IV	NMSDC II : Digital Skills for Employability	Paper-2	2	2	Office Fundamentals	25	75	100
30.	IV	Non-major elective	Paper-2	2	2	Advertisement and Salesmanship	25	75	100
				29	23		175	525	700
SEMESTER V							CIA	Uni. Exam	Total
31.	III	Core Theory	Paper-13	6	4	Cost accounting I	25	75	100
32.	III	Core Theory	Paper-14	5	4	Practical Auditing	25	75	100
33.	III	Core Theory	Paper-15	6	5	Management Accounting	25	75	100
34.	III	Core Theory	Paper-16	6	4	Income Tax Law and Practice I	25	75	100
35.	III	Elective	Paper-1	4	3	(to choose 1 out of 3) 1. Entrepreneurial Development 2. Business Environment 3. Management Information System	25	75	100
36.	IV	Skill based Subject	Paper-2	3	2	Principles of marketing	25	75	100

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
				30	22		150	450	600
SEMESTER VI									
							CIA	Uni. Exam	Total
37.	III	Core Theory	Paper-17	5	4	Cost accounting II	25	75	100
38.	III	Core Theory	Paper-18	5	4	Income Tax law and practice II	25	75	100
39.	III	Core Theory	Paper-19	5	4	Financial management	25	75	100
40.	III	Compulsory Project	Paper-20	5	5	Individual / Group Project	25	75	100
41.	III	Elective	Paper-2	4	3	(To choose one out of 3) 1. Innovation management 2. Logistics management 3. Service Marketing	25	75	100
42.	III	Elective	Paper-3	4	3	(To choose one out of 3) 1. Customs and GST 2. Investment Management 3. Financial services	25	75	100
43.	III	NMSDC III : Digital banking and Audit Essentials for Employability	Paper-3	2	2	Fintech Course	25	75	100
44.	V	Extension Activities		0	1		100	-	100
				30	26		275	525	800
		TOTAL			142				

Semester: V

Paper type: Core Paper-13

Paper code: CCM51

Name of the Paper: COST ACCOUNTING-I

Total Hours per Week: 6

Credit: 4

Lecture Hours: 90

Course Objectives

1. To understand the basic concepts and methods of Cost Accounting.
2. To enable the students to learn the various methods of cost elements.
3. To understand the basic concepts and processes used to determine product costs.
4. To be able to interpret cost accounting statement.
5. To be able to analyze and evaluate information for cost ascertainment, planning, control and decision making.

Course Outcomes

1. After studied unit-1, the student will be able to understand the Nature and Scope of Cost Accounting, and Computation of Cost Sheet and Tenders.
2. After studied unit-2, the student will be able to learn the preparation of Material Purchase and Control.
3. After studied unit-3, the student will be able to impart knowledge about Methods of pricing of Material Issues.
4. After studied unit-4, the student will be able to study about preparation of Labour Cost Control.
5. After studied unit-5, the student will be able to gain knowledge about Distribution of Overheads.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT-I

10 Hours

NATURE AND SCOPE OF COST ACCOUNTING

Cost Accounting: Nature and Scope - Objectives, Advantages and Limitations - Financial Vs. Cost Accounting - Costing System - Types of Costing and Cost Classification - Cost Sheet and Tenders - Cost Unit - Cost Centre and Profit Centre.

UNIT-II

15 Hours

Material Purchase and Control

Purchase Department and its Objectives - Purchase Procedure - Classification and Codification of Materials, Material Control: Levels of Stock and EOQ - Perpetual Inventory System, ABC and VED Analysis - Accounting of Material Losses.

UNIT-III

20 Hours

Methods of pricing of Material Issues

Cost Price Methods: FIFO, LIFO, Average Price Methods: Simple and Weighted Average Price Methods, Notional Price Methods: Standards Price, and Market Price Methods

UNIT – IV

25 Hours

Labour Cost Control

Labour Turnover: Causes, Methods of Measurement and Reduction of Labour Turnover - Idle and Over Time - Remuneration and Incentive: Time and Piece Rate - Taylor's, Merricks and Gantt's Task - Premium Bonus System - Halsey, Rowan and Emerson's Plans - Calculation of Earnings of Workers.

UNIT-V

20 Hours

Overheads

Classification of Overhead Costs -Departmentalization of Overheads - Allocation Absorption and Apportionment of Overhead Costs - Primary and Secondary Distribution of Overheads - Computation of Machine Hour Rate and Labour Hour Rate.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

TEXT BOOKS:

S.no	Authors	Title	Publishers
1	S.P.Jain and Narang	Cost Accounting	Kalyani Publishers, New Delhi
2.	T.S. Reddy & Hari Prasad Reddy	Cost Accounting	Margham Publications, Chennai.
3.	S.P. Iyengar	Cost Accounting	Sultan Chand & Sons, New Delhi.
4	Manosh Dutta	Cost Accounting	Dorling Kindersley (India) Pvt. Ltd, 2010
5	A. Murthy and S. Gurusamy,	Cost Accounting	Vijay Nicole Imprints Private Ltd., Chennai.
6	Khanna B.S.Pandey I.M., Ahuja G.K., and Arora M.N	Practical Costing	S. Chand & Sons
7	Arora M.N	Cost Accounting	S. Chand & Sons
8	R.S.N. Pillai & Bhagavati	Cost Accounting	S. Chand & Sons
9	Bhabatosh Banerjee	Cost Accounting – Theory & Practices	Sultan Chand & Sons
10	V.KSaxena ,C.D Vashist,	Cost Accounting problems and solutions	Sultan Chand & Sons

REFERENCE BOOKS:

S.No	Authors	Title	Publishers
1.	Tulsian	Cost Accounting	Tata McGraw Hills.
2.	S.N.Maheswari	Principles of Cost Accounting	Sultan Chand & sons, New Delhi
3.	ManashDutta,	Cost Accounting	Pearson Education (Singapore) Pvt. Ltd, Second Edition Print, 2005
4	M.C. Shukla, T.S. Grewal, Dr.M.P.Gupta,	Cost Accounting	S.Chand& Company Ltd, 2010.
5	Reddy and Murthy	Cost Accounting	Margham Publications
6	Inamdar, S. M. (Satish Inamdar)	Cost & Management Accounting	Everest Publishing House
7	Kishore, R. M.	Cost & Management Accounting	Taxman Allied Service
8	V.KSaxena ,C.D Vashist,	Advanced Cost & Management Accounting	Sultan Chand & Sons
9	Jawaharlal	Cost Accounting	MC Graw Hill
10	M.E. Thukaram Rao	Cost and Management Accounting	New Age International

Reference Journal

1. Business and Economics Journal,
2. Global Economics,
3. Accounting & Marketing,
4. Accounting Research Journal,
5. Asian Review of Accounting,

6. Asia-Pacific Journal of Accounting and Economics,
7. Journal of Accounting and Organizational Change,
8. Journal of Contemporary Accounting and Economics

E- Materials

1. www.icwai.org
2. www.nasbaregistry.org.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

Semester: V

Paper type: Core Paper-14

Paper code: CCM52

Name of the Paper: PRACTICAL AUDITING

Total Hours per Week: 5

Credit: 4

Lecture Hours: 75

Course Objectives

1. Understand the meaning, types of audit, and difference between auditing and book keeping.
2. Know the meaning of internal control, internal check and audit.
3. Identify different types of vouchers.
4. Understand qualification, Duties, Rights, and different types of auditors.
5. Identify Meaning, Features & Qualifications of Cost and Management auditor and audit reports.

Course Out Comes

1. After studied unit-1, the student will be able to acquire the basic concepts of auditing.
2. After studied unit-2, the student will be able to learn the meaning and importance of internal audit, internal check and control.
3. After studied unit-3, the student will be able to understand the verification of vouchers and vouching.
4. After studied unit-4, the student will be able to study the auditor's appointment, removal, qualification and disqualification.
5. After studied unit-5, the student will be able to identify the auditor's reports and its kinds.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	NO
5	Yes	Yes	Yes	Yes	Yes	NO

UNIT-I

15 Hours

INTRODUCTION

Meaning and Definition of Auditing - Nature and Scope of Auditing - Accountancy and auditing, Auditing and Investigation - Objectives of auditing - Limitations of audit - Advantages of audit - classification of audit.

UNIT-II

15 Hours

AUDIT PROGRAMME AND INTERNAL CONTROL

Meaning and definition of audit program - Advantage and disadvantage - audit file, audit note book, audit working papers - purposes and importance of working papers - Internal check - meaning, objectives of Internal check - features of good Internal check system - Internal Control - meaning, objectives and features of good Internal control .

UNIT-III

15 Hours

VOUCHING

Vouching - meaning of vouching - Importance - objects - Vouching of cash transactions - Verification of assets and liabilities - meaning of verification - objectives - Distinction between vouching and verification - distinction between Valuation and Verification.

UNIT-IV

15 Hours

COMPANY AUDITORS

Company auditors - Qualification and Disqualification of an auditor - Appointment and Removal of an auditor - Powers and Duties of auditors - Liabilities of an auditor

UNIT-V

15 Hours

AUDITOR'S REPORT

Auditor's Report - Importance of auditor's report - contents of audit report - Kinds of reports.

Text Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	B.N. Tandon	A hand book of practical Auditing.	S.Chand
2.	T.R.Sharma	Auditing	SahityaBhavan, Agra.
3.	B.N.TandonSudharsanam, Sundharababu	Practical Auditing	S.Chand,.
4.	Dr.K.Sundar and K.Parri	Practical Auditing	Vijay Nicole Imprints Pvt., Ltd.,
5.	S.K.Basu	Auditing and Principles and Techniques	Pearson
6	B.N. Tandon	Practical Auditing	S. Chand.
7	Dr.Premavathy	Auditing	Vishnu Publications
8	Dinkarpagare	Principles and practice of auditing	Sultan Chand & Sons
9	Raymond J.Noss	Practical auditing technichs	Iunivers
10	B.N Tandon	The handbook of practical auditing	S.chand

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.L.Natarajan	Practical Auditing	Margham Publications
2.	Kamal Gupta and Ashok Arora	Fundamentals of Auditing	Tata Mc.,Graw Hill.
3.	R.G.Saxena.	Auditing	Himalaya Publishing House
4.	S.N.Maheshwari	Banking Theory , law and practice	Kalyani Publications.

5	S. Vengadaman	Practical Auditing	Margham Publication.
6	B.N .Tandon	Practical auditing for ug courses for madrassuniversity	S.chand
7	Dr.Natarajan	practical auditing	Margam
8	A.Jesentha Rani	Practical auditing	Charulatha
9	George Benton Renn	Practical auditing	Kessinger
10	Dr.R.NSengupta	Practical guide to auditing	New central book house

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: V

Paper type: Core Paper-15

Paper code: CCM53

Name of the Paper: MANAGEMENT ACCOUNTING

Total Hours per Week: 6

Credit: 5

Lecture Hours: 90

Course Objective

To introduce students to the various tools and techniques of management Accounting.

1. To enlighten students on Financial Statement Analysis with the emphasis on the preparation of fund flow and cash flow statement.
2. Is to impart knowledge of financial statements and their analysis and interpretations.
3. To emphasize on application of theoretical knowledge and help managers in decision making.
4. To familiarize the students with managerial financial decisions which are taking place in organizations.
5. To acquire the importance of financial information on decision making process.

Course Out Comes

1. After studied unit-1, the student will be able to learn the preparation of Financial Statement Analysis.
2. After studied unit-2, the student will be able to gain effective knowledge about Ratio Analysis
3. After studied unit-3, the student will be able to impart knowledge about Fund Flow and Cash Flow Analysis.
4. After studied unit-4, the student will be able to study about Marginal Costing techniques.
5. After studied unit-5, the student will be able to know about the preparation of Budget and Budgetary Control

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT-I**10 Hours**

Management Accounting: Definition - objectives - Functions - Advantages and limitations - Financial Statement Analysis - Comparative and Common size statements - Trend Analysis.

UNIT-II**20 Hours**

Ratio Analysis: Definition - Significance and Limitations - Classification - Liquidity, Solvency, Turnover and Profitability ratios - Computation of Ratios from Financial Statements - Preparation of Financial Statement from Ratios.

UNIT-III**20 Hours**

Fund Flow and Cash Flow Analysis: Concept of Funds, Sources and Uses of Funds - Fund Flow Statement - Concept of Cash Flow - Cash Flow Statement as Per AS3.

UNIT-IV**20 Hours**

Marginal Costing: Definition - Advantages and Limitation - Break Even Point - Margin of Safety - P/V Ratio - Key factor - Make or Buy Decision - Selection of Product Mix - Changes in Selling Price - Foreign Market Offer - Desired Level of Profit.

UNIT-V**20 Hours**

Budget and Budgetary Control: Definition - Objectives - Essentials - Uses and Limitations - Preparation of Material Purchase, Production, Sales, Cash and Flexible Budget - Zero Base Budgeting.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1	S.N. Maheswari	Management Accounting	Sultan Chand & Sons, New Delhi.
2.	T.S. Reddy & Hari Prasad Reddy	Management Accounting	Margham Publications, Chennai.
3	M Y Khan, PK Jain	Management Accounting	Tata McGraw hill, Fourth Edition, 2003
4	I.M. Pandey,	Management Accounting	Vikas Publishing, third Edition, 2006
5	A.R. Ramanathan, N.L. Hingorani, T.S. Grewal	Management Accounting	Sultan Chand & sons, 5th Edition. 2003
6	M.E. Thukaram Rao	Management Accounting	New Age International
7	M.E. Thukaram Rao	Cost and Management Accounting	New Age International
8	A. Murthy & S. Gurusamy,	Management Accounting	Vijay Nicole Imprints Private Ltd., Chennai.
9	V.K. Saxena & C.D. Vashist	Advanced Cost & Management Accounting – Problems & Solutions	Prentice Hall of India (P) Ltd.
10	R.S.N. Pillai & Bhagavati	Management Accounting	S. Chand

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.S.P.Gupta & Dr.K.L.Gupta	Management Accounting	Sathiya Bhavan Publications
2.	S.P.Gupta	Management Accounting	Sultan Chand & Sons, New Delhi.

3	T.S.reddy&Dr. Hariprasadreddy,	Y. Management Accounting	Margham Publications, Fifth revised Edition, 2014
4	Kulkarni, M. A.	Management Accounting	Career
5	Rao, A. P.	Management Accounting	Everest Publishing House
6	Drury, Colin	Management & Cost Accounting	Thompson Books
7	Horngren, C. T/ Sundem, G. L/ Stratton, W. O	Introduction To Management Accounting	Pearson Education
8	Ghosh, T. P.	Financial Accounting For Managers	Taxman Allied Service
9	Kishore, R. M.	Cost & Management Accounting	Taxman Allied Service
10	Patankar, Sanjay	Text Book Of Management Accounting	NiraliPrakashan Pune

Reference Journal

1. The Chartered Accountant Monthly
2. Journal of Human Values Three time in Year
3. Indian Journal of Marketing Monthly
4. Abhigyan: Journal of Management Monthly
5. Smart Manager Quaterly
6. IUP Journal of Operation Management Quaterly
7. IUP Journal of Business Strategy Quaterly
8. IUP Journal of Management Research Quaterly
9. Prabandhan: Indian Journal of Management Monthly
10. Arthashastra: Indian Journal of Economics & Research Monthly
11. India Green File Monthly
12. Management and Change

E- Materials

1. Indian institute of materials management
2. association for healthcare resource & materials management (AHRMM)
3. management accounting
4. material management
5. introduction to management accounting
6. functions of material management

7. cost and management accounting
8. <https://www.freebookcentre.net/business-books-download/Management-Accounting.html>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

Semester: V

Paper type: Core Paper-16

Paper code: CCM54

Name of the Paper: INCOME TAX LAW AND PRACTICE I

Total Hours per Week: 6

Credit: 4

Lecture Hours: 90

Course Objectives

1. To acquire Knowledge of Different Income Tax Concepts
2. The Main Objective of Taxation is Economic Development
3. To Overcome the Scarcity of Capital, Taxes are regarded as effective means to Control Inflation
4. To Control Cyclic Fluctuations
5. Reduction of Balance of Payments Difficulties

Course Out Comes

1. After studied unit-1, the student will be able to understand the basic level of Income tax Act.
2. After studied unit-2, the student will be able to know the tax calculation on house property income
3. After studied unit-3, the student will be able to achieve knowledge on tax calculation of salaried people.
4. After studied unit-4, the student will be able to obtain knowledge on income tax of business/ professional income.
5. After studied unit-5, the student will be able to understand the administrative set up of income tax department and their powers

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT – I

15 Hours

INTRODUCTION

Income Tax Act 1961- Basic Concepts - Assessment Year - Previous Year - Person - Assessee- Income - Agricultural Income - Capital and Revenue Receipts - Capital and Revenue Expenditures - Exempted Incomes u/s 10.

Residential status of an individual- Residential status of a HUF - Residential status of a firm and association of persons - Residential status of a company - incidence of tax liability.

UNIT- II

15 Hours

INCOME FROM HOUSE PROPERTY

Annual value - Determination of annual value- Income from let out house property - Income from self-occupied house property - Deductions allowed from Income from house property u/s 24.

UNIT- III

30 Hours

SALARIES

Meaning and features of Salary - Allowances - Perquisites - Profits in lieu of Salary - Provident Fund and its types - payments exempted u/s 10: Leave travel concession; gratuity; pension; leave encashment; retrenchment compensation; VRS - Deductions from salary: EA and professional tax- deduction u/s 80C- taxable salary

UNIT – IV

20 Hours

PROFIT AND GAINS OF BUSINESS OR PROFESSION AND DEPRECIATION

Meaning of business and profession - deductions expressly allowed - expenses expressly disallowed - treatment/ admissibility of certain expenses and incomes - income from business- income from profession-Meaning of depreciation - conditions for depreciation - actual cost - written down value- computation of allowable depreciation.

UNIT- V

10 Hours

INCOME TAX AUTHORITIES

CBDT - powers - Director General of income tax - Chief commissioner of income tax - Assessing officer - appointment - Jurisdiction - powers relating to search and seizure.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Gaur &Narang	Income Tax Law & Practice	Kalyani Publishers
2.	Dr. A. Murthy	Income Tax Law & Practice	Vijay Nicole Imprints Pvt.Ltd. Chennai
3.	Reddy,T.S.&Haripr asadReddy,	Income Tax Theory, Law& Practice	Margham Publications, Chennai.
4.	V.B. Gaur &Narang	Income Tax Law And Practice	Kalayani Publishers,2001
5.	DrVinod K. Singhania	Income Tax Law And Practice	Taxmann Publications Pvt. Limited, 2005.
6.	T.N.Manoharan&H. R.Hari	Taxation	Ankit thakkar for snow white publication pvt ltd
7.	A.Murthy	Income Tax Law And Practice	Vijay Nicole
8.	N.Hariharan	Income Tax Law And Practice	Mc grew hill
9.	T .Srinivasan	Income Tax Law And Practice	Vijay Nicole
10.	Rajavelu	Income Tax Law And Practice	S.V.P publications

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Mehrotra	Income Tax Law & Accounts	SahithiyaBhavan Publications
2.	Vinod,K.Singhania	Students Guide to Income Tax	Taxman Publications Pvt. Ltd
3.	Anita Raman	Income Tax Law & Practice	McGraw Hill
4	V. BalaChandran, S. Thothadri,	Taxation Law and Practice	Published by Asoke K. Ghosh, PHI Learning Private Limited, Volume 1, 2003
5	V.P Gaur	Income tax law & practice	Kalyani
6	Dr.H.CMehrotra	Taxation law and practice	Sathiyabhawan
7	M.Jeevarathinam	Income tax law & practice	Winners wisdom
8	Expert Teacher	Taxation law and practice	Sathish and brothers
9	G.S.Mitra	Income tax law & practice	Mahaveer publication
10	Dr.R.K.Jain	Taxation law and practice	SPBD publication

Reference Journal

1.Indian Journal of Tax Law

2.Taxman.com/Journal

3.Vision Journal of Indian Taxation

4.Income Tax Reports, Company Law, Institute of India PvtLtd,Chennai

E- Materials

1. GST and Income Tax Fortnightly E Magazine
2. Capital Gain Clear Tax
3. India filing.com
4. Clear Tax.in
5. Income Tax Management.com

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: V

Paper type: Elective Paper-1

Paper code: CECM55A Name of the Paper: ENTREPRENEURIAL DEVELOPMENT

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

**INTERNAL ELECTIVE
(to choose one out of 3)
PAPER - 1**

Course Objectives

1. To make and create interest among the students to become an Entrepreneur.
2. To facilitates the students to avail the incentives and schemes available for MSMEs.
3. To Promote first generation Businessman and Industrialists
4. To promote self employment Tendencies
5. To provide knowledge about Government Plan and Programmes

Course Outcomes

1. After studied unit-1, the student will be able to understand the basic concepts and theories of entrepreneurship.
2. After studied unit-2, the student will be able to exemplify knowledge on course contents, curriculum and constraints of EDP.
3. After studied unit-3, the student will be able to conceive business ideas and convert them into business projects.
4. After studied unit-4, the student will be able to become familiar with institutions support various forms of assistances and subsidies.
5. After studied unit-5, the student will be able to learn the MSMEs schemes provided to budding entrepreneurs

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	NO
3	Yes	Yes	Yes	Yes	Yes	Yes

4	Yes	Yes	Yes	Yes	Yes	NO
5	Yes	Yes	Yes	Yes	Yes	NO

UNIT- I

15 Hours

INTRODUCTION

Entrepreneurship: Meaning- Nature-Importance-Theories- Entrepreneur: Meaning-Definition- Characteristics-Qualities-Types and Roles of an Entrepreneur-Entrepreneur vs Intrapreneur-Factors Promoting an Entrepreneur - Women Entrepreneur-Problems of Women Entrepreneurs - Role of entrepreneurs in India's Economic Development

UNIT- II

10 Hours

ENTREPRENEURSHIP DEVELOPMENT PROGRAMMES

Meaning-Needs-Objectives -Course Contents and Curriculum-Phases of EDP-Problems and Constraints of EDP- Organisations providing Entrepreneurship Development Programmes.

UNIT- III

13 Hours

NEW VENTURE

Meaning - Promoting New Venture -Sources of Business Ideas - Idea Generation Techniques-Project Identification-Project Selection.- Procedures to Start a New Venture- Project : Meaning-Types-formulation of Project report -Project Appraisal- Network Analysis.

UNIT- IV

12 Hours

INSTITUTIONAL SUPPORT AND SUBSIDIES

Sources of Raising Funds for an Entrepreneur- Need for Institutional Finance- Various Institutions supporting Entrepreneurial growth - Incentives and Subsidies: Meaning-Needs-Incentives and Subsidies available to Entrepreneurs- DIC- Industrial Estates

UNIT- V

10 Hours

MICRO , SMALL AND MEDIUM ENTERPRISES (MSMES)

Introduction- Classification of Enterprises- Memorandum of MSMEs-Registration of MSMEs-MUDRA Scheme, Prime Minister's Employment Generation Programme (PMEGP), STAND-UP INDIA and START-UP INDIA: Objectives-Purpose-Loan facilities available-Applying Procedures.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.S.S Khanka	Entrepreneurial Development	Sultan chand company Ltd.
2.	AbhaJaiswal	Micro Small & Medium Enterprises Development Act, (Law, Policies & Incentives),	Bharat Law House Pvt. Ltd
3.	C.S.V. Murthy	Entrepreneurial Development	Himalaya publishing house, 2015.
4	Dr.S.S. Khanka	Entrepreneurial Development	S. Chand & Company (pvt).Ltd, 2014
5	Sami Uddin	“Entrepreneurial development in India	Mittal Publications, First Edition, 1989.
6	Taneja	Entrepreneurial Development	Galgotia
7	Annie Stephan	Entrepreneurial Development	S.Chand
8	S.A kumar	Entrepreneurial Development	New Age International
9	S.S Kanka	Entrepreneurial Development	S.Chand
10	N.P.Srinivasan	Entrepreneurial Development	S.Chand

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Vasant Desai	Small-Scale Industries and Entrepreneurship	Himalaya Publishing House, 2017
2.	Prasanna Chandra	Project Preparation , Appraisal, Implementation	Tata McgrawHill, New Delhi.
3.	G.N.Pande	A Complete Guide To Successful Entrepreneurship-	VikasPublishingHouse,

			New Delhi
4.	C B Gupta &Srinivasan	Entrepreneurship Development in India	Sultan Chand.
5.	A Gupta	Indian Entrepreneurial Culture	New Age International.
6	H.Shaw	The Global Entrepreneurs	R Publication
7	Vandana Gupta	Entrepreneurship Development in India	Technical Publication
8	CharantimathiPoornima .M	Entrepreneurship Development in India	S.Chand
9	Ca.DrAbhamathur	Entrepreneurship Development in India	S.Chand
10	C.A.Gupta	Entrepreneurship	Pearson

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: V

Paper type: Elective Paper-1

Paper code: CECM55B

Name of the Paper: BUSINESS ENVIRONMENT

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

**INTERNAL ELECTIVE
PAPER - 2**

Course Objectives

1. The basic objective of the course is to develop understanding and provide knowledge about business environment to the commerce students.
2. To understand the fundamentals of Business Environment
3. To promote basic understanding on the Economic environment of business.
4. The provide knowledge about the political environment of business.
5. To know the Social Environment of business.

Course Outcomes

1. After studied unit-1, the student will be able to know the concept of external, micro macro of business environment.
2. After studied unit-2, the student will be able to study the economic policies and conditions in India.
3. After studied unit-3, the student will be able to understand the concept of natural and technological environment.
4. After studied unit-4, the student will be able to acquire the knowledge of social environment and consumer protection.
5. After studied unit-5, the student will be able to study the concept of globalization of Indian business.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	NO
3	Yes	Yes	Yes	Yes	Yes	NO
4	Yes	Yes	Yes	Yes	Yes	NO
5	Yes	Yes	Yes	Yes	Yes	NO

UNIT-I**15 Hours****INTRODUCTION**

An overview of Business environment- types -Internal and External, Micro and Macro - Environmental Analysis and strategies management -Techniques of environmental analysis - steps and approaches.

UNIT-II**10 Hours****ECONOMIC ENVIRONMENT OF BUSINESS**

Significance and elements of economic Environment, economic systems and business environment, Economic planning in India, Government policies - Industrial policy.

UNIT-III**13 Hours****POLITICAL AND LEGAL ENVIRONMENT OF BUSINESS**

Monopoly and Restrictive Trade Practices (MRTP) Act, Foreign Exchange Management Act (FEMA), Consumer Protection Act, Patent Laws.

UNIT-IV**12 Hours****SOCIO, CULTURAL & INTERNATIONAL ENVIRONMENT**

Social responsibility of business, Characteristics, Components, Scope, relationship between society and business, Socio-cultural business Environment, Social Groups, World Trade Organisation (WTO), International Monetary Fund (IMF), Foreign Investment in India

UNIT-V**10 Hours****TECHNOLOGICAL ENVIRONMENT**

Concept, Online Channels, Online Services, Advantage of Online services, E-commerce, Indian conditions of E-commerce and Franchise.

Text Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Francis Cherunilam	Business Environment	Himalaya Publishing House,
2.	K.Aswathappa	Business Environment	Himalaya Publishing House,
3.	Dr.S.Sankaran	Business Environment	Margham Publication
4.	Sheik Saleem	Business Environment	Pearson Education.
5.	Dr.N.Premavathy	Business Environment	Sri Vishnu Publications
6	Suresh Bedi	Business Environment,	Pearson
7	Shaikh Saleem	Business Environment,	McGraw Hill International Books Co.,
8	Paul	Business Environment	McGraw Hill International Books Co.,
9	Justin Paul	Business Environment text and cases	McGraw Hill International Books C
10	Dr.Amit Kumar	Business Environment	Sahithyabhawan publications

References Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Keith Davis William, C.Frederik,	Business and Society,	McGraw Hill International Books Co.,
2.	Dr.M.Dhanabhakym and M.Kavitha	Business Environment	Vijay Nicole Imprints, Pvt., Ltd.,
3.	Pailwar.V.K	Business Environment	Prentice Hall India LearningPvt.,Ltd.,
4.	SarojUpadhyay	Business Environment,	Asian Books Pvt.,Ltd.,
5.	PankajMehra	Aspects of Business Environment	Omega Publication.

6	FRANCIES CHERUNITAM	Business Environment, Text and cases	Himalaya
7	DR.V.C SINHA	Business Environment,	Sanjay
8	MUKESH TREHAN	Business Environment,	EMINANCE IN EDUCATION
9	VEENA KESHAW PAILWAR	Business Environment,	PHI
10	ALOK GOYAL	Business Environment,	VK

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: V

Paper type: Elective Paper-1

Paper code: CECM55C Name of the Paper: MANAGEMENT INFORMATION SYSTEM

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

**INTERNAL ELECTIVE
PAPER - 3**

Course Objectives

1. To have knowledge on fundamental principles of management information system
2. Relate the basic concepts and technologies used in the field of management information system
3. Compare the process of developing and implementing information systems
4. To enable students to understand computer and information processing
5. Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization

Course Out Comes

1. After studied unit-1, the student will be able to understand the fundamental principles of MIS
2. After studied unit-2, the student will be able to basic knowledge about Concepts and Technologies used in MIS
3. After studied unit-3, the student will be able to acquired knowledge on process of developing and implementing information system
4. After studied unit-4, the student will be able to impart knowledge on Information Processing
5. After studied unit-5, the student will be able to enhanced knowledge on DBMS.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT - I**13 Hours**

Definition- Management Information System - MIS Support for Planning, Organizing and Controlling - Structure of MIS- Information for Decision Making

UNIT - II**12 Hours**

Concept of System - Characteristics of System - System Classification - Categories of Information System - Strategic Information System and Competitive advantage.

UNIT - III**13 Hours**

System Analysis and Design -SDLC- Role of System - Analyst- Functional Information System - Personnel ,Production, Material, Marketing.

UNIT - IV**12 Hours**

Computer and Information Processing - Classification of Computer - Input Devices- Storage Devices - Batch and Online Processing- Hardware - Software - Database Management Systems.

UNIT -V**10 Hours**

Development - Maintenance of MIS- Operations of manual information system- Role of Computer In MIS - Data Base Concept - Expert System - System Audit.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Kenneth Claudonand June P Laudon	Management Information System	Prentice Hall of India
2.	M. Assam	Fundamentals of Management Information system	Fundamentals of Management Information system
3.	JawadekarW.S	Management Information System	Tata McGraw Hill Publishing Company Ltd., 2002.

4	Mudrick& Ross	Management Information System	Prentice- Hall of India
5	Sadagopan	Management Information System	Prentice Hall of India
6	Murthy CSV	Management Inforation System	Himalaya Publishing House
7	Jayant Oke	Management Inforation System	Niraliprakaash
8	Jane P.LaudonKeneethC.Laudon	Management Inforation System	Pearsons
9	Ramesh Behl	Management Inforation System	Mc.Graw Educations
10	A.K. Gupta	Management Inforation System	Mc.Graw Educations

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Rahul De	Management Information System	Ocean Book House
2.	Jane Laudonkenneth	Management Information System	Pearson Education
3.	V.S Bagad	Management Information System	Technical Publication
4	P.C.Reddy	Management Information System	Vikas Publishing Pvt. Ltd.
5	NirmalaBagchi	Management Information System	Vikas Publishing Pvt. Ltd.
6	Ramesh Chandra	Management Information System	KalpazPublishng
7	Sahilraj	Management Information System	Pearson Education
8	My.Kamat	Information System Of Management	Pointer
9	AshimaBhatnagar	Information System Of Management	Jsr Publication
10	L.M Prasad	Information System Of Management	S.Chand

E-MATERIALS:

www.dbtra.com
www.itword.com

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: V

Paper type: Skill Based Subject Paper-3

Paper code: CSCM56

Name of the Paper: PRINCIPLES OF MARKETING

Total Hours per Week: 3

Credit: 2

Lecture Hours: 45

PAPER - 3

Objectives

1. To enable the students to understand the elements of Marketing Mix and bases for Market segmentation
2. To make him to appreciate the need for marketing science in the modern business world.
3. To identify the elements of a customer driven marketing strategy
4. To understand the behavioural concepts relevant to marketing
5. To fix the goals of marketing

Course Outcomes

1. After studied unit-1, the student will be able to know the basic principles and practices of marketing.
2. After studied unit-2, the student will be able to be aware of the importance of products, standards of branding, packing and quality management.
3. After studied unit-3, the student will be able to understand the pricing mechanism of marketing.
4. After studied unit-4, the student will be able to know the basic aspects of the channels of distribution and buyers' behaviours.
5. After studied unit-5, the student will be able to articulate sales Promotional techniques used in modern marketing.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	NO
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	yes
5	Yes	Yes	Yes	Yes	Yes	NO

UNIT – I

9 Hours

INTRODUCTION

Market- Meaning- Definition- Classification of markets. Marketing - Meaning - Definition- Evolution - Approaches - Modern marketing concepts - Marketing Mix with Extended 7Ps and 10 Ps- Meaning-Concepts - Role of Marketing in Economic Development-Market Segmentation- Definition -Requirements -Bases for Market Segmentation.

UNIT- II

9 Hours

PRODUCT

Meaning- Features-Classification of products- Product Mix- Product Innovation-New Product Development-Product Life Cycle- Branding- Meaning- Advantages and Limitations. Packaging - Meaning - Kinds - Labelling - Meaning- Advantages and Limitation.

UNIT – III

9 Hours

PRICING

Price - Meaning - Pricing- Importance - Objectives- Factors affecting pricing decisions Pricing Policies- Procedure for price determination- Kinds of Pricing.

UNIT- IV

9 Hours

DISTRIBUTION CHANNELS

Meaning-Importance-Marketing and Distribution- Middlemen in distribution -Function and Kinds of Middlemen - Agents and Merchant Middlemen-Wholesalers -Types - Services rendered by wholesalers - Retailers- Types - Requisites - Services rendered by retailers- Introduction to Supply Chain and Logistic Management - Introduction to Networking Marketing and Niche Marketing.

UNIT- V

9 Hours

PROMOTION

Sales Promotion - Personal Selling - Meaning - Purpose - Types - Advantages - Limitations - Factors to be considered on Personal Selling. Advertising- Meaning and definition- Medias - Advantages- Limitations -Advertising copy -Definition - Elements of an Advertisement copy - Introduction to Cinema Advertising, Social Media Advertising, Web Advertising, and Mobile Advertising.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.S.N.Pillai&Bagavathi	Modern Marketing principles & practices	S. Chand & co ltd., New Delhi.
2.	Gary Armstrong & Philip Kotler	Marketing an Introduction	PearsonPrentice Hall, New Delhi.
3	Philip kotler ,GrayAmstrong	Principles of Marketing	Pearson Education
4	Pooja Jain,Dr.MehaSimbal	Principles of Marketing	Chengage Book House
5	Jim Blythe	Principles of Marketing	Sage Publisher
6	David Jobber	Principles of Marketing	Mc.Graw Educations
7	Amit Kumar	Principles of Marketing	SahityaPublication
8	Adrianpalmer	Principles of Marketing	Mc.Graw Educations
9	Maharajan	Principlesof Service Marketing	Vikas Publishing Pvt. Ltd.
10	Pride,Ferrell	Principles Of Marketing	Chengage Book House

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Stanton William CherlesFutrell	Fundamentals of Marketing	TataMc Grew Hill, New Delhi.
2.	Dr.Rajan Nair &SanjithR Nair	Marketing	S. Chand & co ltd, New Delhi.
3.	Edward W Cudiff	Fundamentals of Modern Marketing	Prentice Hall of India, New Delhi.
4.	Philip Kotler	Marketing Management	Prentice Hall of India, and New Delhi.

5.	Dr. N. Rajan Nair	Marketing an Introductory Text	Sultan Chand & Sons, New Delhi.
6	Dr. Neha srighal	Principles of Marketing	Chengage book house
7	T.N.Chhabra	An introduction to Principles of Marketing	Sun India's
8	Prof.KavithaSharma And Swati Aggarwal	Principles of Marketing	Taxman
9	H.DevendraDr.Mamishy Joshi	Principles of Marketing	Niraliprakashan
10	Dr.NanalKentidas	Principles of Marketing	Niraliprakashan

E-Material

1. Online Study Material for Commerce courses - LPU Distance

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong , M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Core Paper-17

Paper code: CCM61

Name of the Paper: COST ACCOUNTING II

Total Hours per Week: 5

Credit: 4

Lecture Hours: 75

Course Objectives

1. To make the students to understand the process of ascertaining, classification and controlling cost.
2. To enable the students for higher studies like CA, ICWA and ACS with ease and confidence.
3. To ascertain the profitability
4. To facilitate the preparation of financial and other statements
5. To fix the selling price

Course Out Comes

1. After studied unit-1, the student will be able to taught the Computation of Job, Batch, Contract Costing
2. After studied unit-2, the student will be able to learn the preparation of Process Costing.
3. After studied unit-3, the student will be able to impart knowledge about calculation of Operating Costing
4. After studied unit-4, the student will be able to study about preparation of Standard Costing.
5. After studied unit-5, the student will be able to gain knowledge about Reconciliation of Cost and Financial Accounts.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT-I**15 Hours**

Job, Batch, Contract Costing: Job Costing - definition - Features - Procedure - WIP - Cost Accumulation, Batch Costing - EBQ, Contract Costing - Definition, Features, Work Certified and Uncertified - Incomplete Contract - Escalation Clause - Cost Plus Contract - Contract Account.

UNIT-II**15 Hours**

Process Costing: Definition - Features - Job Vs Process Costing - Process Account - Losses - By Products and Joint Products - WIP - Equivalent Units and its Calculation - Closing WIP with or without Process Loss.

UNIT-III**15 Hours**

Operating Costing (Transport Costing): Cost Unit - Cost Classification - Operating Cost sheet.

UNIT-IV**15 Hours**

Standard Costing - Variance Analysis - Material -Labour- Overheads - Fixed - Variable -Sales Variance.

UNIT-V**15 Hours**

Reconciliation of Cost and Financial Accounts.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books:

S.no	Authors	Title	Publishers
1	S.P.Jain and Narang	Cost Accounting	Kalyani Publishers, New Delhi
2.	T.S. Reddy & Hari Prasad Reddy	Cost Accounting	Margham Publications, Chennai.

3.	S.P. Iyengar	Cost Accounting	Sultan Chand & Sons, New Delhi.
4	Manosh Dutta	Cost Accounting	Dorling Kindersley (India) Pvt. Ltd, 2010
5	A. Murthy and S. Gurusamy,	Cost Accounting	Vijay Nicole Imprints Private Ltd., Chennai.
6	Khanna B.S.Pandey I.M., Ahuja G.K., and Arora M.N	Practical Costing	S. Chand & Sons
7	Arora M.N	Cost Accounting	S. Chand & Sons
8	R.S.N. Pillai & Bhagavati	Cost Accounting	S. Chand & Sons
9	Bhabatosh Banerjee	Cost Accounting – Theory & Practices	Sultan Chand & Sons
10	V.KSaxena ,C.D Vashist,	Cost Accounting problems and solutions	Sultan Chand & Sons

Reference Books:

S.No	Authors	Title	Publishers
1.	Tulsian	Cost Accounting	Tata McGraw Hills.
2.	S.N.Maheswari	Principles of Cost Accounting	Sultan Chand & sons, New Delhi
3.	ManashDutta,	Cost Accounting	Pearson Education (Singapore) Pvt. Ltd, Second Edition Print, 2005
4	M.C. Shukla, T.S. Grewal, Dr.M.P.Gupta,	Cost Accounting	S.Chand& Company Ltd, 2010.
5	Reddy and Murthy	Cost Accounting	Margham Publications
6	Inamdar, S. M. (Satish Inamdar)	Cost & Management Accounting	Everest Publishing House
7	Kishore, R. M.	Cost & Management Accounting	Taxman Allied Service
8	V.KSaxena ,C.D Vashist,	Advanced Cost & Management Accounting	Sultan Chand & Sons

9	Jawaharlal	Cost Accounting	MC Graw Hill
10	M.E. Thukaram Rao	Cost and Management Accounting	New Age International

Reference Journal

1. Accounting Research Journal,
2. Asian Review of Accounting,
3. Asia-Pacific Journal of Accounting and Economics,
4. Journal of Accounting and Organizational Change,
5. Journal of Contemporary Accounting and Economics

E- Materials

1. www.icwai.org
2. www.nasbaregistry.org.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong , M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Core Paper-18

Paper code: CCM62

Name of the Paper: INCOME TAX LAW AND PRACTICE II

Total Hours per Week: 5

Credit: 4

Lecture Hours: 75

Course Objectives

1. To acquire Knowledge of Different Income Tax Concepts
2. The Main Objective of Taxation is Economic Development
3. To Overcome the Scarcity of Capital, Taxes are regarded as effective means to Control Inflation
4. To Control Cyclic Fluctuations
5. Reduction of Balance of Payments Difficulties

Course Outcomes

1. After studied unit-1, the student will be able to know the calculation of taxes for gain on capital asset.
2. After studied unit-2, the student will be able to know the tax on other source and its calculation.
3. After studied unit-3, the student will be able to know the adjustment of carry forward Income/Expenditure.
4. After studied unit-4, the student will be able to expertise in preparation of total income of individual/ firm etc.
5. After studied unit-5, the student will be able to gain knowledge on filing of income tax returns.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT- I

20 Hours

CAPITAL GAINS

What are capital assets? - What are not capital assets? - kinds of capital assets - transfer u/s 2 (47) - cost of acquisition - cost of improvement - computation of short term capital gain - computation of long term capital gain - exemptions from capital gains.

UNIT – II

17 Hours

INCOME FROM OTHER SOURCES

Specific incomes chargeable to tax - general incomes chargeable to tax - Interest on securities - Interest exempt from tax u/s 10 (15) - deductions allowed from Income from other sources - computation of income from other sources.

UNIT- III

16 Hours

CLUBBING OF INCOMES AND SET OFF AND CARRY FORWARD OF LOSSES

Income transfer without asset transfer - cross transfer -transfer for the benefit of son's wife - capital gain on an asset gifted before marriage - gifted money used for construction of house by spouse - income including losses - clubbing of business income - clubbing of minor's income - computation of total income.Provisions relating to set off of losses- Provisions relating to set off and carry forward of losses - unabsorbed depreciation - order of set off - computation of total income.

UNIT- IV

12 Hours

AGRICULTURAL INCOME AND DEDUCTIONS FROM GROSS TOTAL INCOME

Meaning of agricultural income - types of agricultural income - income from growing and manufacturing rubber - income from growing and manufacturing coffee - income from growing and manufacturing tea - income of a sugar mill growing its own sugarcane- computation of tax of an assessee having agricultural income.Permissible deductions from gross total income - section 80C, 80CCC, 80CCD, 80D, 80DD, 80DDB, 80E, 80G, 80GG, 80GGA, 80QQB, 80RRB, 80U.

UNIT – V

10 Hours

ASSESSMENT OF INDIVIDUALS AND ASSESSMENT PROCEDURES

Sources of income of an individual - computation of total income and tax liability of an individual. Filing of returns - permanent account number (PAN) -Usage of PAN - TDS - types of assessment - self assessment - Best judgement assessment - Income escaping assessment (reassessment) - Advance payment of tax

Note: Questions in Sec .A, B & C shall be in the proportion of 20:80 between Theory and Problems.

Text Books

S.No	Authors	Title	Publishers
1.	Gaur & Narang	Income Tax Law & Practice	Kalyani Publishers
2.	Dr. A. Murthy	Income Tax Law & Practice	Vijay Nicole Imprints Pvt.Ltd. Chennai
3.	Reddy, T.S. & Hari Prasad Reddy,	Income Tax Theory, Law & Practice	Margham Publications, Chennai.
4.	V.B. Gaur & Narang	Income Tax Law And Practice	Kalayani Publishers, 2001
5.	Dr Vinod K. Singhania	Income Tax Law And Practice	Taxmann Publications Pvt. Limited, 2005.
6.	T.N. Manoharan & H.R. Hari	Taxation	Ankit thakkar for snow white publication pvt ltd
7.	A. Murthy	Income Tax Law And Practice	Vijay Nicole
8.	N. Hariharan	Income Tax Law And Practice	Mc Graw Hill
9.	T .Srinivasan	Income Tax Law And Practice	Vijay Nicole
10.	Rajavelu	Income Tax Law And Practice	S.V.P publications

Reference Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Mehrotra	Income Tax Law & Accounts	Sahithiya Bhavan Publications
2.	Vinod, K. Singhania	Students Guide to Income Tax	Taxman Publications Pvt. Ltd
3.	Anita Raman	Income Tax Law & Practice	McGraw Hill

4	V. BalaChandran, S. Thothadri,	Taxation Law and Practice	Published by Asoke K. Ghosh, PHI Learning Private Limited, Volume 1, 2003
5	V.P Gaur	Income tax law & practice	Kalyani
6	Dr.H.CMehrotra	Taxation law and practice	Sathiyabhawan
7	M.Jeevarathinam	Income tax law & practice	Winners wisdom
8	Expert Teacher	Taxation law and practice	Sathish and brothers
9	G.S.Mitra	Income tax law & practice	Mahaveer publication
10	Dr.R.K.Jain	Taxation law and practice	SPBD publication

Reference Journals

1. Indian Journal of Tax Law
2. Taxman.com/Journal
3. Vision Journal of Indian Taxation
4. Income Tax Reports,Chennai

E- Materials

1. GST and Income Tax Fortnightly E Magazine
2. Capital Gain Clear Tax
3. India filing.com
4. Clear Tax. in
5. Income Tax Management.com

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S

CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Core Paper-19

Paper code: CCM63

Name of the Paper: FINANCIAL MANAGEMENT

Total Hours per Week: 4

Credit: 4

Lecture Hours: 60

Course Objectives

1. To provide expert knowledge on setting financial objectives & goals.
2. To manage Financial Resource, financial risk management and through understanding of investment portfolios and financial instruments.
3. To Maximize the Cost of Capital by Developing a Sound and Economical combinations of Corporate Securities, Proper Estimation and Requirement for Expansion and Growth
4. To Ensure adequate return on Investment
5. To Maintain Proper Cash Flow Creating Reserves and Goodwill

Course Outcomes

1. After studied unit-1, the student will be able to understand the basic Principles and practices of Financial management.
2. After studied unit-2, the student will be able to determine the amount of Capital, Organization and Structure. Reduce cost of Capital and Operating Risks
3. After studied unit-3, the student will be able to have the knowledge and practice of arriving financial Decision makings
4. After studied unit-4, the student will be able to acquire practical knowledge on Calculation of working capital
5. After studied unit-5, the student will be able to gain knowledge on leverage and portfolio management

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes

5	Yes	Yes	Yes	Yes	Yes	Yes
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UNIT- I

10 Hours

Nature and Importance of Finance Functions - Organizing Finance Functions - Functions of Finance Manager - Objectives of Finance Function - Methods and Sources of Raising Finance - Critical Appraisal of the Various Sources of Finance.

UNIT- II

13 Hours

Goals of Finance Function - Financing Decisions - Financial Planning - Financial Forecasting - Capital Structure Decisions - Net Income Approach, NOI Approach and MM Approach- Capitalization - Cost of Capital - Computation of Cost of Capital-Dividend Policy-Factors Determining Dividend Policy.

UNIT- III

13 Hours

Investment Decisions - Estimation of Cash Flows - Evaluation of Alternative Investment Proposals like NPV, ARR, IRR Methods - Decision Making Under Risk and Uncertainty - Inflation and Investment Decisions

UNIT- IV

12 Hours

Working Capital - Meaning, Concept, Types and Significance-Gross and Net Working Capital - Determinants of Working Capital - Sources of WC - Credit and Collection Policies.

UNIT- V

12 Hours

Security Analysis and Portfolio Management - Leverages -Meaning, Types of Leverage.Degree of Operating and Financial Leverage - Financial Ratio Analysis.

TEXT BOOKS:

S.No	Authors	Title	Publishers
1.	Dr.S.N.Maheswari	Financial Management	Sultan Chand & Sons, New Delhi
2.	Dr.A.Murthy	Financial Management	MarghamPublications,Chennai.

3.	Dr. J. Srinivasan, Sridhar and Ramalingam	Financial Management	Vijay Nicole Imprints Pvt .Ltd. Chennai
4.	R.K.Sharma	Financial Management	Kalyani Publishers, New Delhi
5.	I.M. Pandey	Financial Management	Vikas Publishing House Pvt Ltd, 01-Nov-2009
6.	P.c. Kulkarni	Financial Management	B.G. Sathyaprasad, Himalaya Publications, 2004
7.	Dr..V.R.Palanivelu,	Financial Management	S.Chand Publication,2010
8.	I.M Panday	Financial Management	Pearson
9.	Berk	Financial Management	Pearson
10.	Prasana Chandra	Financial Managementtheory and practice	McGraw hill education Pvt. Ltd India

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	I.M.Pandey	Financial Management	VikasPublision house Pvt Ltd. Noida
2.	Prasanna Chandra	Financial Management 10ed.	McGraw hill education Pvt. Ltd India
3.	Subirkumar Banerjee	Financial Management	PHI Learning Pvt Ltd
4.	VyuptakeshSharan	Fundamentals of Financial Management	Pearson Education
5.	Dr .N. Premavathy	Financial Management	Sri Vishnu Publications, Chennai.
6.	S.C. Kuchhal	Financial Management	Chaitanya
7.	P.V. Kulkarni& B.G. Satyaprasad	Financial Management	HimalayaPublishingHouse
8.	M.Y Khan P.K Jain	Financial management text problem and cases	McGraw hill education Pvt. Ltd India

9	Prasanna Chandra	Fundamentals of financial management	Taxmann
10	Dr.S.p. Gupta	Advanced Financial management	Sathiyabhavan

Reference: Journals

1. Indian Journal of Business Finance and Accounting
2. Journal of Financial Reporting and Accounting
3. Asian Academy Management Journal of Accounting and Finance
4. Review of Accounting and Finance

E- Materials

1. Economic Times.Com
2. Financial Express
3. Reserch gate.net
4. Entrepreneur.com
5. The Hindu business line

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Elective Paper-2

Paper code: CECM64A

Name of the Paper: INNOVATION MANAGEMENT

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

**INTERNAL ELECTIVE
(To choose one out of 3)
Paper - 1**

Objectives

1. To help students understand, describe and explain the phenomenon of Innovation.
2. To present students a toolkit to successfully navigate complex landscape that surrounds the innovation process.
3. To reap in the economic benefits of new technological inventions by commercializing them on time
4. To accomplish technology Transfer
5. To reduce new product development time

Course Outcomes:

1. After studied unit-1, the student will be able to perceive the basics of innovation
2. After studied unit-2, the student will be able to appreciate the value of creativity
3. After studied unit-3, the student will be able to gain exposure to various theories of innovation
4. After studied unit-4, the student will be able to apprehend the innovation process.
5. After studied unit-5, the student will be able to inculcate the shade of innovation for the success of business
6. **Matching Table (Put Yes / No in the appropriate box)**

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT- I

12 Hours

INNOVATION AND COMPETITIVE ADVANTAGE

Innovation- Introduction, meaning, definition, concepts, nature, importance, early-stage of innovation -Identifying opportunities-Discovering new points of differentiation. Innovation drivers- State - Technology - Types of innovations; Descriptions of technological, marketing and organization.

UNIT- II

12 Hours

INNOVATION AND CREATIVITY

Creativity - meaning, definition, need for and importance of creativity - Factors influencing creativity. Individual - Self-evaluation of individual - SWOT Analysis - Team - Group dynamics - Meaning, **Characteristics, Stages, Types, Factors affecting group behaviour and team building**- Leadership - Meaning and nature - Creating Breakthroughs in innovation. Perception - meaning, Definition, Perceptual process, Factors affecting perception and techniques to improve perception.

UNIT- III

12 Hours

INNOVATION THEORIES

Major contemporary theories: Disruptive-Networked-Open; Alternative theories: Evolutionary-Uncontested- Adaptive - Green Initiatives.

UNIT- IV

12 Hours

INNOVATION PROCESS

New Product Development-Criticality of the Value Proposition, Differentiation - Paths to Market- Systems of Ideation, Experimentation and Prototyping - Innovation Labs.

UNIT- V

12 Hours

SUCCESS AND INNOVATION

Transformation of Business - Business processes - Recognition and Execution strategies- Designing a Winning Innovative Culture - Patents - Intellectual property - successful innovation case studies (any two).

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Tidd Joe, And Bessant John	Managing Innovation	John Wiley and Sons, Chichester, UK
2.	<u>J. Christopher Westland</u>	Global innovation Management, A strategic Approach	Palgrave Macmillan
3.	<u>J. Christopher Westland</u>	Global Innovation Management	Macmillan International Higher Education
4.	M Adithan	Management of Innovation and Creativity	Atlantic Publishers & Distributors Pvt Ltd
5.	<u>Dr. Leena Modi (Gandhi)</u>	Management Of Innovations And Sustainability	Nirali Publication
6.	M.Adithan	Innovation management and creativity	Atlantic Publication
7.	Michal Rabal Scott Swan	innovation and product management	Springer Puublication
8.	J.A Kulkarini	innovation and product management	Partiridge India
9.	Marcus T.Y	Innovation management Research Wave	Vernon press
10.	Jane HeneryDavid Walker	Management Of Innovations	Swage publications

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Moore, G.A	Dealing with Darwin: How Great Companies Innovate at Every Phase of their Evolution,Capstone.	Random House.

2.	Collins, J.	How the Mighty Fall: And Why Some Companies Never Give In	Random House.
3.	Prahalad C.K. and Krishna	The New Age of Innovation: Driving Concreted ValueThrough Global Networks	M.S. McGraw Hill.
4.	Tom Burns And G.M Stalker	Innovation Management	Oxford University
5.	ShlomoMitakAnd D.V.K Seshadri	Innovation Management	Response Book
6.	Jauhari	Innovation Management	Oxford University
7.	Dr.Glegary.C Mc Laughlin	Innovation Management	Crc Press
8.	Sanjiva Shankar Dubey	Technology And Innovation Management	Phi
9.	Ina Gollers	Crativity For Innovation Management	Routledge
10.	Keith Goffin	Innovation Management Effective Strategy And Innovation	

E-Material

1. [Www.eui.upm.es](http://www.eui.upm.es) › moduloiiipdfBasic Concepts of Innovation and Innovation Management
2. [Https://www.coursehero.com](https://www.coursehero.com) › file Innovation_Management_404_v1.pdf - Innovation Management Developed By Prof
3. What is Innovation Management? What Does Innovation Management mean? Youtubeapp · The Audiopedia

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10

CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Elective Paper-2

Paper code: CECM64B

Name of the Paper: LOGISTIC MANAGEMENT

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

**INTERNAL ELECTIVE
Paper - 2**

Course Objectives

1. To enable students understand the importance and dynamics of a firm’s physical distribution function and management of its supply chain.
2. To understand how warehouse functions in logistics fits into logistics & supply chain management.
3. To have better Inventory Management
4. To meet the efficient flow of operations
5. To provide customer satisfaction by having the right product in the right place at right time

Course Outcomes:

1. After studied unit-1, the student will be able to understand the basic concepts of logistic management
2. After studied unit-2, the student will be able to explore the supply chain intermediaries
3. After studied unit-3, the student will be able to explore the supply chain strategies
4. After studied unit-4, the student will be able to identify the warehousing strategies in logistic management

5. After studied unit-5, the student will be able to to perceive the legal frame work of logistic management.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT- I

12 Hours

Logistics - meaning - definition- scope- importance - function- objectives- of logistics management- customer service and logistics.

UNIT- II

12 Hours

Supply chain intermediaries - Meaning, Importance, Objectives, Functions- Types of Intermediaries- Selection of Channel Member- Motivation, Training and Evaluation of Channel Members.

UNIT- III

12 Hours

Supply Chain Management- Meaning, Definition, Function, Need- Marketing Forces affecting Supply Chain Activities- Supply Chain Activities in India.

UNIT- IV

12 Hours

Meaning, Characteristics of Warehousing -Functions of Warehousing -Types of Warehousing- Selection of Transportation- Warehouse Locations-Packaging and Material Handling- Documents relating to warehousing- Warehousing in India.

UNIT - V

12 Hours

Government Policies And Regulations- Motor Vehicles Act - Carriage By Air, Sea Multi- modal Transportation - Documentation - Airways Bill, Mate Receipt, Railway Receipt, Lorry Receipt, Bill of Lading.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1	Sathish k. Kappor and purvakamal	Basis of Distribution Management Supply chain management strategic planning and operation	Printice Hall of India, New Delhi
2.	Sunil chopra	Logistics and supply chain management	Pearson Education Vijay Nicoles Imprint Pvt. Ltd
3	Nanthakumar .B	Operations Management Theory & Practice	Pearson Education, 2nd Edition, New Delhi
4	.Mahadevan B,	BarryProduction& Operations Management	Pearson Education, 2013
5	Heizer Jay and Render	Production and operations management	Margham Publications- Chennai, 2011.
6	Saravanel&Sumathy	Logistics Management	Pearson Education
7	Vinod V. Sople	Logistics Management	Prentice Hall of India New Delhi
8	Satis c, Ailawadi, Rakesh Singh	Logistics Management	
9	Taylor	supply chain manager's guide	Person Education
10	RonaLH.Ballou	Business Logistics /supply chain management	Pearson education prentice hall, New Delhi

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Sunil Chopra	Essentials of Supply Chain Management	Pearson Publications, New Delhi, Fifth Edition
2.	D K Agarwal	Text Book of Logistic Management	Trinity Publication
3.	V VSople	Logistic Management	Pearson Publication
4.	Anikita Bhatt Karan TajeevRandive	Logistic Management	NiraliPrakashan
5	Ganapathi And Nandhi	Logistic Management	Oxford Publication
6	Dr.L.Nadarajan	Logistic Supply Chain Management	Margam Publication
7	Dr.S.Ramachandran	Supply Chain And Logistic Management	Airwalk Publication
8	Saikumar V Purushothaman	Supply Chain And Logistic Management	Sulthan Chand
9	S.SudalimuthuAnd Anthony Raj	S. Logistic Managementfor International Business	PHI Publication
10	SatishcAilwadi	Logistic Management	PHI Publication

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong , M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Elective Paper-2

Paper code: CECM64C

Name of the Paper : SERVICE MARKETING

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

INTERNAL ELECTIVE

Paper - 3

Course Objectives

1. To enable students to acquire knowledge of service marketing
2. To understand the concepts relating to service quality, pricing and demand for services
3. To impart knowledge about insurance services in service marketing
4. To develop practical knowledge about service marketing.
5. To create new ideas in service marketing.

Course Outcomes

1. After studied unit-1, the student will be able to understand the concepts and evolution of service marketing.
2. After studied unit-2, the student will be able to Explore the 4 Ps of service marketing.
3. After studied unit-3, the student will be able to perceive the strategies in service marketing.
4. After studied unit-4, the student will be able to explore the quality issues of service marketing.
5. After studied unit-5, the student will be able to understand the different services organizations.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	NO
5	Yes	Yes	Yes	Yes	Yes	NO

UNIT - I

12 Hours

Marketing of Services - Introduction - Growth of the Service Sector - The Concept of Service - Characteristics of Services Classification of Services -Using Technology - Developing Human Resources.

UNIT - II

12 Hours

Marketing mix in services marketing - The seven Ps - Product Decisions - Pricing Strategies- Promotion of Services and Distribution Methods for Services - Additional Dimensions in Services Marketing- Internet as a service channel.

UNIT - III

12 Hours

Strategic Marketing Management for Services - Matching Demand and Supply through Capacity Planning and Segmentation - Internal Marketing of a Service - External versus Internal Orientation of Service Strategy.

UNIT - IV**12 Hours**

Delivering Quality Services - Causes of Service-Quality Gaps - The Customer Expectations versus Perceived Service Gap - Factors and Techniques to Resolve this Gaps in Service - Quality Standards, Factors and Solutions.

UNIT - V**12 Hours**

Marketing of Services with special reference to Health Services - Hospitality Services including Travel, Hotels, and Tourism.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1	Dr. L. Natarajan	Services Marketing	Margahm Publications, Chennai
2.	M. K. Rampal&S.L.Gupta	Services Marketing	Galgotta Publications
3	Geethabansal, AmandeepKaur&Bhavna	Services Marketing	Kalyani Publications
4	RamneetKaur, Parampalsingh	Services Marketing	Kalyani Publications
5	S.M. Jha	Services Marketing	Himalaya Publications
6	Dr. B. BaLy	Services Marketing	S. Chand and Co. Publications
7	VasanthiVenugopal& Raghu V.N	Services Marketing	Himalaya Publications
8	Valarie A. Zeithaml Marry Jo Bitner	Service marketing	Mc Graw Hilleducation Publication
9	S.P.Mathur ,Nishu	Service marketing	New Age International
10	Christopher Lovelock,	Service marketing	Pearson Publication

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	R.Srinivasan	Service marketing	PHI Publication
2.	Kisholoy Roy	Marketing service	Everest Publication House
3.	Dr.V.Muthu Ruben	Principlesof marketing service	IIP Publishing House
4.	Vinnie Jauharikirtidutta	Service marketing	OUP India Publisher
5	M.K Rambol,S.L Gupta	Service marketing	Galgotia Publication
6	Dr.Natarajan	Marketing service and management	Margam Publication
7	JochenWirtz	Service marketing	Pearson
8	K..Ramamohanarao	Service marketing	Pearson
9	Dr.ManitaMathru	Service marketing	Red shine
10	JochenWirtz	Essential of Service marketing	Pearson

E- Material

1. http://www.sasurieengg.com/e-course-material/MBA/II-YearSem3/BA7013%20SERVICE_MARKETING.pdf

2. http://www.pondiuni.edu.in/storage/dde/downloads/markiv_sm.pdf

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

CO5	S	S	S	S	S	S	S	S	S	S
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PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Elective

Paper-3

Paper code: CECM65A

Name of the Paper: Customs and Goods and Service Tax

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

INTERNAL ELECTIVE

(To choose one out of 3)

PAPER - 1

Course Objectives

1. To protect the imports and exports of goods for achieving the policy objectives of the Government.
2. Enforcement of Customs legislation and other relevant laws.
3. To eliminate the cascading effect of taxes.
4. To promote competitive pricing and increase consumption.
5. To have an improved logistics and distribution system.

Course Outcomes

1. After studied unit-1, the student will be able to understand the basics of Customs and Excise duty.
2. After studied unit-2, the student will be able to know the fundamental concepts of Goods and Service Tax (GST).
3. After studied unit-3, the student will be able to understand the Goods and Service Tax Registration.
4. After studied unit-4, the student will be able to analyze the procedures of Levy and Collection of GST.
5. After studied unit-5, the student will be able to understand the Assessment Returns and Refund of Goods and Service Tax.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT – I

12 Hours

CUSTOMS AND EXCISE DUTY

Introduction-Customs act 1962- Objectives of Customs Act, Levy and collection of Customs duty , classification of goods , Goods Exempted from Customs duty, Searches ,seizures, confiscation and penalties. Central excise duty 1944- Nature of excise duty, levy and collection of excise duty - Type of excise duty, valuation of goods- clearance of goods- clearance of samples- registration and exemption from registration.

UNIT – II

12 Hours

INTRODUCTION TO GOODS AND SERVICE TAX

Goods and Service Tax - Meaning, History of Goods and Service Tax, Features, Objectives, Challenges, Types - SWOT (Strength, Weakness, Opportunities, and Threats of Goods and Service Tax), Scope of Goods and Service Tax - Difference between Indirect Tax and Goods and Service Tax - Advantages and Disadvantages of Goods and Service Tax - Dimension of Goods and Service Tax - Effects of Goods and Service Tax in Indian Economy - Impact of Goods and Service Tax and its Implication.

UNIT- III

12 Hours

GOODS AND SERVICE TAX REGISTRATION

Meaning, Importance, Types, Procedure for Resident and Non- Resident - Application Process and Enrolment process under Goods and Service Tax - Documents required - Penalties - Cancellation of Registration - Revocation of Cancellation of Registration.

UNIT- IV

12 Hours

LEVY AND COLLECTION OF GST

Supply - Meaning, Place of Supply, Time of Supply, Value of Supply, Methods of Valuation - Goods and Service Tax on Exports.

UNIT- V

12 Hours

ASSESSMENT RETURNS AND REFUND OF GOODS AND SERVICE TAX

Assessment - Meaning and types - Accounts and Other Records - Periods of Retention of Accounts. Returns - Types of returns and their due dates -Furnishings of details of Outward Supply - Claim of Input tax credit and Provisional Acceptance thereof - Matching and Reversal and Reclaim at Reduction in Output tax liability. Payments of Goods and Service Tax -TDS and TCS under Goods and Service Tax - Refund of Goods and Service Tax.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	CA HemantNarang	Goods and Service Tax Simplified, A Complete Guide to New Model GST Law	Computech Publications Limited , New Delhi.
2.	RakeshKumar	Goods and Service Tax	Diamond Pocket Books (P) Ltd., New Delhi.
3.	Dr.H.C.MehrotraProf.V.P. Agarwal	Goods and Service Tax	SahityaBhawan Publication New Delhi(2020).
4.	T S Reddy and Hari Prasad Reddy	Business Taxation	Margham Publication.
5.	Dr. Vinod and K. SinghaniamonicSinghaniamonic	Students Guide To goods and service Tax	Taxmann Publications, New Delhi.
6.	Datey, V.S.	Indirect Tax Law and practice	Taxmann Publications Pvt. Ltd., Delhi,
7.	Bansal K.M	Gst and Custums Law	Taxman
8.	Dr,NitiBhasin,Dr.Sameer Lama	Gst and Custums Law	Taxman
9.	SanjeetSharma , C.A Anoopmodi,C.A	Gst and Custums Law	VK Publication
10.	Mahesh Gupta,C.A Nikhil Gupta	Gst and Custums Law	Rajeev Bansal

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	VS DateyDr.KrishnaSachdev	Principles of GST and customs law	Taxmann
2.	Dr.SonalBabber,RasleenKaur,Kritika	GST and customs law	Scholar tech press
3.	SonnalBabberRasleen Kaur	GST and customs law	Scholer tech press

4	Dr.K.M.Bansal	GST and customs law	Taxmann
5	Dr.RavimM.N	GST and customs law	Professional bros publication
6	Dr.VenodK.Singhania	GST and customs Duty	Taxmann
7	VS Datey	GST	Taxmann
8	ShilpiSahi	GST and customs law	Cengage
9	Taxpal Classes	GST and customs law	A taxpal publication
10	Dr.H.C.MehrotraProf.V.P.Agarwal	Goods and Service Tax and Custom Duty	SahityaBhawanPublication (2021).

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Elective

Paper-3

Paper code: CECM65B

Name of the Paper: INVESTMENT MANAGEMENT

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

**INTERNAL ELECTIVE
(to choose one out of 3)
PAPER - 2**

Course Objectives

1. To enable the students to apply various tools and techniques of Investment and risk management.
2. To provide knowledge on various investment avenues that benefits the individual and nation.
3. To Keep Funds Safe & Secure.
4. To Earn a Steady & Additional Source of Income
5. To have good Retirement Planning

Course Outcomes

1. After studied unit-1, the student will be able to understand the Fundamentals of Investment
2. After studied unit-2, the student will be able to get knowledge pertaining to Security Investment.
3. After studied unit-3, the student will be able to gain knowledge about Non Security Investment.
4. After studied unit-4, the student will be able to know the scientific reasoning about Risk and Return.
5. After studied unit-5, the student will be able to get Reflective thinking through Fundamental and Technical Analysis.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT- I**12 Hours****INTRODUCTION TO INVESTMENT**

Investment Meaning- Investment Vs. Speculation- Investment Vs Gambling- Important factors favourable for investment program- stages in investment - investors classification

UNIT – II**12 Hours****SECURITY INVESTMENT**

Meaning- Bonds- Preference Shares- Equity shares- Derivatives- Options- Swaps- Futures- Mutual funds

UNIT – III**12 Hours****NON SECURITY INVESTMENT**

Meaning- Government Securities- Life Insurance- UTI- Commercial banks- Provident fund- Post office schemes- National Savings Schemes- Fixed Deposit Schemes.

UNIT – IV**12 Hours****RISK AND RETURN**

Meaning- Historical and Expected return- Types of risk- Measurement of risk

UNIT – V**12 Hours****FUNDAMENTAL AND TECHNICAL ANALYSIS**

Meaning- Economy, Industry and Company Specific analysis- Tools for technical analysis- Charts, Support and Resistant level analysis.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Preeti Singh	Investment Management	Himalaya Publishing House. New Delhi. 2014
2.	Prasanna Chandra	Investment Analysis and Portfolio Management,	Tata McGraw - Hill Publishing Company Limited, New Delhi.
3	Dr. Radha	Investment Management	Prasanna Publication, 2015
4	Dr.O.P Agarwal	Security Analysis And Investment Management	Himalaya Publication, 2007.

5	Dr.Prithisingh	Investment Management	“Himalaya Publication, 2015.
6	Natarajan L	Investment Management Security Analysis and Portfolio Management	Margham Publication, Chennai.
7	Avadhani VA	Investment and Securities Market in India	Himalaya Publishing House, Mumbai.
8	Bhalla VK	Investment Management, Security Analysis and Portfolio Management	S.Chand and Company Ltd, New Delhi
9	Dr. V.AAvadhani,	Investment Management	Himalaya Publication, 2004.
10	Preeti Singh	Investment management	Himalaya Publicating House

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.L.Natarajan	Investment management	Margam Publication
2.	Prof.Y.P Singh	Fundamental of investment management	Galgotia Publication
3.	RustagiR.P	Investment management	Sultan Chand And Sons
4	PrasannaChanra	Investment management and portfolio management	Mc GrawHilleducation Publication
5	V.K. Bhalla	Investment management	Sultan Chand and Sons
6	Charles P. Jones	Investment analysis and management	Wiley India Pvt.Ltd
7	BhailaV.K	Fundamentals of investment Management	S.Chand
8	VandanaDargi	Investment management	Global Publication
9	Keith Brown	Investment analysis and portfolio management	Cengage Learning
10	Rustage	Investment analysis and portfolio management	S.Chand

E-Material

1. www.universityofcalicut.info › ...PDF Investment Management - University of Calicut
2. www.pondiuni.edu.in › PDF Security Analysis and Portfolio Management
3. <https://www.cfainstitute.org> › ...PDF the future of investment management - CFA Institute.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Elective Paper-3

Paper code: CECM65C

Name of the Paper: FINANCIAL SERVICES

Total Hours per Week: 4

Credit: 3

Lecture Hours: 60

**INTERNAL ELECTIVE
(to choose one out of 3)
PAPER - 3**

Course Objective

1. To enable the students to gain knowledge of business financial services.
2. Financial system of a country is closely related to the economic development.
3. There is drastic change in the functioning of financial system in this era of liberalization, privatization and globalization.
4. The purpose of including Indian Financial system as a subject is to give a clear understanding and knowledge of financial system in the present scenario.

Course Out Comes

1. After studied unit-1, the student will be able to gain knowledge about Financial Services, Capital and Money Markets
2. After studied unit-2, the student will be able to gain effective knowledge about leasing.
3. After studied unit-3, the student will be able to impart knowledge about Factoring.
4. After studied unit-4, the student will be able to know about Venture capital.
5. After studied unit-5, the student will be able to learn about Mutual funds.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes

4	Yes	Yes	Yes	Yes	Yes	NO
5	Yes	Yes	Yes	Yes	Yes	NO

UNIT-I

12 Hours

Financial services - meaning - Financial services and economic environment - legal and regulatory framework - financial institutions and other participants in the financial services sector - capital and money markets - Instruments - Government - Securities market - SWAP Analysis

UNIT-II

12 Hours

Introduction to leasing - legal and tax aspects - lease evaluation - Merits and Demerits - Accounting and Reporting for Lease - lease funding - Types of lease - Lease agreement - Hire purchase Vs lease - Legal aspects of Hire purchase - rights and duties of hire vendor and hire purchaser.

UNIT-III

12 Hours

Factoring - Types and feature of factoring agreement - Factoring Vs Bills discounting - Services of factor - Consumer Finance and credit card services - forfeiting.

UNIT-IV

12 Hours

Venture capital - meaning and characteristics - criteria for assistance - schemes and guidelines - infrastructure financing - assessment of risk - legal aspects.

UNIT-V

12 Hours

Mutual funds - SEBI Guidelines - Features and types - Management structure and performance evaluation - Growth and recent trends - Investor services - Credit rating agencies - CRISIL, CARE, ICRA - Services - Criteria for rating - Symbols.

Note: Questions in Sec. A, B & C - 100 % Theory.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1	Dr.S.Gurusamy	Financial Services	Vijay Nicholes Imprint Pvt. Ltd., Chennai
2.	Dr.V.Balu	Merchant Banking & Finance Services	Sri Venkateswara Publication, Chennai
3	M.Y. Khan,	Financial Services	Tata McGraw Hill, 2004.
4	K. Sasidharan, Alex Mathews	Financial Services	Tata McGraw Hill, 2010
5	B. S. Bhatia, G. S. Batra,	Management of Financial Services	Deep & Deep Publications Pvt Ltd., 2008.
6	Dr. N. Premavathy	Financial Services and Stock Exchange	Sri Vishnu Publications, Chennai.
7	Dr.S.Gurusamy	Financial Services and Systems	Vijay Nicholes Imprint Pvt. Ltd., Chennai
8	M.Y Khan	Financial Service	Mc GrawHilleducation Publication
9	B.Santhanam	Financial Service	Margam Publication
10	Dr.R.Shanmugam	Financial Service	Wiley India Pvt.Ltd

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	ThummuluriSiddaiah	Financial Service	Pearson Publication
2.	Dr.L.Natrajan	Financial Service And Marketing Reasearch	Margam Publication
3	Renuka Sharma And Keran Mehta	Financial Service	Chengage Book House
4	Christine Ennew, Nigel Waite , Roisin Waite	Financial Services Marketing: An International Guide to Principles and Practice	Routledge

5	Duke Fanelli	The Financial Services Marketing Financial Services Banking & Insurance	Wiley
9	C Satyadevi	Financial Services and System	S.Chand
6	K.Sasidharan And Alex. K Mathews	Financial Services	McGraw Hill
7	Prof. Rishikesh J. Malani, Mr. Nimbolkar Vishal Rajendra, Et Al.	Financial Services	Thakur Publication Pvt. Ltd.
8	Punithavathy Pandian	Financial Services And Markets	Vikas
9	Siddaiah	Financial Services Financial Markets, Institutions & Financial Services	Pearson Publication
10	Prof. BimalJaiswal, Dr.Bhuvana Venkatraman, Et Al.		SathiyaBhawanPublications

Related Journals:

1. Journal of Finance.
2. The Review of Financial Studies.
3. Journal of Financial Economics.
4. Journal of Accounting and Economics.
5. Journal of International Money and Finance.
6. Journal of Business Finance & Accounting.
7. Journal of International Financial Management and Accounting.
8. Journal of Financial Services Research

E-Materials:

1. "Financial Services: Getting the Goods". IMF. 28 March 2012. Retrieved 8 September2015.
2. "Access to a financial account or services". Our World in Data. Retrieved 15 February2020.

3. "Bill Summary & Status 106th Congress (1999 - 2000) S.900 CRS Summary - Thomas (Library of Congress)". Retrieved 2011-02-08.
4. Roberts, Richard (2008). The City: A Guide to London's Global Financial Centre. Economist. p. 2.
5. "Research and statistics FAQ". The City of London. Archived from the original on 26 September 2011. Retrieved 23 February 2012.
6. "Triennial Central Bank Survey - Foreign exchange and derivatives market activity in 2004"

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
 S – Strong, M – Medium, L – Low (may be avoided)

Semester: VI

Paper type: Skill Based Subject Paper-4

Paper code: CSCM66 Name of the Paper: HUMAN RESOURCES MANAGEMENT

Total Hours per Week: 3

Credit: 2

Lecture Hours: 45

PAPER - 4

Course Objectives

1. To enable the students to understand the Human resource management concepts and principles.
2. To create an awareness about the existing HR practices of the companies in India.
3. Defining Organizational Structure And Driving Productivity
4. Offering Employee Satisfaction.
5. Building Coordination Between Organizational Departments

Course Outcomes

1. After studied unit-1, the student will be able to understand the basics of Human Resource Management.
2. After studied unit-2, the student will be able to get the ability to plan Human resource.
3. After studied unit-3, the student will be able to attain knowledge about leadership qualities through Recruitment and Selection.
4. After studied unit-4, the student will be able to know Comprehension about Training and Development.
5. After studied unit-5, the student will be able to get awareness about Performance and Potential Appraisal.

Matching Table (Put Yes / No in the appropriate box)

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	NO	Yes	NO
2	Yes	Yes	Yes	Yes	Yes	NO
3	Yes	Yes	Yes	Yes	Yes	NO
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

UNIT – I

9 Hours

INTRODUCTION TO HUMAN RESOURCES MANAGEMENT

Definition- Meaning, Nature, Scope and Objectives, Functions, Importance. Qualities and Role of HR Manager -Problems and Challenges of HR Manager -Changing Environment of HRM, Changing role of HRM.

UNIT – II

9 Hours

HUMAN RESOURCE PLANNING

Definition, Need and Importance, HRP Process, Problems And Barriers To HRP, HRP Effectiveness. Job Analysis - meaning, process, Job Description and Job Specification. Job Design meaning and methods.

UNIT – III

9 Hours

RECRUITMENT AND SELECTION

Meaning and Definition, Objectives, Sources of Recruitment, Process, Methods and Recruitment Practices In India. Selection- Meaning and Definition, Objectives, Process and preparation of Curriculum Vitae.

UNIT – IV

9 Hours

TRAINING AND DEVELOPMENT, PERFORMANCE APPRAISAL

Meaning - Nature, Principles, Assessing The Needs Of Training, Inputs And Gaps In Training - Training And Development As Source Of Competitive Advantage - Methods Of Training, Evaluation Of Effectiveness Of Training Programme, Making The Training Effective-HR Culture In MNC's.

UNIT-V

9 Hours

Performance and Potential Appraisal - Meaning, Purpose-Process - Methods – Traditional and Modern Methods - Problems. Human Resource Accounting- Methods of valuation of Human resources, controlling costs of Human Resources.

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Dr.S.S. Khanka	Human Resource Management (Text & Cases)	S. Chand Publishing, New Delhi, 5 th edition (2013).
2.	L.M. Prasad	Human Resource Management (Text & Cases)	Sultan Chand and sons, New Delhi, 3 rd edition (2014).
3	K. A. Aswathappa	Human Resource Management	Himalaya Publishing House, 8 th edition.
4	C. B. Mamoria	Personnel Management	Himalaya Publishing House Pvt., Ltd, 13 th edition (2019).
5	P. C. Tripathi	Personnel Management and industrial relations	Sultan Chand and sons, New Delhi, 21 st edition (2013).
6	P.SubbaRao	Personnel and Human Resource Management	Himalaya Publishing House.
7	V.S.P Rao	Human Resource Management	Taxmann's
8	Gary Dessler Biju Verkkkey	Human Resource Management	Pearson Education
9	C.B Gupta	Human Resource Management	Sultan Chand & Sons
10	Susan L. Verhust	Human Resource Management	Wiley India

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Ramashankar Yadav	Human Resource Management	Wiley India
2.	T.N Chhabra	An Introduction to Human Resource Management	Sun India Publication
3.	K.A Swathappa Sadhana Dash	Human Resource Management Text And	Mc Graw Hill

Cases

4.	Raymond A.Aboe John R.Hollenbeue	Fundamentals Of human Resource Management	Mc Grew Hill
5	PravinDurai	Human Resource Management	Pearson Education
6	Ashok khurana	Human Resource Management	Eminence Edition
7	Vinay karwasra	Human Resource Management	Kindle edition
8	Raman Preet	Future of Human Resource Management	wiley
9	Nishantuppal	Human Resource Management analytics	Pearson Education
10	David.ADecenzo,StephenP.Robbins	Human Resource Management	Wewyark john wiley&sons ,inc.,1999

E-Material

1. Online Study Material for Commerce courses - LPU Distance

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low (may be avoided)


ANNAMALAI UNIVERSITY
307 M.COM.

Programme Structure and Scheme of Examination (under CBCS)
 (Applicable to the candidates admitted in Affiliated Colleges from the academic year
 2022 -2023 onwards)

Course Code	Study Components & Course Title	Hours/Wee	Credit	Maximum Marks		
				CIA	ES	Total
SEMESTER - I						
22PCOMC11	Core Course - I : Strategic Financial Management	6	4	25	75	100
22PCOMC12	Core Course - II : Managerial Economics	6	4	25	75	100
22PCOMC13	Core Course - III : Advanced Business Statistics	5	4	25	75	100
22PCOMC14	Core Course - IV : Merchant Banking and Financial Services	5	4	25	75	100
22PCOME15	Core Elective - I	5	3	25	75	100
22PCOMO16	Open Elective - I	3	3	25	75	100
	Total	30	22			600
SEMESTER - II						
22PCOMC21	Core Course - V : Accounting for Managers	6	4	25	75	100
22PCOMC22	Core Course - VI : Income Tax Law and Practice	6	4	25	75	100
22PCOMC23	Core Course - VII : Security Analysis and Portfolio Management	6	4	25	75	100
22PCOMC24	Core Course - VIII : Digital Banking	5	3	25	75	100
22PCOME25	Core Elective - II	5	3	25	75	100
22PFLDC26	Field Study	-	3	25	75	100
22PHUM27	Compulsory Course: Human Rights	2	2	25	75	100
	Total	30	23			700

List of Core Electives
[Internal Elective for Same Major Students]
(Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22PCOME15-1	Organisational Behaviour	5	3	25	75	100
	22PCOME15-2	Human Resource Management	5	3	25	75	100
	22PCOME15-3	Banking and Insurance	5	3	25	75	100
II	22PCOME25-1	Management Informantion System	5	3	25	75	100
	22PCOME25-2	Customer Relationship Management	5	3	25	75	100
	22PCOME25-3	Business Environment	5	3	25	75	100

List of Open Electives
[External Elective for Other Major Students – Inter/Multi Disciplinary Courses]
(Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22PCOMO16-1	Basic Accounting	3	3	25	75	100
	22PCOMO16-2	Stock Market Investing	3	3	25	75	100
	22PCOMO16-3	Services Marketing	3	3	25	75	100

SEMESTER - I CORE - I	22PCOMC11: STRATEGIC FINANCIAL MANAGEMENT	CREDITS: 4 HOURS: 6
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COURSE OBJECTIVES

- 1) To have the understanding of the functions of finance management
- 2) To expand the awareness of long term sources of funds.
- 3) To facilitate the students to the understanding of capital structure and leverage
- 4) To bring subject knowledge about capital investment decision among the students.
- 5) To let students to be acquainted with the subject of working capital management.

Unit 1

Financial Management - Functions - Goals of Financial Management - Maximization Vs. optimizations - Time value of money - Risk-return trade off.

Unit 2

Management of funds - Long term sources - shares and Debentures - Convertible securities and Term Loans - Working Capital financing - Sources and approaches- Bank credit-Basic principles and methods of assessment- Other sources of short term finance Operating environment of working capital

Unit 3

Capital structure planning: Concepts of cost of capital - cost of equity, debt, retained earning - Weighted average cost of capital - Capital structure theories - Net income, Net operating income, MM and Traditional Theories - Leverage - Types and significance. Dividend policy and practices - Dividend policies - Factors affecting dividend decision - Dividend theories - Graham, Gordon, Walter and MM Theories.

Unit 4

Investment Decision : The Capital Budgeting Process, Cash flow Estimation, Payback Period Method, Accounting Rate of Return, Net Present Value (NPV), Net Terminal Value, Internal Rate of Return (IRR), Profitability Index, Capital budgeting under Risk – Certainty Equivalent Approach and Risk Adjusted Discount Rate.

Unit 5

Working capital management-working capital cycle-forecasting of working capital requirements- Factors influencing working capital-Management of inventory, cash and accounts receivables- payables management-credit and collection policies.

Note: The proportion between Theory and Problems shall be 60:40

COURSE OUTCOMES

- 1) After studied Unit-1, the student will be able to understand the functions of finance Management.
- 2) After studied Unit-2, the student will be able to know about the long term sources of funds and environment of working capital.
- 3) After studied Unit-3, the student will be able to gain information about capital structure and leverage
- 4) After studied Unit-4, the student will be able to gain knowledge about capital investment decision
- 5) After studied Unit-5, the student will be able to be acquainted with on the subject of working capital Management.

Text Books

- 1) I M Pandey, Financial Management, Vikas Publishing House Pvt Ltd.
- 2) John H Hampton, Financial Decision Making, Prentice Hall of India Ltd.

supplementary Readings

- 1) Prasanna Chandra, Financial Management, Tata McGraw Hill Publishing Company Limited.
- 2) M.Y.Khan and P.K.Jain, Financial Management, Tata McGraw Hill Publishing Company Limited.
- 3) P.V.Ratnam, Financial Management Theory, Problems and Solutions, Kitab Mahal.
- 4) Corporate Laws and Secretarial Practice –Sultan Chand and Sons, New Delhi.
- 5) N.D.Kapoor, Dr.G.K.Kapoor Corporate Laws and Secretarial Practice, Premier Book Company, New Delhi.

SEMESTER - I CORE - II	22PCOMC12: MANAGERIAL ECONOMICS	CREDITS: 4 HOURS: 6
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COURSE OBJECTIVES

- 1) To enable the students to know the scope and application of managerial economics.
- 2) To knowledge the students to know the managerial use of production function.
- 3) To study about a different marketing structures.
- 4) To know about profit planning and forecasting.
- 5) To study on business cycle and policies.

Unit 1

Managerial Economics – meaning, nature, scope and application – relationship with other discipline – role of managerial economist – demand analysis – demand determinants – forecasting and techniques.

Unit 2

Production function – managerial use of production function – supply analysis – law of supply – managerial uses of supply curve. Cost concepts, classification & determinants – cost output relationship – economics of scale – cost control and cost reduction.

Unit 3

Price and output decision under different marketing structures – perfect competition, monopoly, oligopoly & monopolistic competition – price discrimination – pricing objectives, policies, strategies and methods – price differentials-price forecasting.

Unit 4

Profit – nature & concept – profit planning, policies and forecasting – profit theories – measurement of profit – interest – rent and theories.

Unit 5

Business cycle and policies – economic forecasting of business – input output analysis – national income – accounting and measurement.

COURSE OUTCOMES

On successful completion of the subject, the students acquired knowledge about;

1. The scope and application of managerial economics.
2. Managerial use of production function.
3. Different marketing structures.
4. Profit planning and forecasting.
5. Business cycle and policies.

Text Books

- 1) Joel Dean, Managerial Economics – Prentice Hall, New York.
- 2) Mehta P.L. – Managerial Economics – Sultan Chand and Sons, New Delhi.
- 3) Varshney and Maheswari – Managerial Economics – Sultan Chand and Sons, New Delhi.
- 4) Gupta G.S – Managerial Economics – Tata McGraw Hill, New Delhi.
- 5) Mithani D.M – Managerial Economics - Himalaya Publishing House, Mumbai.
- 6) Dwivedi D.N. – Managerial Economics Vikas Publishing house P.Ltd, New Delhi.
- 7) Cauvery, SudhaNayak and Others - Managerial Economics – S.Chand and Sons. New Delhi.
- 8) H. Craig Petersen, W. Cris Lewis, Managerial Economics, 4th Edition, Pearson Education.

SEMESTER - I CORE – III	22PCOMC13: ADVANCED BUSINESS STATISTICS	CREDITS: 4 HOURS: 5
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COURSE OBJECTIVES

- 1) To enhance the students to know about multiple correlation and multiple regression.
- 2) To extend the knowledge of technique of probability.
- 3) To facilitate the students to have the deep knowledge on sampling methods, proportions-large and small samples- Z test and T test.
- 4) To bring the students to get information about chi square test.
- 5) To know about F-Test and ANOVA.

Unit 1

Partial correlation – partial correlation coefficient – partial correlation in case of four variables – multiple correlation – multiple regression.

Unit 2

Theory of probability – probability rules – Bayes theorem – probability – characteristics and application of binomial, poisson and normal distribution.

Unit 3

Sampling – sampling methods – sampling error and standard error – relationship between sample size and standard error. Testing hypothesis – testing of means and proportions – large and small samples – Z test and T test.

Unit 4

Chi square test - characteristics and application – test of goodness of fit and test of independence – test of homogeneity.

Unit 5

F test – testing equality of population variances analysis of variance - one way and two way classification.

Note : The proportion between theory and problems shall be 20:80

COURSE OUTCOMES

On successful completion of the subject, the students acquired knowledge about;

- 1) Partial and Multiple correlations.
- 2) Probability and Binomial distribution.
- 3) Sampling, Hypothesis, Z Test and T Test.
- 4) Application of Chi – square test.
- 5) Analysis of variance and F test.

Text Books

- 1) S P Gupta, Statistical methods, Sultan Chands & Sons. S P Gupta, Statistical methods, Sultan Chands & Sons.
- 2) D C Samcheri and V K Kapoor, business statistics, Sultan Chand and Sons, New Delhi.

Supplementary Readings

- 1) J.K. Sharma, Business Statistics - Pearson Education.
- 2) Richard I Levin and David S, Rubit, statistics for management, 7th Edition Pearson education New Delhi, 2002.
- 3) Business statistics and operations research, Dr. D. Joseph Anbarasu, Lintech press Trichy.

SEMESTER - I CORE – IV	22PCOMC14: MERCHANT BANKING AND FINANCIAL SERVICES	CREDITS: 4 HOURS: 5
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COURSE OBJECTIVES

To enable student

- 1) Understand the modes of issuing securities
- 2) Acquire financial evaluation technique of leasing and hire purchase

Unit 1: MERCHANT BANKING

Introduction – An Over view of Indian Financial System – Merchant Banking in India – Recent Developments and Challenges ahead – Institutional Structure – Functions of Merchant Bank - Legal and Regulatory Framework – Relevant Provisions of Companies Act- SERA- SEBI guidelines- FEMA, etc. - Relation with Stock Exchanges and OTCEI.

UNIT 2: ISSUE MANAGEMENT

Role of Merchant Banker in Appraisal of Projects, Designing Capital Structure and Instruments – Issue Pricing – Book Building – Preparation of Prospectus Selection of Bankers, Advertising

Consultants, etc. - Role of Registrars –Bankers to the Issue, Underwriters, and Brokers. – Offer for Sale – Green Shoe Option – E-IPO, Private Placement – Bought out Deals – Placement with FIs, MFs, FIIs, etc. Off - Shore Issues. – Issue Marketing – Advertising Strategies – NRI Marketing – Post Issue Activities.

Unit 3: OTHER FEE BASED SERVICES

Mergers and Acquisitions – Portfolio Management Services – Credit Syndication – Credit Rating –Mutual Funds - Business Valuation.

UNIT 4: FUND BASED FINANCIAL SERVICES

Leasing and Hire Purchasing – Basics of Leasing and Hire purchasing – Financial Evaluation.

UNIT 5: OTHER FUND BASED FINANCIAL SERVICES

Consumer Credit – Credit Cards – Real Estate Financing – Bills Discounting – factoringandForfaiting – Venture Capital.

COURSE OUTCOMES

- 1) Good knowledge on merchant banking activities

Text Books

- 1) M.Y.Khan, Financial Services, Tata McGraw-Hill, 12th Edition, 2012
- 2) Nalini Prava Tripathy, Financial Services, PHI Learning, 2011.

Supplementary Readings

- 1) Machiraju, Indian Financial System, Vikas Publishing House, 2nd Edition, 2010.
- 2) J.C.Verma, A Manual of Merchant Banking, Bharath Publishing House, New Delhi,
- 3) Varshney P.N. & Mittal D.K., Indian Financial System, Sultan Chand & Sons, NewDelhi.
- 4) Sasidharan, Financial Services and System, Tata Mcgraw Hill, New Delhi, 2nd Edition,2011.
- 5) Website of SEBI

SEMESTER - I CORE ELECTIVE – I	22PCOME15-1: ORGANISATIONAL BEHAVIOUR	CREDITS: 3 HOURS: 5
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COURSE OBJECTIVES

- 1) To make the students to understand and the need and importance of Organizational Behavior.
- 2) To impart the students to gain expert knowledge about the application of organizational conflict technique to resolve problems in an organization.
- 3) To make an awareness among students about the implication of organizational changes and its effectiveness.

Unit 1: Introduction to Organisational Behaviour

Organisational Behaviour – Meaning- Importance- Nature and Scope- Organisation Goals-Functions- Evolution of Organisational Behaviour-Factors Influencing Organisational Behaviour.

Unit 2: Organisational Structure and Culture

Organisational Structure– Meaning-Need – Elements- Typology- Organisational Structure and Employee Behaviour-Meaning and Definition of Organizational Culture-Types Functions –Factors influencing organizational culture-Differentiation between organizational culture and climate.

UNIT 3: Organisational Conflicts and Leadership

Organisational Conflicts – Causes and Types – Managing Conflicts – Leadership: Theories and styles – Motivation – Theories of Motivation – Communication – Conflict Management: Role Conflict – Goal Conflict and inter personal conflict

Unit 4: Organisational Effectiveness and Quality of Work Life

Organisational Effectiveness- Meaning-Approaches to Organisational Effectiveness- Factors influencing Organisational Effectiveness-Quality of Work Life- Meaning – Definition- Evolution and Development of the Concept of QWL-Constituents of QWL.

UNIT 5: Organisational Change and Development

Organisational Change – Meaning- Reasons for changing – Types of Changes- Organisational Resistance-Managing Resistance to Change- Organisational Development Meaning-Characteristics – Models – Factors influencing of an OD Intervention

COURSE OUTCOMES

After successful completion of the course, the students will able to:

- 1) Appreciate the implication of Organizational Behaviour in an organization.
- 2) Compare the strength and limitations of different organizational structure.
- 3) Solve the different forms of conflicts and assume different leadership styles.
- 4) Recall the significance of quality of work life and organizational changes.
- 5) Recognize the factors affecting the organizational effectiveness.

Text Books

- 1) L.M. Prasad – Organisational Behaviour – Sultan Chand & Sons, Delhi.
- 2) K. Aswathappa – Essentials of Organisational Behaviour, McGraw Hill, Delhi.
- 3) Fred Luthans, Organisation Behaviour, McGraw Hill, Delhi
- 4) Hell Riegel, Slocum and Woodman, Organisation Behaviour, SouthWestern, Thomson Learning, 9th Edition,
- 5) R.S. Dwivdi, Human Relations and Organizational Behaviour, McMillan India Ltd., 5th Edition.
- 6) Stephen P. Robbins, Organizational Behaviour, 9th Edition, Pearson Education, New Delhi,
- 7) P.Subba Rao, Essentials of Human Resource Management and Industrial Relations, Himalaya Publishing House.
- 8) P.C. Tripathi, Personnel Management and Industrial Relations, Sultan Chand & Sons.
- 9) B.S.Bhatia and G.S.Batra Human Resource Management — Deep & Deep Publications.

SEMESTER - I CORE ELECTIVE – I	22PCOME15-2: HUMAN RESOURCE MANAGEMENT	CREDITS: 3 HOURS: 5
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COURSE OBJECTIVES

- 1) To enable the students to have a thorough understanding of changing role of HRM in global and Indian perspective.
- 2) To disseminate the students about various methods of recruitment, training and performance appraisal techniques.
- 3) To impart the students to gain expert knowledge of various theories of motivation and human resource audit.

Unit 1: Introduction to Human Resource Management

HRM Concepts – Significance- Scope –Nature of human resource management – Features of HRM – Personal Management Vs HRM, Functions of HRM- Competencies of HR manager

Unit 2: HR Planning and Job Analysis

Importance of HR planning - Characteristics of HR planning – Factors influencing HR planning Levels – Process in HR planning – HR – Format System – Job analysis – Job description – Job designation.

Unit 3: Human Resource Development

Recruitment – Factors – Recruitment Policy- Recruitment process – Sources of recruitment – selection – Concept – Selection Strategies – Selection Tests – Interview – Process- Types –Training- Features- Process- Various methods of Training.

Unit 4: Performance appraisal and Compensation Management

Performance appraisal - Ranking, rating scales, critical incident method - MBO as a method of appraisal - Removing subjectivity from evaluation - Criteria for promotions and job enrichment

Unit 5: Motivation

Meaning – Nature – Significance – All Theories of Motivation – Approaches to Motivation – Motivational Applications – Human Resource Audit – Meaning – Objectives – Quantitative indicators – HR Audit Plan.

COURSE OUTCOMES

After successful completion of the course, the students will able to:

- 1) Comprehend the fundamentals of Human Resource Management
- 2) Compute job analysis report and be able to develop job description and job specification.
- 3) Describe the various motivational applications in practice
- 4) Explain performance appraisal techniques and able to prepare performance appraisal forms
- 5) Develop human resource audit plan and conduct HR audit.

Text Books

- 1) Aswathappa, Human Resource and Personnel Management, TataMcGraw Hill, NewDelhi, 2002.
- 2) A.M. Sheikh, Human Resource Development and Management, S. Chand & Co, NewDelh

Supplementary Readings

- 1) Dressler- Human Resource management, 8th Ed. Pearson Education, 2002
- 2) De Cenzo and Robbins, Personnel/Human Resource Management, Prentice Hall of India, 1998.
- 3) S.K.Chakraborty, Values and Ethics for Organization, Oxford University Press 1999.

SEMESTER - I CORE ELECTIVE – I	22PCOME15-3: BANKING AND INSURANCE	CREDITS: 3 HOURS: 5
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COURSE OBJECTIVES

- 1) To impart the students to have a deep knowledge in the functioning of commercial banks.
- 2) To make the students to comprehend the general principles of contract of insurance and other forms of insurance.
- 3) To impart the students to master over the provisions of banking instruments.

Unit 1: Banking Functionary Services

Commercial Banks - Functions – services – mechanism of Credit creation; merchant banking – virtual banking – Central banking – Functions – Credit controlling mechanism.

Unit 2: Commercial Banks Role on Economic Development

Industrial and priority sectors lending – policies term lending, industrial priority sector lending. Rehabilitation of small sick units, guidelines for priority sector lending commercial bank role in SME - micro credit.

Unit 3: Instruments in Banking Negotiable Instruments

Features-Types of Cheques-Draft-Promissory notes-Other type of Banking Institutions. Debit card and Credit card-Smart card-Endorsements-Types.

Unit 4: Insurance and Function

Definition - Importance, Introduction – General Principles of insurance contract - Life insurance Vs other forms of insurance – various plans and claim settlement – recent development in life insurance.

Unit 5: General Insurance Policies

Features of marine insurance, types of marine policies, marine clauses – marine losses, Features of fire insurance, insurable interest – types of fire insurance policies.

Recent Trends in Banking and Insurance. Faculty member will impart the knowledge on recent trends in Banking and Insurance to the students and these components will not cover in the examination.

COURSE OUTCOMES

After successful completion of the course, the students will able to:

- 1) Understand the fundamental concepts of banking and Insurance.
- 2) Recall the role of commercial banks in Economic Development.
- 3) Master over the provisions of banking instruments.
- 4) Understand the applicability of various types of policies.
- 5) Recognize the fundamental principles of general insurance.

Text Books

- 1) Mishra, M.N., S.B.Mishra, 2015, Insurance Principles and Practice, S. Chand and Sons PVT Ltd, Ram Nagar, New Delhi
- 2) Murhty, A. 2017, Principles and Practices of Insurance Margam Publication, Chennai
- 3) Gorden Nataraj, 2016 Banking Himalaya Publication, New Delhi
- 4) Shekhar K.C., Lekshmy Shekhar, 2017, Banking Theory and Practice, Vikas Publishing Houses Pvt Ltd., Chennai
- 5) Ramachandran R. 2015, Banking Theory and Practices MJP Publishers, 5, Muthu Kalathy Street, Triplicane, Chennai – 5.
- 6) Sundaram, KPM, E.N.Sundaram, 2016, Modern Banking Sultan Chand and Sons, New Delhi.

SEMESTER - II CORE – V PART – III	22PCOMC21: ACCOUNTING FOR MANAGERS	CREDITS: 4 HOURS: 6
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COURSE OBJECTIVES

- 1) To understand the basic principles and concepts in accounting
- 2) To draft the final accounts as per accounting standards
- 3) To acquire knowledge in Rectification of errors and Bank Reconciliation statement
- 4) To analyse the financial statements like ratios and funds flow statements
- 5) To enable students to learn the elements of cost

Unit 1: Introduction to Accounting

Need and Types of Accounting, Users of Accounting concepts and conventions of Accounting, Accounting Equation (problems on accounting equation), Generally Accepted Accounting Principles (GAAP).

Preparation of books of Accounts: Journals, Subsidiary books, three column cash book, ledgers and trial balance. Depreciation- Straight line and Written down Value Methods.

Unit 2: Preparation of Financial Statements

Final Accounts: Meaning, Features, Uses and Preparation of Trading Account, Statement of Profit and Loss and Balance Sheet - Adjusting and Closing Entries. (Basic problems on Final accounts of companies).

Rectification of Errors: Types of Errors - Rectification of Errors before and after Preparations of Trial balance.

Unit 3:

Bank Reconciliation Statement - Need - Reasons for Difference between Cash Book and Pass Book Balances - Problems on Favourable and Overdraft Balances.

Unit 4: Analysis of Financial Statements I

Ratio Analysis- solvency ratios, profitability ratios. activity ratios, liquidity ratios, market capitalization ratios; Common Size Statement; Comparative Balance Sheet and Trend Analysis.

Analysis of Financial Statements II: Funds Flow Statement. Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis;

Unit 5

Definition, scope, objectives and significance of Cost Accounting, its relationship with Financial Accounting and Management Accounting Cost Objects, Cost Centers and Cost Units – Elements of Cost Classification of Cost Role of Cost Accountants in Organizations.

COURSE OUTCOMES

After the successful completion of the course, the students will be able to:

- 1) Understand the need and types of Accounting, Users of Accounting concepts and conventions
- 2) Gain knowledge in preparing financial statements
- 3) Acquire knowledge on preparing the Bank reconciliation statement
- 4) Understand and apply the different types of ratios
- 5) Learn the elements of cost

Text Books

- 1) Financial Accounting: A Managerial Perspective, Narayanaswamy R. 5/e, PHI, 2014.
- 2) A Text book of Accounting For Management, Maheswari S. N. Maheswari Sharad K Maheswari, 2/e, Vikas Publishing house (P) Ltd.
- 3) Financial Accounting. Tulsian P. C. 1/e, Pearson Education.
- 4) Accounting for managers, Madegowda J. Himalaya Publishing House. Advanced Accountancy, Gupta R. L & Radhaswamy M, Sultan Chand Publications.
- 5) Financial Accounting. Jain S. P and Narang K L. Kalyani Publishers. Business Taxation, Akhileshwar Pathak and Savan Godiawala, 2/e, McGraw Hill.
- 6) Education (India) Pvt. Ltd, 2013.

OUTCOME MAPPING

	Programme Outcomes				
	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

*3– Strong, 2- Medium, 1- Low

SEMESTER - II CORE – VI	22PCOMC22: INCOME TAX LAW AND PRACTICE	CREDITS: 4 HOURS: 6
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COURSE OBJECTIVES

To get the students to acquaint with knowledge on the provisions of Income Tax Regulations in India

- 1) To educate the students on computation of income from various sources
- 2) To impart knowledge to the students to file tax returns

Unit 1

Income Tax Act – Definition – Income – Agriculture Income – Assessee – Previous year – Assessment year – Residential Status – Scope of Total Income – Capital and Revenue – Receipts and Expenditure – Exempted Incomes.

Unit 2

Heads of income - Salaries income – Allowances – Perquisites – Gratuity – Pension – Profits-in-lieu of salary - Provident funds - Income from House property – Definition of annual value - Deductions from annual value - Computation of income house property under different circumstances.

Unit 3

Computation of Profits and Gains of Business or Profession – Computation of Capital Gain - Computation of Income from other sources.

Unit 4

Clubbing of income – Set off and Carry forward of losses - Permissible deductions from gross total income – Sec.80s.

Unit 5

Income Tax Authorities – Procedure for Assessment – Tax Deducted at Source (TDS) – Assessment of Individuals, Hindu Undivided Family, Partnership Firms and Companies.

Note : Theory 25 Marks : Problems - 50 Marks

COURSE OUTCOMES

- 1) Understand the concept of income
- 2) Compute the total income of various kinds of assesses
- 3) Understand the clubbing of income and carry forward of losses
- 4) Determine the tax liability under different heads of income
- 5) Get familiarized with filing of return on different kinds of assesses

Text Books

- 1) Gaur & Narang, "Income Tax Law & Practice", DP Kalyani Publishers, New Delhi.
- 2) Dingar Pagare, "Tax Laws", S.Chand & Sons, New Delhi.
- 3) Vinod K. Singhanian, "Direct Taxes", Taxmann's Publications, New Delhi.
- 4) T.S.Reddy & Hari Prasad Reddy, "Income Tax Theory, Law & Practice", Margham Publications, Chennai.
- 5) Government of India, Income Tax Manual
- 6) Dr.H.C.Mehrotra- Income Tax Law and Practice, Sahitya Bhavan Publications, Uttar Pradesh.
- 7) Dr.Bhagawathi Prasad - Law & Practice of Income Tax India, VishwaPrakashan Publishers, Delhi.
- 8) Murthy, Income Tax- vijay Nicole, Chennai

SEMESTER - II CORE – VII	22PCOMC23: SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT	CREDITS: 4 HOURS: 6
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COURSE OBJECTIVES

- 1) To enable the students to know the meaning and types of security analysis & portfolio management.
- 2) To make the students to understand the meaning and features of hire purchase.
- 3) To develop Knowledge about mutual funds.
- 4) To Knowledge the students to know the meaning and features of venture capital.
- 5) To enhance the students to know about the significance and types of Factoring.

Unit 1

Nature and Scope of investment Management Investment Objectives - Investment Process - Investment Media security And Non-Security Forms of investment gilt edged Securities - Sources of Investment Information.

Unit 2

New Issues Market - Methods of Issuing - Parties Involved in the New Issue Market - Secondary Market - Stock Exchanges - NSE and BSE - Trading Mechanism - Online Trading - SEBI and Investors Production.

Unit 3

Security Analysis - Approaches to Security Analyses - Fundamental Analysis - Technical

Analysis - Dow Theory - Random Walk Theory - Efficient Market Hypothesis.

UNIT 4

Portfolio Analysis - Traditional and Modern Approach - Rationate of Diversification of Investments - Markovitz Theory - Sharp Index Model - Capital Asset Pricing Model.

Unit 5

Investment companies in India - Types of Mutual Fund Operations in India - UTI – SEBI and RBI Guidelines For Mutual Funds.

COURSE OUTCOMES

On successful completion of the subject, the students acquired knowledge about;

- 1) Meaning and types of security analysis & portfolio management.
- 2) The meaning and features of hire purchase.
- 3) Develop Knowledge about mutual funds.
- 4) Meaning and features of venture capital.
- 5) Significance and types of Factoring.

Text Books

1. Punithavathy Pandian : Security Analysis and Portfolio Management
(Vikas Publishing House)
2. Gupta L.C. : Return Of Equities – The Indian Experience
(New Delhi Oxford)
3. Bhalla V. : Investment and Portfolio Management (S.Chand &
Co. Delhi)
4. Fisher & Jordan : Security Analysis and Portfolio Management
5. PreetaSingh : Security Analysis (Himalayas Publishing House)
6. Avadhani V.A : Investment and securities Markets in India.
7. SEBI : Guideline 1992
8. Jack Dark Francis : Investments Analysis and Management (McGraw Hill
1990)
9. Gara K.L : Stock Exchange In India.
10. Yasasway : Equity Investment Strategy.

SEMESTER - II CORE – VIII	22PCOMC24: DIGITAL BANKING	CREDITS: 4 HOURS: 6
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COURSE OBJECTIVES

- 1) To enable the students to know the banking legislation in India.
- 2) To study the changing scenario of Indian banking system.
- 3) To know about the bank deposits, loans and advances.
- 4) To study on demonetization and remonetization.
- 5) To study on payment system and digital banking.

Unit 1: Banking Legislations

Evaluation of banking legislation in India – reserve bank of India Act 1934 – major provisions of banking regulation Act 1949/1970 Act – the banking regulation amendment Act, 2017.

Unit 2: Changing Profile of Indian Banking

Changing scenario of Indian banking system – shift from security to purpose orientation – change from whole sale character to retail character – financial exclusion – need for financial inclusion.

Unit 3: Bank Deposits, Loans and Advances

Customers accounts with the banker – deposits – opening of bank accounts – types of deposits accounts – NRI deposits – general rules of sound lending – forms of advances.

Unit 4: Demonetization and Remonetization

Demonetization an Remonetization – history of demonetization in India – meaning – definition – background – objectives – advantages and disadvantages – demonetization – black money- fake money – digital financial transactions – cash less economic – remonetization – the role of RBI in demonetization and remonetization.

Unit 5: Payment System & Digital Banking

Innovative banking payment system – rupay – rupay secure – IMPS – National unified USSD platform (USSD) – National automated clearing house (NACH) – Aadhaar enabled payment System (AEPSC – KYC/MICR vs CTS - Comparison – national financial switch (NFS) RTGS, NEFT, UPI, CCIL – National payment corporation – forex settlements, securities settlement enhanced mobile banking – payment banking and small finance banking – competitive and collaborative services.

COURSE OUTCOMES

On successful completion of the subject, the students acquired knowledge about;

- 1) Banking legislation in India.
- 2) The changing scenario of Indian banking system.
- 3) Bank deposits, loans and advances.

- 4) Demonetization and remonetization.
- 5) Payment system and digital banking.

Text Books

- 1) Gurusamy .S 2017, Banking Theory Law and Practice, Vijay Nicole imprints (p) Ltd, Chennai.
- 2) Arunajatesan .S 2017, Technology in banking margham publications Chennai.
- 3) Digital Banking 2016 Indian Institute of banking and finance, taxman publication New Delhi.

SEMESTER - II CORE ELECTIVE – II	22PCOME25-1: MANAGEMENT INFORMATION SYSTEM	CREDITS: 3 HOURS: 5
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COURSE OBJECTIVES

- 1) To study about information system and business model.
- 2) To know about modern information system.
- 3) To study the functional area of information system.
- 4) To enable the students to know testing security and risk of information system.
- 5) To know about software engineering qualities.

Unit 1

Information system – establishing the frame work – business model – information system architecture – excolection of information systems.

Unit 2

Modern information system – system development life cycle – structured methodologies – designing computer based method – procedures control and designing structured programme.

Unit 3

Functional areas – finance marketing, production, personnel levels , concepts of DSS, EIS, ES –comparison – concepts and knowledge representation – managing international information system.

Unit 4

Testing security – coding techniques – detectation of error – validation – cost benefit analysis – assessing the value and risk of information system.

Unit 5

Software engineering qualities – design, production, service, software specification, software metrics, software quality assurance – systems methodology – objectives – time and logic knowledge and human dimension – software life cycle models – verification and validation

COURSE OUTCOMES

On successful completion of the subject, the students acquired knowledge about;

- 1) Information system and business model.
- 2) Modern information system.
- 3) Functional area of information system.
- 4) Testing security and risk of information system.
- 5) Software engineering qualities.

Text Books

- 1) Management information systems, management perspectives, D.P. Goyal, second edition Macmillan, New York.
- 2) Management information systems, Dr,S.P Rajagopalan, Margham publications, chennai.
- 3) Gardon B. Davis, Management information system : Conceptual foundations, McGraw Hill, USA.

SEMESTER - II CORE ELECTIVE – II	22PCOME25-2: CUSTOMER RELATIONSHIP MANAGEMENT	CREDITS: 3 HOURS: 5
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COURSE OBJECTIVES

To facilitates the students to understand the process of CRM, implementation of CRM strategies and customisation of services

Unit 1

Introduction and Significance - CRM Emerging Concepts; Need for CRM; CRM Applications; CRM Decisions; The Myth of Customer Satisfaction; CRM Model; Understanding Principles of Customer Relationship; Relationship Building Strategies; Building Customer Relationship Management by Customer Retention; Stages of Retention; Sequences in Retention Process; Understanding Strategies to Prevent Defection and Recover Customers.

Unit 2

CRM Process: Introduction and Objectives - an Insight into CRM and e-CRM/ online CRM; The CRM cycle - Assessment Phase; Planning Phase; The Executive Phase; Modules in CRM, 4C's of CRM Process; CRM Process for Marketing Organization; CRM Affiliation in Retailing Sector; Key e-CRM features.

Unit 3

CRM Architecture: IT Tools in CRM; Data Warehousing - Integrating Data from different phases with Data Warehousing Technology; Data Mining: - Learning from Information Using Data Mining Technology like OLAP etc.; Understanding of Data Mining Process; Use of Modelling Tools; Benefits of CRM Architecture in Sales & Productivity; Relationship Marketing and Customer Care, CRM Over Internet.

Unit 4

CRM Implementation: Choosing the right CRM Solution; Framework for Implementing CRM: a Step-by-Step Process: Five Phases of CRM Projects

Unit 5

Development of Customizations; Beta Test and Data Import; Train and Retain; Roll out and System Hand-off; Support, System Optimization and Follow-up; Client/Server CRM Model; Use of CRM in Call Centers using Computer Telephony Integration (CTI); CTI Functionality; Integration of CRM with ERP System. Case Studies

Text Books

- 1) Mohammed, H. Peeru and a Sagadevan (2004). Customer Relationship Management. Vikas Publishing House, Delhi.
- 2) Paul Greenberge (2005). CRM-Essential Customer Strategies for the 21st Century. Tata McGraw Hill.
- 3) William, G. Zikmund, Raymund McLeod Jr.; Faye W. Gilbert (2003). Customer Relationships Management. Wiley.
- 4) Alex Berson, Stephen Smith, Kurt Thearling (2004). Building Data Mining Applications for CRM. Tata McGraw Hill.

SEMESTER - II CORE ELECTIVE – II	22PCOME25-3: BUSINESS ENVIRONMENT	CREDITS: 3 HOURS: 5
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COURSE OBJECTIVES

- 1) To understand the concepts of Business Environment.
- 2) To identify the Social Responsibility of Business to different stakeholders
- 3) To understand How Economic Environment in Industrial Development Policies
-Industrial policy, Fiscal policy, Monetary policy, Economic Reforms in India
- 4) To understand the Socio-Cultural Environment.
- 5) To familiarize with the Technological Environment and Modernisation of Technology.

Unit 1: Theoretical Framework of Business Environment

Business Environment: Concept, significance and nature of business environment; Elements of environment – internal and external; Changing dimensions of business environment; Techniques of environmental scanning and monitoring. PEST and SWOT analysis

Unit 2: Economic Environment of Business

Economic Environment: Significance and Elements of Economic Environment; Economic systems and business environment; Economic Planning in India; Industrial Development Policies - Industrial policy, Fiscal policy, Monetary policy. Economic Reforms in India - Liberalisation and impact of Globalisation. Impact of Rupee Devaluation and Demonetization.

Unit 3: Political and Legal Environment

Political and Legal Environment: Elements of political environment; Government and Business; Changing Dimensions of Legal Environment in India – Classification of Laws Influencing Business, Competition Act, Consumerism in India - Consumer Protection Act. - Objectives of GST. Significance of Corporate Governance – Need of Environmental Protection.

Unit 4: Socio-Cultural Environment

Business and Society – Objective of Business. Components of Socio-cultural environment; Social institutions and systems; Elements of Culture - Social Values and Attitudes;. Social Responsibility of Business – Guidelines. Ethical Principles in Business. Code of Ethics.

Unit 5: Technological Environment

Technological Environment: Factors governing Technological Environment-Impact. Innovation - Technology Transfer – Modernisation -Factors to be Considered for Appropriate Technology. Incentives and Concessions for Technological Research - Productivity in Indian Industry - Intellectual Property Rights.

COURSE OUTCOMES

- 1) The students will be able to learn Theoretical Framework of Business Environment.
- 2) The students will be able to make the student knowledge about business Economic Environment of Business.
- 3) The students will be able to Familiarize Current Political and Legal Environment.
- 4) The students will be able to understand the Socio Cultural Environment and Ethics.
- 5) The students will be able to learn the Latest Technology Environment for Business.

Text Books

- 1) Francis Cherunila: Business Environment Himalaya Publishing House, Bombay.
- 2) C.B.Gupta: Business Environment, Sultan Chand and Sons, New Delhi.

Supplementary Readings

- 1) Adhikary , M: Economic Environment of Business, Sultan Chand & Sons, New Delhi.
- 2) Aswathappa,K.Legal Environment of Business, Himalaya Publication, New Delhi.
- 3) Chakravarty, S: Development Planning, Oxford University Press, Delhi.

SEMESTER III						CIA	Uni. Exam	Total
14.	Core	Paper- 8	5	4	Goods & Service Tax (GST)	25	75	100
15.		Paper- 9	5	4	Organisational Behaviour	25	75	100
16.		Paper- 10	6	4	Advanced Cost Accounting	25	75	100
17.		Paper-11	6	4	Research Methodology	25	75	100
Internal Elective for same major students								
18.	Core Elective	Paper -3	4	3	(To choose one out of 3) A. Agri Business Management B. Services Marketing C. Business Analytics	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
19.	Open Elective	Paper -3	4	3	(To choose one out of 3) A. Small Business Management B. Banking Theory C. Stress Management	25	75	100
20.	**MOOC Course		-	-		-	-	100
			30	22		150	450	700
SEMESTER IV						CIA	Uni. Exam	Total
21.	Core	Paper- 12	6	4	Direct Taxes	25	75	100
22.		Paper- 13	6	4	Investment & Portfolio Management	25	75	100
23.		Paper- 14	5	5	Project Development	25	75	100
24.	Core	Project	5	5	Project With Viva voce	100 (75 Project +25 viva)		100
Internal Elective for same major students								
25.	Core Elective	Paper 4	6	3	(To choose one out of 3) A. Financial Services B. Information Technology in Business C. Entrepreneurial Development	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
26.	Open Elective	Paper 4	3	3	(To choose one out of 3) A. Office Management B. Business Organisation C. Principles of Auditing	25	75	100
			30	24		150	450	600
								2600

* Field Study

There will be field study which is compulsory in the first semester of all PG courses with 2 credits. This field study should be related to the subject concerned with social impact. Field and Topic should be registered by the students in the first semester of their study along with the name of a mentor before the end of the month of August. The report with problem identification and proposed solution should be written in not less than 25 pages in a standard format and it should be submitted at the end of second semester. The period for undergoing the field study is 30 hours beyond the instructional hours of the respective programme. Students shall consult their mentors within campus and experts outside the campus for selecting the field and topic of the field study. The following members may be nominated for confirming the topic and evaluating the field study report.

- (i). Head of the respective department
- (ii). Mentor
- (iii). One faculty from other department

****Mooc Courses**

Inclusion of the Massive Open Online Courses (MOOCs) with zero credits available on SWAYAM, NPTEL and other such portals approved by the University Authorities.

ANNAMALAI UNIVERSITY
MASTER OF COMMERCE
SYLLABUS
UNDER CBCS
(With effect from 2021-2022 onwards)
SEMESTER-I
PAPER - 1
ADVANCED FINANCIAL MANAGEMENT

Course Objectives

1. To have the understanding of the functions of finance management
2. To expand the awareness of long term sources of funds.
3. To facilitate the students to the understanding of capital structure and leverage
4. To bring subject knowledge about capital investment decision among the students.
5. To let students to be acquainted with the subject of working capital management.

UNIT-I

Financial Management - Functions - Goals of Financial Management - Maximization Vs. optimizations - Risk-return trade off.

UNIT-II

Management of funds - Long term sources - shares and Debentures - Convertible securities and Term Loans - Working Capital financing - Sources and approaches- Bank credit-Basic principles and methods of assessment- Other sources of short term finance Operating environment of working capital

UNIT-III

Capital structure planning: Concepts of cost of capital - cost of equity, debt, retained earning - Weighted average cost of capital - Capital structure theories - Net income, Net operating income, MM and Traditional Theories - Leverage - Types and significance. Dividend policy and practices - Dividend policies - Factors affecting dividend decision - Dividend theories - Graham, Gordon, Walter and MM Theories.

UNIT-IV

Management of fixed assets - Evaluation of capital investment decision: Payback period - ARR - IRR - NPV - CAPM.

UNIT-V

Working capital management-working capital cycle-forecasting of working capital requirements-Factors influencing working capital-Management of inventory, cash and accounts receivables-payables management-credit and collection policies.

Note: The proportion between Theory and Problems shall be 40:60

Text Books

1. I M Pandey, Financial Management, Vikas Publishing House Pvt Ltd.
2. John H Hampton, Financial Decision Making, Prentice Hall of India Ltd.

Reference Books

1. Prasanna Chandra, Financial Management, Tata McGraw Hill Publishing Company Limited.
2. M.Y.Khan and P.K.Jain, Financial Management, Tata McGraw Hill Publishing Company Limited.
3. P.V.Ratnam, Financial Management Theory, Problems and Solutions, Kitab Mahal.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the functions of finance Management.
2. After studied Unit-2, the student will be able to know about the long term sources of funds and environment of working capital.
3. After studied Unit-3, the student will be able to gain information about capital structure and leverage
4. After studied Unit-4, the student will be able to gain knowledge about capital investment decision
5. After studied Unit-5, the student will be able to be acquainted with on the subject of working capital Management.

PAPER - 2

ACCOUNTING FOR MANAGERIAL DECISION

Course Objectives

1. To enhance the understanding of the Accounting for Decision making
2. To extend the knowledge of Ratio Analysis.
3. To facilitate the students to have the deep understanding financial statements
4. To bring about the awareness of Cost Management.
5. To let students to know about financial decisions and capital structure

UNIT-I

Accounting for Decision making - Scope and Importance - Decision Accounting vs. Financial Accounting and Cost Accounting.

UNIT-II

Financial and Investment analysis - Analysis and Interpretation - Ratio Analysis Leverage analysis-Budgeting and budgetary control - Functional Budgets- Master Budget - Flexible budgeting - Zero Base Budgeting

UNIT-III

Understanding Financial statements-Construction and analysis of profit and loss account and balance sheet-Construction and analysis of Fund flow and cash flow statements.

UNIT-IV

Cost Management- Absorption and Marginal Costing - Cost - volume-profit analysis Applications and techniques.

UNIT-V

Financial decisions-capital structure-dividend decisions (only simple problems).

Note: 80% of the total marks be allotted for problems and 20% for theory

Text Book

1.Management Accounting and Financial Control - S.N.Maheswari, Sultan Chand & sons, New Delhi

Reference books

1. Management Accounting - Man Mohan and Goyal.
2. Management Accounting - Hingorani and Ramanathan.
3. Management Accounting - Charles Horngren.
4. Management Accounting - J.Batty.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the concept of Accounting for Decision making
2. After studied Unit-2, the student will be able to understand the Ratio Analysis Leverage analysis-Budgeting and budgetary control
3. After studied Unit-3, the student will be able to understand the analysis of Fund flow and cash flow statements
4. After studied Unit-4, the student will be aware of the Marginal Costing, Applications and its technique
5. After studied Unit-5, the student will be able to know Financial decisions Making

PAPER - 3

MARKETING MANAGEMENT

Course Objectives

1. To enhance the understanding of Core Marketing and Marketing segments and targets.
2. To extend the knowledge of marketing mix and brand equity.
3. To facilitate the students to have the deep understanding of Marketing Channels and Value networks and Market Logistics.
4. To bring about the awareness of marketing promotion and role of marketing communication in advertisement.
5. To let students to know about recent trends in modern marketing

UNIT I: Introduction

Marketing: Definition, importance and scope – Core marketing concepts – Functions of Marketing. Consumer Buying Motives - Customer Value, Customer Relationship Management- Significance - Identifying Market Segments and targets.

UNIT II: Marketing Mix – Product & Pricing

Marketing Mix - Product – Definition - characteristics and classifications - New Product Development – Product Life Cycle Management – Product Vs Services. Packaging and Labeling - Brand Equity – Measuring Brand Equity. Pricing - Objectives - Pricing Strategies -. Factors affecting price of a product- Ethical issues in pricing decisions.

UNIT III: Marketing Mix - Physical Distribution

Physical distribution: Marketing Channels and Value Networks – Role of Marketing Channels – Channel design decisions – Middlemen in Distribution – Functions of Wholesalers – Retailers. Elimination of Middlemen - Modern Retailing Practices – Classifications. Market Logistics – Objectives.

UNIT IV: Marketing Mix - Promotion:

Promotion: Role of Marketing Communication - Communication Mix – Advertising – Kinds of Media – Planning an Advertising Campaign, Personal Selling - Qualities of a Good Salesman, Sales Promotion – Strategies, Public relations – Functions and Types .

UNIT V: Recent Trends in Modern Marketing

Direct Marketing – Features – Benefits- Types. Impact of Digital Marketing on Businesses. Building Word-of-Mouth Marketing Strategy - Importance of Socially Responsible Marketing. Elements of Green Marketing. Cyber Marketing – Nature - Limitations

Text Book:

1 Philip Kotler, Kevin Lane Keller, Abraham Koshy and Mithileswar Jha. 2017. Marketing Management. [Thirteenth Edition]. Pearson Education, New Delhi. Reference Books:

2 Ramaswamy, V.S and Namakumari S, 2009. Marketing Management. [Third Edition]. Macmillan India Ltd, New Delhi.

3 Rajan Saxena. 2009. Marketing Management. [Fourth Edition]. Tata-McGraw Hill, New Delhi.

Course Outcome

1. The students will be able to know the core market and their functions.
2. The students will be able to know the various kinds of Pricing and various stages in product life cycle, new product development.
3. The students will gain knowledge about the marketing channel and distribution.
4. The students will learn about the kinds of advertisement and qualities of good salesman.
5. The Student will know about the recent trend in modern marketing and digital marketing.

PAPER - 4

ADVANCED BUSINESS STATISTICS

Course Objectives

1. To enhance the understanding of multiple correlation and multiple regression
2. To extend the knowledge of technique of probability.
3. To facilitate the students to have the deep knowledge on Sampling methods, proportions-large and small samples- Z test and T test
4. To bring about students to get information about chi square test.
5. To let students to know about F-Test and ANOVA.

Unit-I

Partial correlation-Partial correlation coefficient-Partial correlation in case of four variables-Multiple correlation -Multiple regression.

Unit-II

Theory of probability-probability rules-Bayes theorem-Probability distribution-Characteristics and application of Binomial, poisson and normal distribution.

Unit-III

Sampling- sampling methods- sampling error and standard error- relationship between sample size and standard error. Testing hypothesis- testing of means and proportions-large and small samples- Z test and T test.

Unit-IV

Chi square distribution- Characteristics and application- test of goodness of fit and test of independence- Test of Homogeneity.

Unit-V

F distribution- testing equality of population variances- Analysis of variance- one way and two way classification.

Note: The proportion between theory and problems shall be 20:80

Text Books:

1. S P Gupta, Statistical methods, Sultan chand& Sons 2000, New Delhi
2. D C Samcheri and V K Kapoor, Business statistics, Sultan Chand and sons, New Delhi

Reference Books

1. J.K.Sharma, Business Statistics- Pearson Education
2. Richard I Levin and David S. Rubit, Statistics for management, 7th Edition, Pearson education, New Delhi, 2002
3. Business statistics and operations research, Dr D Joseph Anbarasu, Lintech press Trichy

Course Outcomes

1. After Studied Unit-1, The Student Will Be Able To Know Partial And Multiple Correlations.
2. After Studied Unit-2, The Student Will Be Able To Know Probability And Binomial Distribution.
3. After Studied Unit-3, The Students will know the Issues Surrounding Sampling, Hypothesis, Z Test and T Test.
4. After Studied Unit-4, The Student Will Be Able To Have The Awareness About Application Of Chi- Square Distribution.
5. After Studied Unit-5, The Student Will Be Able To Know About Analysis Of Variance And F Test.

CORE ELECTIVE

PAPER 1

(TO CHOOSE ANY 1 OUT OF THE GIVEN 3)

A. BUSINESS ENVIRONMENT

Course Objective

1. To understand the concepts of Business Environment.
2. To identify the Social Responsibility of Business to different stakeholders
3. To understand How Economic Environment in Industrial Development Policies - Industrial policy, Fiscal policy, Monetary policy, Economic Reforms in India
4. To understand the Socio-Cultural Environment.
5. To familiarize with the Technological Environment and Modernisation of Technology.

UNIT - I : Theoretical Framework of Business Environment

Business Environment: Concept, significance and nature of business environment; Elements of environment – internal and external; Changing dimensions of business environment; Techniques of environmental scanning and monitoring. PEST and SWOT analysis

UNIT - II: Economic Environment of Business

Economic Environment: Significance and Elements of Economic Environment; Economic systems and business environment; Economic Planning in India; Industrial Development Policies - Industrial policy, Fiscal policy, Monetary policy. Economic Reforms in India - Liberalisation and impact of Globalisation. Impact of Rupee Devaluation and Demonetization

UNIT- III : Political and Legal Environment

Political and Legal Environment: Elements of political environment; Government and Business; Changing Dimensions of Legal Environment in India – Classification of Laws Influencing Business, Competition Act, Consumerism in India - Consumer Protection Act. - Objectives of GST. Significance of Corporate Governance – Need of Environmental Protection.

UNIT- IV : Socio-Cultural Environment

Business and Society – Objective of Business. Components of Socio-cultural environment; Social institutions and systems; Elements of Culture - Social Values and Attitudes;. Social Responsibility of Business – Guidelines. Ethical Principles in Business. Code of Ethics.

UNIT- V: Technological Environment

Technological Environment: Factors governing Technological Environment-Impact. Innovation - Technology Transfer – Modernisation -Factors to be Considered for Appropriate Technology. Incentives and Concessions for Technological Research - Productivity in Indian Industry - Intellectual Property Rights.

Text Books

1. Francis Cherunila: Business Environment Himalaya Publishing House, Bombay.
2. C.B.Gupta: Business Environment, Sultan Chand and Sons, New Delhi

Reference Book

1. Adhikary , M: Economic Environment of Business, Sultan Chand & Sons, New Delhi.
2. Aswathappa,K.Legal Environment of Business, Himalaya Publication, New Delhi.
3. Chakravarty, S: Development Planning, Oxford University Press, Delhi.

Course Outcome

1. The students will able to learn Theoretical Framework of Business Environment.
2. The students will able to make the student knowledge about business Economic Environment of Business.
3. The students will able to Familiarize Current Political and Legal Environment.
4. The students will able to understand the Socio Cultural Environment and Ethics.
5. The students will able to learn the Latest Technology Environment for Business.

CORE ELECTIVE

PAPER 1

B. COMPUTER APPLICATION IN BUSINESS

Course Objectives

1. To make the students to understand the basic concepts of Computers and Computer hardware.
2. To expand the understanding of information Technology
3. To facilitate the students to have insights on words processing
4. To know how to present the business documents using Excel Sheet
5. To let to know students to Power Point presentation using various Transitions.

UNIT-I : COMPUTER HARDWARE

CPU, Input devices, Output Devices, Communication devices, storage devices Types of computer system.

UNIT-II: INFORMATION TECHNOLOGY

Basic idea of LAN (Local Area Network), and WAN (Wide Area Net work) E-mail: Internet Technologies, Access Devices, Concept of World Wide Web and Internet browsing.

UNIT-III : WORD PROCESSING

Introducing and working with MS Word in MS-Office - Word Basic Commands, formatting - Text and documents, Sorting and Tables, Working with graphics, introduction to Mail merge.

UNIT-IV : SPREAD SHEET

Working with EXCEL - Formatting functions, chart features, working with graphics in EXCEL using worksheets as database in accounting, Marketing, finance and personnel areas.

UNIT-V : PRESENTATION WITH POWER POINT

Power Point, basics creating Presentation of easy way: working with graphics in Power Point show time, sound effect and animation effects.

Text Books

1. Mansfield, Ron: The Compact Guide to Micros soft Office BPB Publicaton, New Delhi.
2. O.Brian...A: Management information System, Tala Mc Graw Hill, Delhi.
3. Ullman, J.O: Principles of Data base System, Galgoia publication, New Delhi

Reference Books:

1. Date, C.J: An Introduction to Data base systems, Addison Wesley, Massachusetts.
2. Dienes, Sheih.S: Micro soft Office, Professional for Windows 95: Instant Reference: BPB Publication, New Delhi

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the various components of a computer system: Storage Devices, Input Devices & Output devices
2. After studied Unit-2, the student will be able to develop an idea about World Wide Web and Internet browsing
3. After studied Unit-3, the student will be able to know about the Preparation and presentation of business documents using Word Document
4. After studied Unit-4, the student will be able to will gain knowledge of about Preparation and presentation of the business documents using Excel Sheet,
5. After studied Unit-5, the student will be able to acquire the knowledge about how to Prepare PPT- Power Point presentation using various Transitions, Animations and other layouts.

CORE ELECTIVE

PAPER 1

C. MANAGERIAL ECONOMICS

Course Objectives

1. To make the students to understand the theories of managerial economics and factors.
2. To expand the awareness of Demand analysis and Forecasting
3. To facilitate the students to understand the law of variable proportions, product function and cost function
4. To bring subject knowledge on Economics of size and capacity Utilization and market structure pricing.
5. To let students to be acquainted with the subject of Business cycle and Policies.

UNIT-I

Definition and scope of the subject-fundamental concepts and Methods-firm's objectives and the role of managerial economist.

UNIT-II

Demand analysis and Forecasting for consumer goods and capital goods-use of business indicators- type of elasticity.

UNIT-III

Concept and resources allocation- Cost Analysis- Short run and long run Cost functions production functions- cost price- Output relations.

UNIT-IV

Economics of size and capacity Utilization - Input-Output analysis- Market Structure Pricing and output general equilibrium.

UNIT-V

Pricing Objectives- pricing methods and approaches-price discrimination, Product line pricing-profit planning and Cost control- Business cycle and Policies. .

Text Books:

1. Peterson, managerial economics, 4th edition - Pearson education - New Delhi.
2. Sampat Mokherjee, Business and Managerial Economics, New Central Book Agency, Calcutta.
3. R.L. Varshney & K.L. Maheshwari, Managerial Economics-Sultan Chand & Sons, New Delhi.

Reference Books:

1. Spencer M.H. Managerial Economics Text, Problems and short cases, Richard D. Inwin INC.
2. Sankaran.S, Managerial Economics Margham Publications, Chennai.
3. Dwivedi D.N , Managerial Economics, Vikas-New Delhi
4. Mankar & Denkar, Business Economics, Himalaya publishing House, Bombay
5. Joel Dean, Managerial Economics, Prentice Hall of India - New Delhi.

Course Outcomes:

1. After studied Unit-1, the student will be able understand the theories of managerial economics and factors.
2. After studied Unit-2, the student will be able to develop an idea about Demand analysis and Forecasting.
3. After studied Unit-3, the student will be able to provide an idea regarding law of variable proportions, product function and cost function.
4. After studied Unit-4, the student will be able to make them aware about the Economics of size and capacity Utilization and market structure pricing.
5. After studied Unit-5, the student will be able to acquire the knowledge about be Business cycle and Policies

OPEN ELECTIVE

PAPER 1

(TO CHOOSE ANY 1 OUT OF THE GIVEN 3)

A. PRINCIPLES OF MARKETING

Course Objectives

1. To enhance the understanding of the evolution of Marketing
2. To extend the knowledge on Bases of Market Segmentation and factors influencing Consumer Behaviour
3. To facilitate the students to understand the various Elements of Marketing Mix and Product Life Cycle.
4. To bring subject knowledge on kinds of Pricing and types of Channels of Distribution.
5. To let students to know on the subject of Recent trends in Marketing.

Unit - I Introduction

Meaning of market – classification of markets- meaning and definition of marketing features of marketing – importance of marketing – difference between marketing and selling – Evolution of marketing concepts - functions of marketing.

Unit - II Market Segmentation and Consumer Behaviour

Meaning and definition of market segmentation – different patterns of market segmentation – Definition of consumer behaviour - factors determining consumer behaviour.

Unit - III Marketing Mix

Four P's of marketing mix - definition of product - classification of products - stages in new product development - product life cycle.

Unit - IV Pricing policy and Channel of distribution

Factors affecting price decision – Types of pricing strategies - definition of channel of distribution – types of Channel of distribution - factors determining Channel of distribution.

Unit – V Recent trends in Marketing

Social marketing – Demarketing – Remarketing – Over marketing – Meta marketing – E-Marketing – online retailing – shopping malls.

Text Books:

1. Rajan Nair, Marketing, Sultan Chand & Sons , New Delhi
2. Varshney, Marketing Management, Sultan Chand & Sons , New Delhi.

Reference Books:

1. Jaisankar, Marketing, Margham Publications, Chennai
2. L. Natarajan, Marketing, Margham Publications, Chennai
3. Dr. K. Sundar, Essentials of Marketing, Vijay Nicole Imprints Private Ltd., Chennai

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the evolution of Marketing across ages through varying views on Marketing concept
2. After studied Unit-2, the student will be able to know the Bases of Market Segmentation and factors determining consumer behaviour
3. After studied Unit-3, the student will be able to know the Significance of Elements of Marketing Mix and Factors affecting price decision
4. After studied Unit-4, the student will be able to know about kinds of Pricing and types of Channels of Distribution
5. After studied Unit-5, the student will be able to know the recent trends in Marketing.

OPEN ELECTIVE

PAPER 1

B. ELEMENTS OF INSURANCE

Course Objectives

1. To impart understanding about the functions, nature and principles of insurance
2. To bring understanding on the basics of Life Insurance
3. To facilitate knowledge on the principles and kinds of Marine Insurance
4. To provide knowledge to the students about computation of claims in respect of Fire Insurance
5. To know about Miscellaneous Insurance and Key players in Indian Insurance Industry

Unit - I: Introduction

Insurance -Meaning, functions, nature and principles of insurance, importance of insurance to Individuals and business - Elements of the insurance contract - Types of insurance contract – Insurance as a tool to manage risk.

Unit - II: Life Insurance

Life Insurance - Features of a life insurance contract - Advantages of Life Assurance - Types of Life Insurance Plans – Claims in Life Insurance - Health Insurance Policies – benefits

Unit - III: General Insurance - Marine Insurance

Marine Insurance - Types of Marine Losses - Contract of marine insurance – Elements of marine insurance – classes of policies – policy conditions – clause in a marine insurance policy.

Unit - IV: General Insurance - Fire Insurance

Fire Insurance - features of a fire insurance – kinds of policies – policy conditions – payment of claims – reinsurance.

Unit - V: General Insurance – Miscellaneous Insurance

Miscellaneous Insurance – Motor insurance – Burglary – Personal accident insurance.
Key players in Indian Insurance Industry

Text Books:

Reference Books:

1. M. N. Mishra, Insurance Principles And Practice, S. Chand & Co, New Delhi, 2000
2. M.N.Mishra, Modern concepts of Insurance, S.Chand&Co
3. P.S . Palandi, Insurance in India, Response Books – Sagar Publications

Course Outcomes

1. After Studied Unit-1, Students will be able to gain knowledge on functions, nature and principles of insurance
2. After Studied Unit-2, Students will be able understand the existence of Life Insurance and learn its benefits
3. After studied unit-3, Students will be able to gear up the principles and kinds of Marine Insurance
4. After Studied Unit-4, Students will be able to know the usefulness of Fire Insurance to the stakeholders.
5. After Studied Unit-5, the student will be able to know the Miscellaneous Insurance policies and Key players in Indian Insurance Industry

OPEN ELECTIVE

PAPER 1

C. CORPORATE SOCIAL RESPONSIBILITY

Course Objectives

1. To enhance the understanding of the corporate Social responsibility of Business
2. To extend the knowledge of factors influencing CSR policy
3. To facilitate the students to have the understanding about benefits of CSR to the company
4. To students to know about institutional investors in corporate governance
5. To let students to know about corporate governance board and its power.

UNIT I

Corporate social responsibility – Meaning – Definition – scope of CSR– a rational argument of CSR – Economic argument for CSR – strategies of CSR – challenges and implementation of CSR in Indian – relation between CSR and corporate governance – major code of CSR initiative in India – barriers to social responsibility – social responsibility of business.

UNIT II

Designing a CSR policy – factors influencing CSR policy – managing CSR in an organization role of the human resource professional in CSR– global reorganization of CSR – ISO 14000 – SA8000 – AA1000 – codes – formulated by an Global compact – UNDP – global reporting Initiative.

UNIT III

CSR reporting trend in developing countries – timing and mode of release of CSR reports – CSR policy of a multi-product, multi-location Indian MNC's – constitutions of corporate social responsibility – dimensions of CSR – benefits of CSR to the company.

UNIT IV

Corporate governance – concept, structure, process, origin – scope and present scenario – role of institutional investors in corporate governance – structure and development or board – role of capital marketing governance, governance rating future of governance – innovation practices – case studies with lesson learned.

UNIT V

Corporate governance board and its power – responsibility – disqualification, board committee and their functions – remuneration committee – nomination committee, compliance committee – share holder grievance committee – investor relation committee – investment committee – risk management committee – and audit committee – regulatory framework of corporate governance in India; SEBI guidelines and clause 49; reforms in the company act 2013 – corporate governance in PSU; and banks.

Text Book:

1. Tandon Bb Vashishi, Ak, Kesho Prasad Arya PP, Corporate Governance Deep and Deep Publication, New Delhi. 1st Edition.
2. S.A. Sherlekar Ethics in Management, Himalaya Publishing House – 2009.

Reference books.

1. Corporate Social Responsibility In India – Sanjay K. Agarwal Sage Publication Ltd – UK 2008.
2. William B. Werther and David Chandler, Strategic Corporate Social Responsibility, Sage Publication In 2001.
3. Mallin Christine A, Corporate Governance (Indian Edition) Oxford University Press, New Delhi.
4. Blowfield, Michal and Alan Murray, Corporate Responsibility Oxford University Press, New Delhi.

Course Outcomes:

1. After studied Unit-1, the student will be able to acquire the knowledge Corporate Social responsibility of Business
2. After studied Unit-2, the student will be able to know the Identify the factors influencing CSR policy and Global Organisation CSR
3. After studied Unit-3, the student will be able to have to understanding of benefits of CSR to the company
4. After studied Unit-4, the student will be able to know the institutional investors in corporate governance
5. After studied Unit-5, the student will be able to know about corporate governance board and its power.

SEMESTER II
PAPER - 5
CORPORATE LAWS

Course Objectives

1. This course is aimed at teaching students various Acts that impact Indian Corporations like Corporate Governance that is essential in today's Business World.
2. This course also deals with provisions of Competition Act, 2000 related to Companies.
3. To educate students with regard to SEBI the listing procedures.
4. To Impart Knowledge about provisions of FEMA Act help Companies that deal in International Trade.
5. Provisions related to Companies in the Insolvency and Bankruptcy Code, 2016 will help the students to understand the process of Insolvency Resolution and Liquidation.

UNIT - I

Corporate Laws – Corporate Personality – Corporate Governance – Concept – Corporate Governance Practices and Codes: Provisions under The Companies Act. – E-Governance

UNIT - II

Competition Act, 2000 – Introduction – Objectives – Important Definitions – Prohibition of Anti-Competitive Agreements – Prohibition of Abuse of Dominant position – Regulation of Combinations – Competition Commission of India – Composition – Duties, Powers and Functions – Penalties – Appellate Tribunal – Procedures & Powers – Powers of the Central Government.

UNIT - III

The Securities and Exchange Board of India Act, 1992 – Introduction – Objectives – Important Definitions – Definitions under Securities Contracts (Regulations) Act, 1956 - Powers and Functions of SEBI – Registration – Penalties – Adjudication – Appellate Tribunal – Appeals – Procedure and Powers of The Securities Appellate Tribunal – Power to make Rules and Regulations – SEBI Issue of Capital and Disclosure Requirements Regulations, 2018 – General conditions for Public Issues and Rights Issues – Conditions for Initial Public Offer – Conditions for Further Public Offer – Pricing - Promoters Contribution – Listing of Securities – Conditions for Listing – Types of Listing – Procedure for Listing Requirements – Benefits of Listing – Defects of listing - The SEBI (Prohibition of Insider Trading) Regulations, 2015

UNIT - IV

The Foreign Exchange Management Act, 1999 – Introduction – Objective – Differences and Similarities between FERA and FEMA - Important Definitions under the Act – Provisions related to Regulation and Management of Foreign Exchange – Authorised Person – Offences – Contraventions & Penalties – Adjudication & Appeals – Appellate Tribunal – Directorate of Enforcement

UNIT - V

Insolvency and Bankruptcy Code, 2016 – Introduction – Objectives – Applicability of the Code – Important Definitions – Relationship between Bankruptcy, Insolvency and Liquidation - Corporate Insolvency Resolution Process – Liquidation Process – Fast Track Insolvency Process for Corporate Persons – Voluntary Liquidation – Adjudicating Authority – Offences and Penalties – Insolvency and Bankruptcy Board of India – Insolvency Professional Agencies – Insolvency Professionals – Information Utilities – Powers of Central Government

Text Books:

1. J. Jayasankar, Corporate Laws, Margham Publications, Chennai
2. Bharat Bhushan, N.D. Kapoor, Dr. Rajni Abbi & Rajiv Kapoor, N.D. Kapoor's Elements of Mercantile Law, Sultan Chand & Sons Pvt. Ltd., New Delhi

Reference Books:

1. K. Aswathappa & G. Sudarsana Reddy, Business Regulations, Himalaya Publishing House, Mumbai
2. Dr. MR Sreenivasan, Business Law (Commercial Law), Margham Publications, Chennai
3. Gulshan, S.S. A Hand book of Corporate Laws, S. Chand & Co, New Delhi

E-Resources:

1. The Institute of Chartered Accountants of India's Study Material for Competition Act, 2002: <https://resource.cdn.icai.org/47565bosfinal-p6d-cp2.pdf>
2. The Institute of Chartered Accountants of India's Study Material for The Foreign Exchange Management Act, 1999: <https://resource.cdn.icai.org/47681bosfinal-p6d-cp6.pdf>
3. The Institute of Chartered Accountants of India's Study Material for The Insolvency and Bankruptcy Code, 2016: <https://resource.cdn.icai.org/47588bosfinal-p6d-cp4.pdf>
4. The Institute of Cost Accountants of India's Study Notes for Corporate Laws: <https://icmai.in/upload/Students/Syllabus2016/Final/Paper-13-Revised-Aug.pdf>
5. The Competition Act, 2002 Bare Act at India Code - Digital Repository: https://indiacode.nic.in/handle/123456789/2010?view_type=browse

6. The Securities and Exchange Board of India Act, 1992 Bare Act at India Code - Digital Repository:
https://indiacode.nic.in/handle/123456789/1890?view_type=search&sam_handle=123456789/1362
7. The Securities and Exchange Board of India Act, 1992 Bare Act at SEBI's Website:
<https://www.sebi.gov.in/legal/acts/jan-1992/securities-and-exchange-board-of-india-act-1992-as-amended-by-the-finance-no-2-act-2019-3.html>
8. Securities Contracts (Regulation) Act, 1956 at SEBI's Website:
<https://www.sebi.gov.in/acts/contractact.pdf>
9. The Foreign Exchange Management Act, 1999 Bare Act at India Code - Digital Repository:
https://indiacode.nic.in/handle/123456789/1988?view_type=search&sam_handle=123456789/1362
10. The Insolvency and Bankruptcy Code, 2016 at India Code - Digital Repository:
https://indiacode.nic.in/handle/123456789/2154?view_type=browse&sam_handle=123456789/1362

Course Outcomes

1. Define Corporate Personality, Corporate Governance, E-Governance and describe the Corporate Governance Code in Companies Act.
2. Discuss the prohibitions of certain Agreements, Abuse of Dominant Position and Regulation of Combinations under The Competition Act.
3. Enumerate the Powers and Functions of SEBI.
4. Describe the provisions related to listing of Securities, Public Offerings and discuss the prohibition of Insider Trading in various regulations of SEBI
5. Discuss the provisions related to Regulation and Management of Foreign Exchange, Related Offences, Penalties and Appeals Procedure under FEMA, 1999.
6. Elucidate the Corporate Insolvency Resolution Process and Liquidation Process under Insolvency and Bankruptcy Code, 2016.

PAPER - 6

HUMAN RESOURCE MANAGEMENT

Course Objectives

1. To make students to understand the basic concepts of Human Resource Management.
2. To expand the understanding of the Recruitment and Selection Procedure
3. To facilitate the students to be thoughtful about the Grievances procedure
4. To express to students the methods of Performance Appraisal
5. To let to know students about the Techniques of Training.

UNIT-I

HRM- Nature and Scope – Functions of HRM – Functions of HR Manager - development of the human potential - Link between organization planning and HR planning.

UNIT-II

Acquisitions and maintenance of personnel - recruitment and selection - purposes and methods of recruitment and selection - Maintenance of personnel - motivation for increased productivity - Q W L.

UNIT-III

Rewards and incentives - financial and non-financial incentives - Grievance procedure - conflict - process - stress vs. challenge - sources - resolution.

UNIT-IV

Performance appraisal - Ranking, rating scales, critical incident method - MBO as a method of appraisal - Removing subjectivity from evaluation - Criteria for promotions and job enrichment.

UNIT-V

Human development - training - need and importance - methods of training - designing training program - Evaluation of training program - Executive development. - Organization change - change agents - resistance to change - managing the resistance.

Text Books

4. Aswathappa, Human Resource and Personnel Management, TataMcGraw Hill, NewDelhi, 2002.
5. A.M. Sheikh, Human Resource Development and Management, S. Chand & Co, New Delh

Reference Books:

1. Dressler- Human Resource management, 8th Ed. Pearson Education, 2002
2. De Cenzo and Robbins, Personnel/Human Resource Management, Prentice Hallof India, 1998.
3. S.K.Chakrabothy, Values and Ethics for Organization, Oxford University Press 1999.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the concepts of Human Resource Management

2. After studied Unit-2, the student will be able to understand Recruitment and Selection Procedure
3. After studied Unit-3, the student will be able to know the various ways of solving the employee grievances procedure.
4. After studied Unit-4, the student will be able to know the evaluation the methods of Performance Appraisal
5. After studied Unit-5, the student will be able to evaluate the Different Techniques of Training.

PAPER - 7

ADVANCED CORPORATE ACCOUNTING

Course Objectives

1. To enhance the understanding of the accounts of banking companies and final accounts.
2. To have the knowledge about IRDA Regulations Regarding the Preparation of Financial Statements.
3. To facilitate the students to have the deep understanding of holding company account, Consolidation of balance Sheets and Profit and Loss Accounts
4. To know about Inflation accounting
5. To let students to know about Human Resource Accounting

UNIT-I

Accounts of Banking Companies - Legal Provisions - Capital Adequacy Norms - Rebate on Bills Discounted - Asset Classification and Provisioning - Preparation of Final accounts.

UNIT-II

Insurance Company Accounts - Nature of Insurance Business - Distinction between Life and Non Life Insurance - Accounts of Life Insurance Business - Accounts of General Insurance Business - IRDA Regulations Regarding Preparation of Financial Statements.

UNIT-III

Holding Company Accounts - Consolidated Financial Statements - Consolidation of balance Sheets and Profit and Loss Accounts.

UNIT-IV

Inflation accounting - Need - Objections - Adjustments for General Price Changes - Current Purchasing Power Accounting (CPP) - CPP method of preparing financial statements.

UNIT-V

Human Resource Accounting - Need and Development - Importance of Human Resource Accounting - Objections against Human Resource Accounting - Human Resource Accounting in India. Corporate Social Reporting - Concept and objectives of social responsibility.

Text Books:

1. M.Y.Khan, Indian Financial System, Tata McGraw Hill, 2001.
2. H.R.Machiraju, Indian Financial System, Vikas Publishing House, 1999
3. B.S. Bhatia &G.S.Bhatre, Management of Capital Markets, Financial Services and Insitutions, Deep and Deep Publishers, 2000.

Reference Books:

1. Dr. V. Balu, Merchant Banking & Finance Services, Sri Venkateswara Publication, Chennai
2. Dr. N. Permaivathy, Financial Services and Stock Exchange, Sri Vishnu Publications, Chennai.
3. Dr.S.Gurusamy, Financial Services and Systems, Vijay Nicholes Imprint Pvt. Ltd., 2004 Chennai.

Course Outcomes

1. After studied Unit-1, the student will be able to make them aware about the accounts of banking companies.
2. After studied Unit-2, the students will gain knowledge on preparation of accounts of insurance companies.
3. After studied Unit-3, the students will be able to know develop knowledge of holding company concept & preparation of consolidated balance sheet.
4. After studied Unit-4, the student will be able to know about Inflation accounting and CPP method
5. After studied Unit-5, the student will be able to know about Human Resource Accounting in India.

CORE ELECTIVE

PAPER 2

A. EXPORT AND IMPORT MANAGEMENT

Course Objectives

1. To enhance the understanding of the International Trade and Foreign Trade Policy.
2. To extend the knowledge of Balance of Payments and FEMA.
3. To facilitate the students to have the deep understanding of Export Procedure and Export Documents.
4. To bring about the awareness regarding the Guidelines of Import Procedure.
5. To let students to know about Export Pricing, Financing and EXIM Bank.

UNIT- I: INTRODUCTION TO INTERNATIONAL TRADE

Features of International Trade - Differences between International Trade and Domestic Trade - Advantages against International Trade - Free Trade and Protection - Advantages of Free Trade and Protection - Tariffs- Non -Tariff barriers - Quota - Foreign Trade Policy - Incoterms

UNIT- II: BALANCE OF PAYMENTS AND FOREIGN EXCHANGE MANAGEMENT ACT (FEMA)

Definitions of Balance of Payments - uses of Balance of Payments- Differences between balance of trade and balance of payments - Objectives of the FEMA- Administration of the Act - Dealings in foreign exchange - Capital Account Transactions - Exports of Goods and Services

UNIT- III: EXPORT PROCEDURE AND EXPORT DOCUMENTS

Step-by-Step procedure for export - Documents required for Export - Bill of Lading - Airway Bill - Shipping Bill - Documents related to payment - Letter of Credit (LC) - Bill of Exchange - Trade Receipts - Letter of hypothecation - EPCG - Clearing and Forwarding Agents - Logistic Management - Supply Chain

UNIT- IV: GUIDELINES AND IMPORT PROCEDURE

Introduction - Procedure for Import - Duties at the time of import - Duty Calculation - Changes in import Procedure - Import under Export Promotion Schemes and Duty payment through EXIM - EOU'S and SEZ ,Special Additional Duty of Customs (SAD) - Imports Tax Credit (ITC) -Custom Clearance -Refund on Exports - Duty free Import.

UNIT- V: EXPORT PRICING AND FINANCING

Pricing objectives - Factors affecting pricing decisions - Steps involved in pricing - Pricing methods - Dumping - Marketing methods- Trade Fairs - Export Incentives – Financing for Export and Import- Pre-shipment & Post –Shipment finance - Letter of Credit –Discounting of Foreign bills -(ECGC) Financial Institutions for International Trade – EXIM Bank- Risk Management.

Text books:

Unit-I: Export Import Procedures, Dr. Natarajan. L, Margham Publications, Chennai.

Unit-II: Export Import Management, Parul Gupta, Mc Graw Hill Education (India) Pvt. Limited,

2018, Chennai.

Unit-III: Logistic and Supply Chain Management. Dr. Natarajan . L, Margham Publications, Chennai.

Unit-IV: International Trade, Dr. Sankaran .S, Margham Publications, Chennai.

Unit-V: Export Import Procedures, Dr. Natarajan . L, Margham Publications, Chennai

Reference Books:

- 1.Export Import Management, Justin Paul & Rajiv Aserkar, Oxford University Press, 2013, Noida
2. Practical Guide on How to Start Export-Import Business, Chaudhari Shiva CA, Educreation Publishing, Delhi.
3. Kenneth D, Building an Import / Export Business, John Wiley&Sons. Inc. 2007, New Jersey
4. Belay Seyoum, Export-Import Theory, Practices and Procedures, Routledge Publishers, 2009, New York.
5. Kulwinder Singh, Foreign Trade of India, New Century Publications, 2014, New Delhi.

Journals:

1. Import, Export and Economic Growth. [www. researchgate.net](http://www.researchgate.net)
2. International Journal of Export Import Marketing. [www. econpapers.repec.org](http://www.econpapers.repec.org)
3. The relationship between Import and Export. [www. onlinejournal.in](http://www.onlinejournal.in)
4. International Journal of Export Marketing. www.inderscience.com
5. Export summary Journal Entries. [www. Knowledgecentre. Zuora.com](http://www.Knowledgecentre.Zuora.com)

E-Material:

1. How to Start an Import/Export Business. www.entrepreneur.com
2. EXIM Financing and Documentation, [www. Pondiuni.eu.in](http://www.Pondiuni.eu.in)
3. Importing & Exporting, www.patsula.com
4. India's export – Import Procedure and documentation, [www. research publish.com](http://www.researchpublish.com)
5. Importing & Exporting in India – Leading Edge Alliance. [www. leaglb.com](http://www.leaglb.com)

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the International Trade and Foreign Trade Policy
2. After studied Unit-2, the student will be able to know the Balance of Payments and FEMA
3. After studied Unit-3, the student will be able to understand the Export Procedure and Export Documents.
4. After studied Unit-4, the student will be aware of the Guidelines of Import Procedure.
5. After studied Unit-5, the student will be able to know Export Pricing, Financing and EXIM Bank.

CORE ELECTIVE

PAPER 2

B. GLOBAL MARKETING

Course Objectives

1. To enhance the understanding of the Global Marketing environment
2. To extend the knowledge of global market entry strategies
3. To facilitate the students global product policy and price
4. To bring knowledge about the global marketing channels
5. To understand the International marketing promotional strategies.

UNIT-I Global Marketing – Introduction

Global Marketing - Scope - Importance - Global vs. National Marketing - Global Marketing Environment - Social - Cultural - Political - Legal and Regulatory Environments. - International Marketing Research Process, market surveys, marketing information system

UNIT-II Global Market Entry Strategies

Identifying foreign markets - Global Market Entry Strategies - Joint Ventures, Strategic Alliances, Direct Investment, Manufacturing and Franchising. E-marketing.

UNIT-III Global Product Policy and Pricing

Global Customers - Segmentation-Targeting – Global Product Life Cycle – Innovative Products and Adaptation - Global Product Positioning. Branding - Country of Origin Effect and Global Brands. Pricing for International Markets - Objectives - Transfer Pricing Strategy -.Dumping - Incoterms 2020.

UNIT-IV Global Marketing Channels

Global Marketing Channels and Physical Distribution - Channel Objectives and Constraints. Channel Structures – Home County Middlemen - Foreign County Middlemen. Factors Involved in Distribution Systems, Modes of Transportation, International Packaging - Objectives of Logistics and Supply Chain Management.

UNIT-V International Marketing Promotional Strategies

Promotional Strategies - International Marketing Communications – Generic Promotions in International Marketing. Nature of International Advertising - Diversified Advertising Strategy - Personal Selling, Trade Fairs and Exhibitions – Role of Export Promotion Organisations.

Text Books:

4. Varshney, R.L. and Bhattacharya B: International Marketing Management, Sultan Chand & Sons, New Delhi.
5. Duby V.K.: Export Marketing, Common Wealth Publishers, New Delhi.
6. Philip R Cateora, Mary C. Gilly, John L Graham - International Marketing, The McGraw-Hill Companies, Inc

Reference Books:

1. Warnen J.Keegan: Global Marketing Management, Prentice Hall of India, New, Delhi.
2. Cherian and Jacob: Export Marketing, Himalaya Publishing House, Mumbai

Course Outcomes

1. After studied Unit-1, the students will be able to understand the concepts of Global marketing and Marketing information system.
2. After studied Unit-2, the students will be able to get full information about global market entry strategies and direct investment.
3. After studied Unit-3, the students will be able to understand the global product policy and pricing for international market
4. After studied Unit-4, the students will be able to learn important Global Marketing Channels and Physical Distribution
5. After studied Unit-5, the students will be able to know about international marketing, promotional strategies and International Marketing communication.

CORE ELECTIVE

PAPER 2

C. E-COMMERCE

Course Objective:

1. To gain an understanding of basic concepts, theories and business models underlying E commerce.
2. To improve familiarity with current challenges and issues in E -commerce.
3. To know the concept of Electronic Data Interchange.
4. To enable the students to understand the data and message security.
5. To know about the Electronic Payment Schemes and Digital Payment.

UNIT-I: ELECTRONIC COMMERCE

Meaning- Traditional Commerce – E. Commerce and its application in business. Basic Blocks of E Commerce, E Commerce consumer- Anatomy of E. commerce.

UNIT-II: NETWORK INFRASTRUCTURE

Global Information Distribution Networks – Components of the 1 – way – policy issues- Internet terminology- Internet Governance- An overview of Internet Applications.

UNIT-III: NETWORK LAYERS

Internet Protocol (IP) – Transmission Control Protocol (TCP) – Multimedia Concepts – Advantages of Internet. Electronic Data Interchange (EDI)- EDI and E. Commerce – EDI application in Business.

UNIT- IV: NETWORK SECURITY

Client Server Network security – Firewalls and Network Security- data and message Security – encrypted documents and Electronic Mail. Video conferencing.

UNIT-V: DIGITAL DOCUMENTS

Documents Library- Types of Digital Documents – corporate data warehouse – Electronic Payment Scheme – Intra-organizational Electronic Commerce.

TEXT BOOKS:

1. David Kosiur, understanding Electronic Commerce, Addison Wesley, 1996.
2. Soka, From EDI to Electronic Commerce, Tata McGraw- Hill, 1995.

REFERNCE BOOKS

- 1.Saily Chan, Electronic Commerce Management, John Wiley, 1998.
- 2.Neil Randall, The Internet in a Wee, 2ndEdn. Prentice Hall of India, New Delhi.
- 3.Kamalesh, k. Balaji and Debjani Nag, “E-Commerce”, the cutting edge of business, Tata McGraw – Hill, 2000.
- 4.Marilyn Greenstein and Todd M. Fein Mann, Electronic Commerce, security, Risk Management, Irwin **McGraw Hill, 2000**

Course Outcome:

1. The students will be able to understand the Applications of E commerce in business
2. The students will be able to understand the Network Infrastructure of E Commerce.
3. The students will be able to understand the Internet Protocols in E Commerce.
4. The students will be able to understand the Network Security in E Commerce.
5. The students will be able to understand the Types of Digital Documents in E Commerce.

OPEN ELECTIVE

PAPER 2

A. PRINCIPLES OF MANAGEMENT

Course Objectives

1. To enhance the understanding of the Principles of Management
2. To extend the knowledge of steps involved in the process of Planning and decision making.
3. To impart knowledge in Principles of Organisation
4. To provide the students the knowledge about the Authority to delegation
5. To extend the knowledge on Need of co-ordination and Control Process.

Unit – I

Management: Definition- Importance- Principles of Management- Functions of a Manager- Role of a Manager- Skills of a Manager.

Unit – II

Planning: Meaning- Nature- Objectives- Steps in Planning- Limitation of Planning- Decision making- Process of decision making- Types of decisions.

Unit – III

Organisation: Meaning- Nature- Importance- Informal organisation- Principles of Organisation.

Unit – IV

Authority: Meaning- Responsibility – Difference between Authority & Responsibility- Accountability.

Delegation: Meaning- Advantages- Reasons for non-delegation- How to make Delegation effective.

Unit – V

Co-ordination: Need of co-ordination- Types – Techniques- Controlling – Meaning and importance of Controlling- Control Process

Text Books:

1. P.C. Tripathi & P.N. Reddy – Principles of Management – Tata McGraw- Hill.
2. Gupta C.B. Business Management.

Reference Books:

1. Hanagan – Management Concepts & Practices- MacMillan India Ltd.
2. Dr. N. Perma – Business Management.
3. Massie – Essentials of Management – Prentice – Hall of India.
4. J. Jayasankar – Principles of Management – Margham Pub.
5. R.N. Gupta – Principles of Management – S. Chand Pub.

Course Outcomes

1. After Studied Unit-1, Students will be able to understand the principles & Functions of Management
2. After Studied Unit-2, Students will be able to understand the Planning and its importance
3. After studied unit-3, Students will be able to understand the Organization and its importance
4. After Studied Unit-4, Students will be able to understand the Authority, Responsibility & Delegation.
5. After Studied Unit-5, the student will be able to understand the Need for Co-ordination and importance of Control

OPEN ELECTIVE

PAPER 2

B. ELEMENTS OF ACCOUNTING

Course Objectives

1. To understand the basic concepts of Accounting.
2. To explain students about the Preparation of Ledger Accounts
3. To facilitate the students in the Preparation of Trial Balance
4. To express to students to about various classification of Error
5. To let to know students to know the Balance Sheet with simple Adjustments

Unit - I:

Accounting – Meaning - Definition – Objectives — Double Entry System- Meaning of Debit and Credit - Advantages – Limitations – Types of Accounts– Accounting Rules – Accounting Terminology – Accounting Concepts and Conventions.

Unit - II:

Journal – Meaning – Preparation of Journal – Ledger Accounts – Meaning – Preparation of Ledger Accounts – Advantages over Journal – Ledger Accounts.

Unit - III:

Trial Balance – meaning – Advantages - Preparation of Trial Balance - Subsidiary Books – Meaning – Types.

Unit - IV:

Errors – Classification – Rectification (Rectification after the preparation of final account is excluded) – Suspense Account – Meaning and Need.

Unit - V:

Preparation of Final Accounts – Trading account - Profit and Loss account - Balance Sheet with simple Adjustments

(Weightage: Theory: 30%, Problems: 70%)

Text Books

1. Jain,S.P & Narang,N.L., Advanced Accounting, Kalyani Publications.
2. Jaya Charulatha and Baskar, Introduction to Accountancy, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books

1. Gupta,R.L&Radhaswamy,M,AdvancedAccounts,SulthanChand,NewDelhi.
2. Shukla&Grewal&Gupta,AdvancedAccounting,S.Chand&Co.,NewDelhi

Course Outcomes:

1. After studied Unit-1, the student will able to understand the basis account concepts and double entry system
2. After studied Unit-2, the student will able to Pass Journal Entries, Prepare Ledger Accounts.
3. After studied Unit-3, the student will able to know the Preparation Trial Balance.
4. After studied Unit-4, the student will able to know the Rectification after the preparation of final account is excluded
5. After studied Unit-5, the student will able to know the Preparation Trading a/c, Profit & Loss a/c and Balance Sheet

OPEN ELECTIVE

PAPER 2

C. ELEMENTS OF BUSINESS LAW

Course Objectives

1. To enhance the understanding of the contract and agreement
2. To extend the knowledge of devaluation joint Rights and liabilities and Discharge of contract.
3. To facilitate the students to have the understanding about Indemnity and Guarantee
4. To know about Bailment and pledge
5. To let students to know about Contract of Agency and Termination agency.

Unit – I:

Contract – Formation and Essential element of contract – Types of contract and Agreement – Rules as to Offer – Acceptance and Consideration – Capacity to contract.

Unit – II:

Performance of contract – Devolution of Joint Rights and liabilities – Discharge of contract.

Unit – III:

Indemnity and Guarantee – Features and Distinctions – Extent of Surety's liability – Rights and Discharge of surety.

Unit – IV:

Bailment: Definition – Features – Rights and duties of Bailor and Bailee, pledge: Definition – Features – Rights and duties of pawnor and pawnee – Difference between Bailment and Pledge.

Unit – V:

Contract of Agency – Definition and meaning – creation – Ratification and Requisites - Rights of Principal and Agent – personal liability of Agent – Termination Agency.

Text Book:

1. P.C. Tulsian, Business Laws, Tata McGraw Hill, New Delhi.
2. Dr. N. Premavathy, Business Law, Sri Vishnu Publications, Chennai

Reference Items: books.

1. N.D. Kapoor, Business Laws, Sultan Chand & Sons, New Delhi.
2. R.S.N. Pillai & Bagavathi, Business Laws, S. Chand & Co., New Delhi

Course Outcomes:

1. After studied Unit-1, the student will be able to acquire the basic knowledge and understand the types of contract and Agreement
2. After studied Unit-2, the student will be able to know the essential elements of contract and rules as to offer.
3. After studied Unit-3, the student will be able to have the understanding of law relating to indemnity and guarantee
4. After studied Unit-4, the student will be able to know the duties and rights of the Bailor and Bailee and Agent and Principal.
5. After studied Unit-5, the student will be able to know about law of Agency.

SEMESTER III

PAPER - 8

GOODS AND SERVICES TAX (GST)

Course Objectives

1. To gain expert knowledge on the principles and law relating to Indirect Taxation and GST in India.
2. To expose the students with the latest development in GST.
3. To impart skill in applying and analysing the provisions of Goods and Service Tax Act.
4. To know about the basic Administration of GST.
5. To Familiarize the Provisions to appeal in the court.

Unit 1: Introduction:

Meaning and Definition of Indirect Taxes-Nature-Scope Constitutional provisions-Advantages-Disadvantages-Difference between Direct and Indirect Taxes- Types-Milestones in the history of Indirect Taxation in India - **Goods & Services Tax (GST)** Act 2016- Introduction - Meaning-Definition-Major Indirect Taxes merged in to Goods and Service Tax.

Unit 2: Basic Provisions of GST:

Introduction--Historical backdrop of Goods and Service Tax-objectives & features - Strengths, Weaknesses, Opportunities and Challenges (SWOC) Analysis of GST in India.– Advantages & Limitations of GST-Economy, Industry and trade, tax payers-Types of GST - CGST-IGST-SGST- UTGST Schedules-Rate of GST- Tamil Nadu GST Provisions.

Unit 3: Main Provisions of GST:

Provisions Compensation (GST) Law-Definitions of important terms-Levy of Tax-Collection-relating to Place, Time and Value of Supply-Different meaning of supply- Composite Supply Mixed supply- Scope of Supply- Taxable Supply- E-Commerce-Supply Chain.

GST Exemption limit-Tax Invoice-Credit and Debit Notes-Valuation Rules-Computation Tax Input tax Credit (ITC)-Registration-procedures-Deemed Registration-Cancellation of Registration.

Accounts and Records- Period of Retention of Records- Presumption as to Documents>Returns-Annual-Final-Payment of Tax-Information Technology in GST Audit- Special Audit-Assessment-Refund-Consumer welfare Fund-GST Practioners - TDS/TCS.

Unit 4: Administration of GST:

GST Council-Authorities-Inspection-search seizure-Arrest-Demand-Recovery-Liability to pay tax in certain cases-Advance Ruling- Authority and Appellate Authority - GSTN-Information infrastructure for GST.

Unit 5: Appeals & Revisions under GST:

Appeals-Appeal to High Court Appeal to Supreme Court- Revisions-Offences- Compounding of Offences-Penalty Transitional provisions-IGST Provisions- Inter-state Supply- Intra-state supply- Zero rated Supply- Imported Supply- Transfer of ITC-Compensation Rules- Base year Revenue-Projected Revenue-Miscellaneous provisions-Interest-Job Work Procedure Deemed Export.

Text Books:

1. Goods and Services Tax, Dr. H.C. Mehrotra and V.P. Agarwal, Sahitya Bhawan Publications, Agra.
2. GST- A Brief Introduction, L.V.R. Prasad and G.J. Kiran Kumar, PK Publishers.
3. Indirect Taxes- Dr.H.CMehrotra & Prof. Agarwal, SahityaBhavanPublishers,Agra.

Reference Book

1. GST Law & Procedure, Anandaday Misra, Taxman
2. Hand Book of GST in India Concepts and Procedures(2017Edition) RakeshGarg&SandeepGarg - Bloomsbury India Publications
3. GST in India-RakeshGarg&SandeepGarg, Bloomsbury IndiaPublications
4. All about GST-V.S Datey-Taxman Publications.
5. GST Law, Concept & Impact Analysis-Dr.SanjivAgarwal
6. GST Law & Analysis with Conceptual Procedure-Bimal Jain &IshaBensalYoungGlobal.
7. GST Bare Acts, Rules, Notifications &Circulars
8. An Insight of GST in India-ICWAI, Vol:1&2

Course Outcome

1. The students will able to know and familiarize with the fundamentals of Taxation.
2. The students will able to know GST and its history of GST and their types.
3. The students will able to know the exempted goods and Services under GST Act.
4. The students will able to know the Administration of GST and Authority.
5. The students will able to know how to avail the Appeal and Revision under GST Act.

PAPER - 9

ORGANISATIONAL BEHAVIOUR

Course Objectives

1. To understand the basic concepts of organisational behaviour .
2. To bring an understanding on different types of motivational theories
3. To facilitate the students to know the stress management
5. To let to know students to organisational structure and Organisational Effectiveness

Unit I: Introduction

Organisational Behaviour – Concepts - Nature & Scope – Organisational Behaviour Models - Foundations of Individual Behaviour – Personality – Stages of Personality - Perception – Learning – Attitudes – Values – Emotions.

Unit II: Motivation

Motivation – Theories by Maslow, Herzberg, McGregor, McClelland & Vroom – Motivational Tools in Organisation – Effects on Work Behaviour - Motivation and Morale - Organisational Citizenship Behaviour.

Unit III: Group Dynamics and Stress Management

Group Dynamics – Formal and Informal Group - Group Norms - Group Cohesiveness - Group Behaviour - Group Decision Making – Work Stress - Stress Management – Coping Strategies of Stress.

Unit IV: Leadership and Organisational Conflicts

Leadership – Traits - Styles – Theories of Leadership - Power and Politics - Organisational Conflicts - Stages - Sources - Types - Conflict Management.

Unit V: Organisational Structure and Organisational Effectiveness

Organisational Structure – Foundation and Types - Organisational Culture and Climate – Organisational Development – Organisational Effectiveness & Performance – Organisational Ethics.

Text Books

1. S.S. Khanka, Organisational Behaviour, S.Chand & Co. Ltd., New Delhi.
2. K. Aswathapa, Organisational Behaviour, Himalaya Publishing House.

Reference Books:

1. Stephen P. Robbins, Organizational Behavior, Pearson Education, New Delhi.
2. L.M. Prasad, Organisational Behaviour, Sultan Chand and Sons, New Delhi.
3. Margie Parikh and Rajen Gupta, Organisational Behaviour, Tata McGraw Hill Education, New Delhi

Course Outcome

1. After studied Unit-1, the student will be able to understand the basic concept of organisational behaviour and foundations of individual behaviour
2. After studied Unit-2, the student will be able to develop an idea about different motivational theories and evaluate motivational strategies used in a variety of organizational settings.
3. After studied Unit-3, the student will be able to understand the foundation of group dynamics and the nature of stress and its management.
4. After studied Unit-4, the student will be able to evaluate the appropriateness of various leadership styles and how to deal with organisational conflict.
5. After studied Unit-5, the student will be able to understand different types of organizational structures and importance of organizational effectiveness.

PAPER - 10

ADVANCED COST ACCOUNTING

Course Objectives

1. To enhance the understanding of the basic concepts in Cost Accounting.
2. To extend the knowledge of Methods of Costing Process costing.
3. To facilitate the students to have the deep understanding of Standard Costing and Variance analysis
4. To bring about the awareness of Methods of cost reduction.
5. To let the students to know about Benefits from adoption of ABC-Just in Time Costing (JIT).

UNIT-I

Nature and significance of cost accounts-Definition of Costing, Scope, Objectives, Functions and limitations of cost accounting-Installation of costing system-Elements of Cost- Cost centre and profit centre-Preparation of Cost sheet, tender of quotations.

UNIT-II

Methods of Costing-Process costing, Treatment of equivalent production- Inter process profit-Joint and by product Costing-Preparation of contract account, Cost plus contract and escalation clause.

UNIT-III

Standard Costing and Variance analysis-Material, Labor and Overheads -reporting of variances

UNIT-IV

Cost control and Cost Reduction-Control over wastages, Scrap, Spoilage and defectives-Methods of cost reduction

UNIT-V

Activity based costing-Meaning and concept-Characteristics of ABC-Benefits from adoption of ABC-Just in Time Costing (JIT)

Note: The proportion between theory oriented and problem oriented questions in the university examination shall be 20:80

Text Book

1. T.S.Reddy and Y.H. Reddy- Cost and Management Accounting-Margam Publications, Chennai.
2. S.P. Jain and K.L. Narang-Cost accounting-Kalyani Publishers-New Delhi.

Reference books

1. Ravi M Kishore Advanced Management Accounting - Taxman's-New Delhi. 4. Management Accounting - J.Batty.
2. B.K. Bhar- Cost Accounting-Academic publishers, Calcutta.
3. C.T.Horangren-Cost Accounting - A Managerial Emphasis- Pearson education-New Delhi.

4. Jawaharlal - Cost Accounting-Tata Mc. Graw Hill
5. Robert S. Kaplan-Anthony A. Atkinson- Advanced Management Accounting - Prentice Hall of India-New Delhi 8.
6. Weldon's Cost Accounting and Cost Methods - Mc. Donald and Evens Limited.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the basic concepts in Cost Accounting and also familiarizing with the preparation of Cost Sheets, Tenders and Quotations.
2. After studied Unit-2, the student will be able to understand Preparation of Process Costing.
3. After studied Unit-3, the student will be able to Know the Standard Costing and Variance Analysis
4. After studied Unit-4, the student will be aware of the Cost control and Cost Reduction.
5. After studied Unit-5, the student will be able to develop the knowledge about Activity based costing.

PAPER - 11

RESEARCH METHODOLOGY

Course Objectives

1. To enhance the understanding of the basics of Research Methodology
2. To extend the knowledge of Data Collection and Sampling.
3. To facilitate the students to have the deep understanding of Processing of Data
4. To bring about the awareness of data Analysis through Statistical Tools.
5. To let students to know about Research Report.

UNIT-I : INTRODUCTION

Research - definition, characteristics, nature and scope. Various types of research - Formulation of research problem - Major steps in Research – Hypothesis – Research Design - Uses of social research.

UNIT-II : SAMPLING AND DATA COLLECTION

Sampling: Meaning, definition, need and types - Merits and demerits of sampling. Data collection: Sources of data; Primary and Secondary data. Procedure for data collection, Tool of data collection - Questionnaire – Interview-Schedule.

UNIT-III : DATA PROCESSING AND ANALYSIS

Processing of data: editing, coding and Tabulation - Problems - use of computer in social research. Analysis of data: Statistical analysis; diagrammatic and graphic representation. Interpretation of results.

UNIT-IV : STATISTICAL APPLICATIONS

Statistical Tools used in Research – F test – t- Test, Analysis of Variance (ANOVA) – Chi-Square Analysis.

UNIT-V : RESEARCH REPORTS

Structure and components - Types of Research Report, Good Research Report. Pictures and Graphs. Introduction to SPSS Package

Text Books

1. Kothari.C.R. Research Methodology - Methods & Technology, New Age International Publisher, New Delhi.
2. Panneerselvam. R. Research Methodology, Prentice Hall of India, New Delhi, 2004.New Delhi, 1994.
3. Gupta, C.B., An introduction to Statistics Methods, Vikas Publishing House, 1998,New Delhi

Reference Items: books.

1. Wilkinson. T.S. & Bhandarkar. P.L. Methodology and Techniques of Social Research, Himalaya Publishing House, 2000, Mumbai.
2. Young, P.V., Scientific Social Survey and Research, Prentice Hall, 1949. New York.
3. Gupta, S.P. Statistical Methods, Sultan Chand and sons, 1999, New Delhi

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the basics of Research Methodology.
2. After studied Unit-2, the student will be able to know the Data Collection and Sampling
3. After studied Unit-3, the student will have understanding of Processing Data.
4. After studied Unit-4, the student will be able to have the awareness of Data Analysis through opt Statistical Tools
5. After studied Unit-5, the student will be able to know about Research Report and SSPS pacakage

**CORE ELECTIVE
PAPER -1**

(to choose one out of 3)

A. AGRIBUSINESS MANAGEMENT

Course Objectives

1. To enhance the understanding of the Management Concept and Agripreneurs
2. To extend the knowledge of Agribusiness and Commodities Market.
3. To facilitate the students to have the deep understanding of Agricultural Market and Products.
4. To bring about the awareness of Small Scale Industry and MSME.
5. To let students to know about financial schemes for Agribusiness.

Unit-1: Management Concepts and Agripreneurs.

Management Concepts & Principle - Basic Concepts of Management - Managerial Environment - Management Functions - Leading and Leadership - Forms of Business organization - Entrepreneurial Competencies - Agripreneurs.

Unit-2: Agribusiness and Commodities Markets.

Management principles to Agribusiness -Nature and Characteristics of Agribusiness -Agro-based Industries in India -Agricultural Supply Chain Management - Strategic Management in Agribusiness - Risk Management in Agribusiness - Contract Farming - Commodity Markets - Recent Innovations in Commodities Markets - Warehousing

Unit-3: Production, Consumption, Processing and Marketing of Agricultural Products.

Production, Consumption, Processing and Marketing of Agricultural Products – Agricultural Production Scenario in India – Consumption of Agricultural Products – Agricultural Marketing – Agricultural Marketing Functions – Classification of Markets- Cooperative Agricultural Marketing – Pricing – Marketing cost-margins-price spreads – Food Processing –Rural Marketing

Unit-4: Small Scale Industry – MSME.

Small Scale Industrial Undertaking -Ancillary Industrial Undertaking - Tiny Enterprises - Export Oriented Units -Small Scale (Industrial related) Service and Business Enterprises (SSSBE) - Women Enterprises - Village and Small Scale Industries –MSME- Khadi Village Cottage Industries

Unit-5: Financing Agribusiness.

Financing Agribusiness – NABARD - Financial Assistance from Banks - Micro Credit Firms – Cooperative Banks - Types of Agricultural loans - Risk Management – Export Opportunities – Quality Management - TQM.

Text Books

Unit-1: [Girdhari Lal Meena](#), Fundamentals of Agribusiness Management, Agrotech Publishing Academy, 2017, Udaipur

Unit-2: Vedamurthy K.B, Agribusiness Management and Trade, Anand Agricultural University, Anand.

Unit-3: TNAU, Tamil Nadu, AECO 341 - Fundamentals of Agri Business Management.

Unit-4: [Girdhari Lal Meena](#), Fundamentals of Agribusiness Management, Agrotech Publishing Academy, 2017, Udaipur.

Unit-5: [Subba Reddy S](#), [Raghu Ram P](#), [Agricultural Finance & Management](#), Oxford & Ibh Publishing Co. Pvt. Ltd. New Delhi.

Reference Items: books.

1. [Freddie L. Barnard](#), [Jay T. Akridge](#), Agribusiness Management, Routledge Publishers. 2012, Canada.
2. Acharya S.S, Agricultural Marketing In India, Oxford & Ibh Publishing Co. Pvt. Ltd. 2019 New Delhi.
3. Sharma, Entrepreneurship in Livestock & Agriculture, CBS Publication, 2010 New Delhi,
4. [Dr. Smita Diwase](#), Indian Agriculture and Agribusiness Management, Krish Management Network, 2017, New Delhi
5. [Ramesh Chand](#), Agriculture Marketing, [KSK Publishers & Distributors](#), 2011, Delhi
6. Katnalli Gauradevi S, Agro-Based Industries in India, ABD Publishers, Jaipur.
7. [Srinivas Puri](#), Agro-Based Industries and Their Prospects, Random Publications, 2016, New Delhi,

Journals

8. The Madras Agricultural Journal, NABARD, Tamil Nadu Regional Office, Chennai.
9. Yojana, Rural Development, New Delhi
10. Agricultural Update, Muzaffar Nagar, UP
11. Agri Business and Food Industry, New Delhi
12. Kurukshetra, Ministry of Rural Development, New Delhi.
13. Kisan World, Chennai.

E-Materials

1. Vedamurthy K.B. Agribusiness Management and Trade. www.agrimoon.com.
2. [Adnan Adeel](#), [Principles of Agribusiness Management](#), www.academia.edu
3. Agribusiness Management. www.senecaahs.org
4. Principles of Agribusiness Management, pdf – free download.
5. James G. Berlein, *Principles of Agribusiness Management*. www.wattpad.com

Course Outcomes:

1. After studied Unit-1, the student will be able to understanding of the Management Concept and Agripreneurs.
2. After studied Unit-2, the student will be able to know the Agribusiness and Commodities Market.
3. After studied Unit-3, the student will be able to have the deep understanding of Agricultural Market and Products.

4. After studied Unit-4, the student will be able to have the awareness of Small Scale Industry and MSME.
5. After studied Unit-5, the student will be able to know about financial scheme for Agribusiness.

**CORE ELECTIVE
PAPER -1**

B. SERVICES MARKETING

Course Objectives

1. To be aware of the Essential Elements of marketing mix in Service marketing.
2. To expand the understanding of marketing strategies for various services marketing-mix
3. To help the students in understanding of Product support services and problems of Service quality management
4. To enhance knowledge on Marketing of financial services.
5. To let the students to know CRM, and identify the Customer needs.

UNIT-I

Growth of the Service Sector - Nature and Concept of Service - classification of services - Characteristics of Services and their marketing implications - Essential Elements of marketing mix in Service marketing.

UNIT-II

Marketing strategies for service firms with special reference to information, communication, consultancy, advertising, professional services, after sales service, recruitment training and tourism.

UNIT-III Product support services - pricing of services - problems of Service quality management - Customer Expectations - innovation in services.

UNIT-IV Marketing of financial services - nature - types - marketing of insurance - mutual fund - marketing for non - profit firms - Growth of financial services in India.

UNIT-V CRM - identifying and Satisfying Customer needs - Relationship marketing - Customer Satisfaction - Managing Service Brands.

Text Books:

1. Christopher Lovelock, Services Marketing, Pearson Education.
2. E.G. - Bateson, Managing Service marketing - Text and Readings, Dryden press, Hidsdale
3. Philip Kotler and Paul N. Bloom, Marketing professional Services, Prentice hall, New Jersey.

Reference Books:

1. Payne, the essence of Service Marketing, New Delhi, prentice Hall.
2. Helen Wood Ruffe, Services Marketing, Macmillan India, New Delhi.
3. Mary Ann pezzallo, Marketing Financial Services, Macmillan.
4. Dr.S.Gurusamy, Financial and Markets Vijay Nicole imprints private limited, Chennai.
5. Dr.B.Balaji, Services, Services Marketing and Management, S.Chand & Company Ltd., New Delhi.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the Essential Elements of marketing mix in Service marketing
2. After studied Unit-2, the student will be able to develop an idea about marketing strategies for various services marketing-mix.
3. After studied Unit-3, the student will be able to know and learn about Product support services and Identify the problems of Service quality management
4. After studied Unit-4, the student will be able to learn the of Marketing of financial services.
5. After studied Unit-5, the student will be able to acquire the knowledge about CRM.

**CORE ELECTIVE
PAPER -1**

C. BUSINESS ANALYTICS

Course Objectives

1. To have the basic knowledge about Business Analytics.
2. To make the understanding about levels of Business Analytics.
3. To enable to students to know about types of Business Analytics
4. To bring knowledge about the Decision Making.
5. To enable the students to know about the approaches in Decision Making.

UNIT - I Business Analytics – Introduction

Definition of Business Analytics – Characteristics of Business Analytics and Business Intelligence. The basic rule of Business and Business Analysis - Evolving role of the Business Analyst.

UNIT - II levels of Business Analytics

Different levels of Business Analytics - Categories of Business Analytical methods and models. Business Analytic Process -. Classical Requirements and Tasks performed by Business Analysts

UNIT - III Decision Making

Decision Making - Objectives - Role and Significance of Decision Making- Decision Making Process - Rationality in Decision Making - Programmed and Non Programmed Decision Making- Decision Making under Uncertainty and Risk

UNIT - IV Approaches in Decision Making

Modern Approaches in Decision Making – Decision Support Systems - Heuristic Techniques- Participative Decision Making - Simulation – Brainstorming – Delphi Technique – Common Problems in Decision Making

UNIT - V Value of Analytics

Value of Analytics in Decision Making - Types of analytics – Descriptive, Predictive and Prescriptive analytics

Text book

1. C.B.Gupta, Business Management, Sultan Chand and Sons, New Delhi

2. Harold Koontz, Heinz Wehrich, 'Essential of Management', Tata Mcgraw Hill

Reference book

1. RN.Prasad, Seema, Achrya –Fundamentals of Business Analysis, Willy Publishers
2. Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams- Essentials of Business Analytics, Cengage Learning.
3. Albright Winston, Business Analytics- Data Analysis-Data Analysis and Decision Making, Cengage Learning, Reprint 2016.

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the concept of Business Analytic
2. After studied Unit-2, the student will be able to understand the Categories of Business Analytical methods and models
3. After studied Unit-3, the student will be able to understand the Role and Significance of Decision Making.
4. After studied Unit-4, the student will be aware of the Modern Approaches in Decision Making and Common Problems in Decision Making
5. After studied Unit-5, the student will be able to know Value of Analytics in Decision Making.

**OPEN ELECTIVE
PAPER - 1**

(to choose one out of 3)

A. SMALL BUSINESS MANAGEMENT

Course Objectives

1. To enhance the understanding of the concept of Small Business and MSME.
2. To extend the knowledge of Starting a Small Industry.
3. To facilitate the students to have the deep understanding of the Type of the Organizations
4. To bring about the awareness of Sources of Finance for Small Business.
5. To let students to know about the Incentives and Subsidies given the Government.

UNIT-I: SMALL BUSINESS INTRODUCTION

Meaning of Small Scale Enterprises – Objectives of Micro, Small and Medium Enterprises Act of 2006 (MSME) – Importance of MSMEs – Advantages – Problems – Measures of the Government to Develop Small Industries.

UNIT-II: STEPS FOR STARTING A SMALL INDUSTRY

Steps for Starting a Small Industry – Search for Business Idea, Sources of Ideas – Project Formulation and Design, Introduction to Total Quality Management (TQM)

UNIT-III: TYPE OF THE ORGANIZATIONS

Selection of the Type of Organization – Sole Proprietorship - Partnership – Joint Stock Company – Factors Influencing the Choice of Organization.

UNIT-IV: SOURCES OF FINANCE

Sources of Project Finance – Short Term, Medium Term and Long Term Finance – Role of Banks – Institutions Assisting Small Enterprises – District Industries Centres (DICs), Industrial Estates, SIDO, NSIC, SIDCO, SISI, TIIC and SIPCOT.

UNIT-V: - INCENTIVES AND SUBSIDIES

Incentives and Subsidies – Meaning – Need and Problems – Schemes of Incentives for MSME & SSI Units –Export Opportunities

Text books

1. Dr. Vijayshree P.T & Dr. Alagammal. M. Entrepreneurship and Small Business Management, Margham Publications, Chennai
2. Gupta C.B & Srinivasan N.P. Entrepreneurship Development in India, Sultan Chand & Sons, 1999, New Delhi

3. Saravanavel P. Entrepreneurship Development, ESS PEE KAY Publishers, Chennai.
4. Gupta C.B. & Srinivasan N.P. Entrepreneurship Development in India, Sultan Chand & Sons, 1999, New Delhi
5. Satish Taneja & Gupta S.L, Entrepreneur Development, Galgotia Publishing Company 2002, New Delhi.

Reference Books:

1. Jayshree Suresh, Entrepreneurial Development, Margham Publications, 2015 Chennai
2. Gordon.E & Natarajan, Entrepreneurship Development, Himalaya Publishing House, 2009 Mumbai.
3. Poornima M. Charantimath, Entrepreneurship Development and Small Business Enterprises, Pearson Publishers, 2013, Chennai.
4. Anil Kumar. S, Small Business and Entrepreneurship, I. K. International Pvt Ltd, 2008, New Delhi
5. Besterfield Dale H. Total Quality Management (TQM) Pearson Publishers, 2018, Chennai.

Journals:

6. The_Journal_of_Entrepreneurship. www.ediindia.org
7. Journal of Small Business and Entrepreneurship Development. www.jsbednet.com
8. International Journal of Small Business and Entrepreneurship Development. www.researchgate.net
9. Journal of Small Business and Enterprise Development. www.emerald.com
10. International Journal of Entrepreneurship and Innovation. www.sagepub.com

E-Materials:

1. Poornima M Charantimath, Entrepreneurship Development And Small Business Enterprise, www.goodreads.com
2. Kevin McQueen , Small Business Development Strategies. www.bwbsolutions.com
3. Darren Dahl, How to Develop a Business Growth Strategy, www.inc.com
4. Tamil Nadu Manufacturing Business Incubation Infrastructure Development Project, Entrepreneurship Development and Innovation Institute, www.startup-tn.in
5. Dr.Jayakumar. V, Total Quality Management. www.easyengineering.net

Course Outcomes:

6. After studied Unit-1, the student will be able to understand the concept of Small Business and MSME.
7. After studied Unit-2, the student will be able to know how to start a Small Industry step by step.
8. After studied Unit-3, the student will be able to understand the Type of the Organizations.
9. After studied Unit-4, the student will be aware of the Sources of Finance for Small Business.
10. After studied Unit-5, the student will be able to know Incentives and Subsidies given the Government.

PEN ELECTIVE

PAPER - 1

B. BANKING THEORY

Course Objectives

1. To enhance the understanding of Developments in Banking Sector
2. To extend the knowledge of Functions of Commercial Banks.
3. To facilitate the students to have the knowledge on the Factors influencing Bank lending
4. To bring about students to familiar with the Functions of Central Banks
5. To let students to know about Recent Trends in Banking Sector

UNIT – I: An Introduction to Banking

Introduction – Definition of Banking – Classification of Banks – Components of Indian Banking System – Banking Structure in India.

UNIT – II: Commercial Banks

Introduction – Definition – Features of a Commercial Banks – Origin of Commercial Banking in India – Function of Commercial Bank – Credit Creation.

UNIT – III: Function of Banking

Introduction – Opening of Accounts – Types of Accounts – Relationship with customers – KYC – Norms – Banking lending – Types of lending – Factors influencing Bank lending CIBIL.

UNIT – IV: Central Banks

Introduction – Definition – Characteristics – Role and objectives – Functions – Difference between Central bank and Commercial banks – Credit control.

UNIT – V: Recent Trends in Banking

Electronic Fund Transfer – Benefits of Electronic Banking – RTGS – NEFT – ATM – Credit and Debit Card – Core Banking Solutions (CBS).

Text Books:

1. P.N. Varshney., - Banking Law and Practice – Sultan Chand & Sons New Delhi-24th Edition
2. B. Santhanam, Banking and Financial System, Margham Publication, Chennai.
3. S.N. Mahaeswari, Banking Law and Practice, Kalyani Publications, Chennai.

Reference Books:

1. Natarajan S. and Parameswaran R. – Indian Banking – S. Chand and Co. Ltd., New Delhi (Latest Ed).
2. Vasudevan S.V. – Theory of Banking – S. Chand and Co. Ltd., New Delhi (Latest Ed).
3. S.N. Maheswari, Banking Law and Practice, Kalyani Publications, Chennai

Course Outcomes

1. After Studied Unit-1, The Student will be able to know classification of banks, ownership, function and banking structure in India.
2. After Studied Unit-2, The student will be able to familiar with the Types and Functions of Commercial Banks.
3. After Studied Unit-3, The Students will able to analyse the Relationship between Banker and Customer.
4. After Studied Unit-4, The Student will be able to know the Functions of Central Banks
5. After Studied Unit-5, The Student will be able to Analyse Recent Trends in Banking Sector.

**OPEN ELECTIVE
PAPER - 1**

C. STRESS MANAGEMENT

Course Objectives

1. To enhance the understanding of the meaning of Stress, Types and Causes of Stress.
2. To extend the knowledge of Personality its Types and Perception.
3. To facilitate the students to have the deep understanding of Emotional Intelligence - EQ
4. To bring about the awareness of Stress at Work Place.
5. To let students to know about Stress Management and Counselling.

UNIT- I: STRESS, TYPES - CAUSES

Stress - Meaning of Stress- Types - Causes of Stress - Personal Factors - Environmental Factors
Organisational Factors - Consequences of Stress - Psychological Symptoms - Behavioural
Symptoms.

UNIT- II: PERSONALITY AND PERCEPTION

Personality -Types Personality - Determinants of Personality - Personality Theories - Trait
Theories - Similarities of Individuals - Individuals Difference - Dimensions of Personality -
Perception - Attention and Selection

UNIT- III: EMOTIONAL INTELLIGENT

Emotion - Types of Emotions - Positive and Negative emotions - Feelings – Sensations -
Moods - Emotional Intelligence - EQ- Behaviour Theory - Cognitive Theory – Emotions and
well-being

UNIT- IV: STRESS AT WORK PLACE

Stress and Job Performance – Role conflict – Organisational culture – Work Stress – effects of
works on individual and organization - Stress of the working women - Time Management

UNIT- V: STRESS MANAGEMENT AND COUNSELLING

Stress Management and Counselling - Prevention of Stress - Escaping Stress - Coping with
Stress -Counselling - Characteristics of Counselling - Importance of Counselling- Functions of
Counselling - Types of Counselling.

Text book

1. Stress Management an Integrated Approach, Dr. Viswanathan Gopalan, GenNext Publication, 2016, New Delhi.
2. Introduction to Psychology, Clifford Morgan and Richard King , McGraw Hill Education, 2017 Chennai
3. Emotional Intelligence, Dainel Goleman, Penguin Random House, 2006, Noida

4. Human Resource Management, Jayasankar. J, Margham Publications, 2002, Chennai.
5. Richard Nelson Jones, Basic Counselling Skills: A Helper's Manual, Sage Publications, 2012, New Delhi

Reference - Books:

1. Stress Management, Chakravarty Ajanta, Rupa Publications, 2012, Chennai.
2. Organizational Behaviour, University of Minnesota Libraries Publishing, 2017. USA
3. John Romas, Practical Stress Management, Academic Press, 2017, Cambridge.
4. Dale Carnegie, How to Stop Worrying and Start Living, Rupa Publication, 2016, Kolkata
5. Dr. Bimal Chhajer A complete guide to Managing Stress, New Ages Books, 2006, Chennai
6. Shashi Jain, Introduction to Psychology, Kalyani Publishers, 2006, Bengaluru,
7. Mangal S. K. Emotional Intelligence, PHI Learning Pvt. Ltd. 2015, New Delhi

Journal:

8. International Journal of Stress Management. www.aapb.org
9. The American Journal of Psychology on JSTOR. www.jstor.org
10. International Journal of Stress Management. www.apa.org
11. International Journal of Psychology. www.onlinelibrary.wiley.com

E-Materials

1. International Journal of Stress Management. www.springer.com
2. Stress Management. www.helpguide.org
3. A Study of Learning Stress and Stress Management Strategies. www.sciencedirect.com
4. Management of Stress at Workplace. www.globaljournals.org

Course Outcomes:

1. After studied Unit-1, the student will be able to understand the concept of Stress, Types and Causes of Stress
2. After studied Unit-2, the student will be able to understand the Personality its Types and Perception.
3. After studied Unit-3, the student will be able to understand the Emotional Intelligence - EQ
4. After studied Unit-4, the student will be aware of the Stress at Work Place.
5. After studied Unit-5, the student will be able to know Stress Management and Counselling skills.

SEMESTER IV

PAPER - 12

DIRECT TAXES

Course Objective

1. To Learn the Students about History of Income Tax in India.
2. To Facilitate the Practical Knowledge on Calculation of Income from House Property.
3. To Impart Practical knowledge on Income from Business & Professional and Capital Gain.
4. To Make understand the Computation of Total Income of Individuals.
5. To know about the Assessment Procedure, e-filing of Return and Tax Planning.

UNIT – I: Introduction

History of Income Tax in India - Basic Concepts – Income – Persons – Previous Year – Assessment Year – Assessee – Gross Total Income – Total Income – Determination of Residential Status – Scope of Total Income and Incidence of Tax – Incomes Exempt from Tax u/s 10.

UNIT – II: Income from Salary & House Property

Computation of Income from Salary – Allowances – Perquisites – Deductions including Standard Deduction – Income from House Property – Annual Value – Self-Occupied House - Let-Out House – Deemed to be Let-Out House – Partly Self-Occupied and Partly Let Out – Deductions.

UNIT – III: Income from Business & Profession and Capital Gains

Profits and Gains of Business and Profession – Admissible Deductions – Expenses Expressly Disallowed – Deemed Incomes – Depreciation – Block of Assets – Normal Depreciation – Additional Depreciation – Capital Gains – Short-term and Long-term Capital Gains – Exemptions.

UNIT IV: Income from Other Sources and Computation of Total Income

Income from Other Sources – Aggregation of Income – Set-Off and Carry Forward of Losses – Deductions available from Gross Total Income – Computation of Total Income of Individuals.

UNIT V: Assessment Procedure, e-filing of Return and Tax Planning

Assessment Procedure – Methods – Assessment of Individuals – e-filing of Tax Return – Tax Planning – Meaning, Need and Limitations – Tax Evasion and Tax Avoidance.

Note: Weightage of marks: Theory 40% Problems 60%

Text Books:

1. Gaur and Narang, Income Tax Law & Practice, Kalyani Publishers, New Delhi.


ANNAMALAI UNIVERSITY
115_B.B.A.

Programme Structure and Scheme of Examination (under CBCS)
 (Applicable to the candidates admitted in Affiliated Colleges from the
 academic year 2022 -2023 onwards)

COURSE CODE	PART	STUDY COMPONENTS & COURSE TITLE	HOURS/WEEK	CREDIT	MAXIMUM MARKS		
					CIA	ESE	TOTAL
SEMESTER - I							
22UTAML11	I	Language Course - I: Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I: Communicative English I	5	3	25	75	100
22UBBAC13	III	Core Course - I: Principles of Management	4	4	25	75	100
22UBBAC14		Core Course - II: Financial Accounting	4	4	25	75	100
		Core Practical - I: Tally	4	-	-	-	-
		Allied Course - I	4	3	25	75	100
22UBBAS16		Skill Based Course - I: Salesmanship	2	2	25	75	100
22UENVS18	IV	Environmental Studies	2	2	25	75	100
		Total	30	21			700
SEMESTER - II							
22UTAML21	I	Language Course - II: Tamil/other Languages	5	3	25	75	100
22UENGL22	II	English Course - II: Communicative English II	5	3	25	75	100
22UBBAC23	III	Core Course - III: Business Environment	5	4	25	75	100
22UBBAP24		Core Practical - I: Tally	5	4	25	75	100
		Allied Course - II	4	3	25	75	100
22UBBAS26		Skill Based Course - II: Presentation Skills	2	2	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28		Soft Skill	2	1	25	75	100
		Total	30	21			800

List of Allied Courses (Choose 1 out of 3 in each Semester)

Semester	Course Code	Course Title	H/W	C	CIA	ESE	Total
I	22UBBAA15-1	Principles of Banking System	4	3	25	75	100
	22UBBAA15-2	Consumer Behavior	4	3	25	75	100
	22UBBAA15-3	Business Economics	4	3	25	75	100
II	22UBBAA25-1	Principles of Insurance	4	3	25	75	100
	22UBBAA25-2	Customer Relationship Management	4	3	25	75	100
	22UBBAA25-3	Managerial Economics	4	3	25	75	100

SEMESTER: I CORE: I PART: III	22UBBAC13: PRINCIPLES OF MANAGEMENT	CREDITS: 4 HOURS: 4 / Week
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Course Objectives

1. To familiarize the students with principles of management concepts.
2. To provide an insight about the management functions of planning, organizing, staffing, directing & controlling.
3. To enumerate the importance of organizing and organizational structure.
4. To make them understand on the importance of HR practices and motivation.
5. To enable them to understand the techniques of co-ordinations.

Unit I: Management

Hours: 12

Management: Definition, Nature, Scope – Functions of Management – Principles of Management – Management: Art, Science and Profession – Levels of Management: Top level, Middle level, Lower level.

Unit II: Planning

Hours: 12

Planning: Introduction, Nature, Scope – Importance of Planning – Steps in Planning – Types of Plan – Decision Making – Types of Decision – Decision Making Process.

Unit III: Organising

Hours: 12

Organising: Definition, Principles – Organisations Structure: Types – Span of Control – Departmentation – Process and Methods.

Unit IV: Staffing & Directing

Hours: 12

Staffing & Directing: Meaning – Recruitment – Selection – Directing: Nature, Purpose – Decentralisation – Motivation – Maslow's and Herzberg Theories.

Unit V: Controlling

Hours: 12

Controlling: Meaning, Nature, Importance – Control Process – Co-ordination – Need, Type and Techniques for excellent Co-ordination.

Course Outcomes

At the end of the course, the students will be able to

1. Understand the basic concept of management and practices
2. Understand the proper planning, elements and techniques of planning recognise and apply the skills necessary for carrying out effective management practices.
3. Understand the different organization structure need for departmentation.
4. Understand the basic concepts of staffing process in the human resource department and theories of motivation.
5. Understand the problems and stages in controlling process & coordination.

Text Books

1. Ramasamy, T. (2014). Principles of Management. Mumbai: Himalaya Publishing House.
2. Satya Raju, R. & Parthasarathy, A. (2018). Management: Text and Cases. New Delhi: PHI Learning Pvt. Ltd. 3rd Edition.
3. Prasad, L. M. (2020). Principles and Practice of Management. New Delhi: Sultan Chand & Sons.
4. Tripathi, P. C., Reddy, P. N. & Ashish Bajpai. (2021). Principles of Management. New Delhi: McGraw Hill Education. 7th Edition.
5. Gupta, C. B. (2021). Management: Theory and Practice. New Delhi: Sultan Chand & Sons.

Supplementary Reading

1. Sherlekar, S. A., Jain. Khushpat S., & Jain. Apexa V. (2017). Principles of Management. Mumbai: Himalaya Publishing House.
2. Dinkar Pagare. (2018). Principles of Management. New Delhi: Sultan Chand & Sons.
3. Harold Koontz, Heinz Weihrich, Mark V. Cannice. (2020). Essentials of Management. New Delhi: McGraw Hill.
4. Gupta, R. N. (2022). Principles of Management. New Delhi: Sultan Chand & Sons.
5. Meenakshi Gupta. (2019). Principles of Management. New Delhi: PHI Learning Pvt Ltd.

Outcome Mapping

Course Outcome	Programme Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3					
CO2			2			
CO3			2			
CO4				2		
CO5					2	

SEMESTER: I CORE: II PART: III	22UBBAC14 FINANCIAL ACCOUNTING	CREDIT: 4 HOURS: 4 / Week
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Course Objectives

1. To inculcate basic accounting concepts and postulates
2. To understand how trial balance helps to check accuracy in the ledger positioning
3. To provide wide knowledge about final accounts
4. To understand the meaning of depreciation and methods of charging depreciation
5. To build a base income and expenditure & receipts and payment accounts.

Hours: 12

Unit I: Basics of Accounting

Accounting: Meaning, Objectives – Accounting Concepts – Kinds of Accounts – Double entry Vs Single entry – Accounting Rules – Journal – Ledger.

Unit II: Trial Balance and Subsidiary Books

Hours: 12

Trial Balance: Meaning, Methods – Errors: Types of Errors – Rectification of Errors – Subsidiary Books – Types of Cash Book – Problems.

Unit III: Final Accounts

Hours: 12

Trading Account – Profit and Loss Account – Balance Sheet with simple Adjustments – Bank Reconciliation Statement (simple problem).

Unit IV: Depreciation

Hours: 12

Depreciation – Straight Line Method – WDV Methods and Annuity Method.

Unit V: Non-Profit Organisation Accounting

Hours: 12

Accounting for Non-Trading Institution – Income and Expenditure Account – Receipts and Payment Account.

Course Outcomes

At the end of the course, the students will be able to

1. Understand the fundamentals of financial accounting
2. Ensure the mathematical accuracy of the business transaction recorded in company ledger.
3. Prepare various books of accounts and final accounts.
4. Understand how to determine the amount of depreciation from the total value of property.
5. Learn to prepare various accounts; receipts and payments account, income and expenditure, balance sheet for non-profit organisation.

Text Books

1. Maheswari, S. N., Maheswari, Suneel K. & Maheswari., Sharad K. (2018). Financial Accounting. New Delhi: Vikas Publishing House.
2. Shukla. M. C., Grewel. T. S., & Gupta. S. C. (2017). Advanced Accounting Volume-I. New Delhi: Sultan Chand Publishing.

3. Grewal, T. S. (2022). Double Entry Book Keeping (Financial Accounting). New Delhi: Sultan Chand Publishing.
4. Tulsian, P. C. (2018). Principles and Practice of Accounting. New Delhi: McGraw Hill.
5. Jain, S. P., Narang, K. L., Simmi Agrawal, & Monika Sehgal. (2020). Financial Accounting. New Delhi: Kalyani Publishers.

Supplementary Reading

1. ASB (1999) Statement of Principles for Financial Reporting, London, ASB.
2. Elliott, Barry., & Elliott, Jamie. (2009). Financial Accounting and Reporting. Harlow, UK: Pearson Education Limited. 13th Edition.
3. Banerjee, Ashok. (2012). Financial Accounting: A Managerial Emphasis. New Delhi: Excel Books.
4. Jawahar Lal., & Seema Srivastava. (2014). Financial Accounting: Principles and Practices. New Delhi: Sultan Chand Publishing.
5. Gupta, R. L. & Gupta, V. K. (2022). Financial Accounting. New Delhi: Sultan Chand & Co.

Outcome Mapping

Course Outcome	Programme Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3					
CO2		3				
CO3	3					
CO4	2					
CO5	2					

SEMESTER: I SKILL BASED: I PART: IV	22UBBAS16: SALESMANSHIP	CREDIT: 2 HOURS: 2 / Week
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Course Objectives

- 1 To provide the students with various duties and responsibilities of salesman.
- 2 To learn importance of sales presentation and sales aids.
- 3 To enable them to analyse sales forecasting and its methods.
- 4 To help them to know the factors affecting sales decision.

Hours: 12

Unit I: Introduction

Salesmanship – Functions of Salesman – Importance – Duties and Responsibilities of Salesman – Qualities of a Successful Salesman.

Unit II: Essentials of Sales

Hours: 12

Essentials of Sales – Knowledge of Industry and Company – Knowledge of Products – Knowledge of Customer – Buying Motives

Unit III: Sales Presentations

Hours: 12

Sales Presentations – Sales Aids – Use of Technology in Sales – Market Survey – Importance of Market Survey to Salesman and Producer.

Unit IV: Sales Forecasting

Hours: 12

Sales Forecasting: Definition, Methods, Uses, Advantages and Disadvantages – Sales Quota.

Unit V: Sales Management

Hours: 12

Sales Management: Definition – Roles and Techniques – Sales Decisions – Factors affecting Sales Decision – Sales Force Decision – Sales Territory – Tele Marketing.

Course Outcomes

At the end of the course, the students will be able to understand

1. Duties and responsibilities of salesman.
2. Essentials of sales.
3. Importance of market survey to salesman and producer.
4. Sales forecasting.
5. Various factors affecting sales decision.

Text Books

- 1 Richard R. Still., Edward W. Cundiff., Norman A. P. Govoni., & Sandeep Puri. (2017). Sales and Distribution Management. New Delhi: Pearson Education.
- 2 Bholanath Dutta, & Girish C. (2011). Salesmanship. Mumbai: Himalaya Publishing House.
- 3 Saravanavel, P., & Sumathi. S., (2012). Advertising and Salesmanship. Chennai: Margham Publication.
- 4 William Maxwell. (2018). Salesmanship. Trieste Publishing.

5 Anil Keskar, & Suresh Abhyankar. (2020). Sales Management and Personal Selling. Mumbai: Himalaya Publishing House.

Supplementary Reading

- 1 William L. Cron, & Thomas E. Decarlo. (2009). Sales Management: Concepts and Cases. 10th Edition. New Delhi: Wiley India.
- 2 Thomas N. Ingram, Raymond W. LaForge, Ramon A. Avila. Schwepker Jr., & Michael R. Williams. (2019). Sales Management: Analysis and Decision Making. Oxfordshire, UK: Routledge. 10th Edition.
- 3 Sahu, P. K., & Raut, K. C. (2003). Salesmanship and Sales Management. New Delhi: S. Chand Publishing. 3rd Edition.

Outcome Mapping

Course Outcome	Programme Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1		3				
CO2	2					
CO3	2					
CO4			2			
CO5						3

SEMESTER: II CORE: III PART: III	22UBBAC23 BUSINESS ENVIRONMENT	CREDIT: 4 HOURS: 5 / Week
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Course Objectives

- 1 To enable the students to understand the nature of business and its environment.
- 2 To know how economic culture, culture systems influence organizations
- 3 To understand how government pertaining to business have an influence on an organization
- 4 To understand how privatization and globalization affects organizations
- 5 To enable the students to examine and evaluate the business economic systems.

Hours: 12

Unit I: Business Environment

Business Environment: Meaning – Various Environments affecting Business – Economic, Socio-Cultural, Political and Government – Competitive, Demographic. Physical and Geographical and Technological Environments

Unit II: Economic Culture

Hours: 12

Business and Society – Interface between Business and Culture – Social Responsibilities of Business: Meaning, Types – Arguments for and against Social Responsibilities – Social Audit – Business Ethics.

Unit III: Business and Government

Hours: 12

Business and Government – State Regulations on Business – New Industrial Policy – Industrial Licensing Policy.

Unit IV: Privatization and Globalization

Hours: 12

Privatization: Meaning – Ways of Privatization – Benefits – Arguments against Privatization – Pros and Cons of Liberalization and Globalization – MNC – Merits and Demerits.

Unit V: Business Economic System

Hours: 12

Business and Economic System – Socialism, Capitalism and Mixed Economy – Impacts on Business – Public Sector – Objectives – Achievements and Failures.

Course Outcomes

At the end of the course, the students will be able to

1. Acquaint with business objectives, dynamics of business and environment
2. Able to recall and relate business and society.
3. Enable to discuss the contemporary issues in business.
4. Describe concepts like business ethics, ethical dilemmas, corporate culture.
5. Acquaint with various strategies of global trade.

Text Books

1. Francis Cherunilam. (2018). Business Environment. Mumbai: Himalaya Publishing House.
2. Sachdeva. S. (2018). Business Environment. Agra: Lakshmi Narain Agarwal Educational Publishers.
3. Fernando, A. C. (2011). Business Environment. New Delhi: Pearson India Education.
4. Shaikh Saleem. (2015). Business Environment. New Delhi: Pearson India Education.
5. Aswathappa, K. (2011). Essentials of Business Environment. Mumbai: Himalaya Publishing House.

Supplementary Reading

1. Garg, V. K., & Dhingra, I. C. (2004). Basic Economics and Business Environment. New Delhi: S. Chand & Sons.
2. Sherlekar, S. A., & Sherlekar, V. S. (2021). Modern Business Organization and Management. Mumbai: Himalaya Publishing House.
3. David, L. Mothersbaugh. (2022). Consumer Behaviour: Building Marketing Strategy. New Delhi: McGraw Hill.

Outcome Mapping

Course Outcome	Programme Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3		2		2	
CO2		3		2	2	
CO3	2		3			2
CO4		3		2	2	
CO5	2		2			2

SEMESTER: II CORE PRACTICAL: I PART: III	22UBBAP24 TALLY (PRACTICALS)	CREDIT: 4 HOURS: 5 / Week
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Course Objectives

- 1 Help the students to know the fundamental concepts of Tally.
- 2 Help them to understand how to use Tally software in day to day applications.
- 3 Familiarize the students to use this package for business.
- 4 Introduce the students to some basic tools like creation of voucher, purchase order etc.
- 5 Familiarize the students in the preparation of tax related sales vouchers.

Unit I: Introduction

Hours: 12

Introduction to Tally – Selecting a Company – Shutting a Company – Altering a Company – Accounting Information – Groups – Managing Groups – Single & Group – Ledgers.

Unit II: Vouchers

Hours: 12

Vouchers – Creating Vouchers – Displaying and Altering Vouchers – Control Vouchers –Purchase Vouchers – Sales Vouchers – Payment – Receipt and Journal Vouchers – Bank Reconciliation Statement.

Unit III: Inventory Management

Hours: 12

Inventory Management – Stock Groups – Stock Categories – Stock Items – Types of Inventory Vouchers – Receipt Note Vouchers.

Unit IV: Purchase & Sales Order

Hours: 12

Purchase Orders – Creation of a Purchase Order – Altering a Purchase Order – Deleting a Purchase Order – Sales Orders – Deleting a Sales Order – Invoices Reports –Trial Balance – Profit and Loss A/c Balance Sheet.

Unit V: Pay Roll & Tax

Hours: 12

Pay Roll in Tally – Collected at Source – Tax Deducted at Sources – various Financial Statements – Budget – GST.

Course Outcomes

- 1 Using Tally to create personal business documents following current professional and/or industry standards
- 2 Create scientific and technical documents incorporating the billing procedures
- 3 Develop entries for creation of vouchers
- 4 Design bills for implementation of taxation aspects.
- 5 Design and construct financial statements after considering taxes and GST.

Text Books

- 1 Kumar, S. (2018). Tally ERP 9 with GST. New Delhi: TB Publications. 1st Edition.
- 2 Sharaddha Singh. (2018). Tally ERP 9: Power of Simplicity. New Delhi: V & S

Publishers.

- 3 Manoj Bansal, & Ajay Sharma. (2018). Computerised Accounting System. Agra: Sahitya Bhawan Publications.
- 4 Asok K. Nadhani. (2018). Tally ERP 9 Training Guide. New Delhi: BPB Publications. 4th Edition.
- 5 Parag Joshi. (2018). Tally ERP 9 with GST. New Delhi: Dnyansankul Prakashans Publications.

Supplementary Reading

- 1 Tally Education Pvt. Ltd. (2018). Official Guide to Financial Accounting using Tally ERP 9. New Delhi: BPB Publications. 4th Edition.
- 2 Navneet Mehra. (2020). GST Tally ERP 9: Power of Simplicity. New Delhi: V & S Publishers.
- 3 Namrata Agrawal. (2019). Tally.ERP 9. New Delhi: Dreamtech Press.
- 4 Bimlendu Shekhar. (2021). Tally Practical Work Book-1. 2nd Edition.
- 5 DT Editorial Services. (2020). Tally.ERP 9 with GST in Simple Steps. New Delhi: Dreamtech Press.

Outcome Mapping

Course Outcome	Programme Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1		3				
CO2		2				
CO3		3				
CO4		3				
CO5	2					

SEMESTER: II SKILL BASED: II PART: III	22UBBAS26 PRESENTATION SKILLS	CREDIT: 2 HOURS: 2 / Week
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Course Objectives

- 1 To impart knowledge to develop the presentation skills.
- 2 To help the students to make their presentations effectively.
- 3 To learn about the fundamental presentation skills.

Unit I: Introduction

Hours: 6

Presentation: Meaning, Importance – Preparing for Presentation – Guidelines for Effective Presentation – Steps in making Successful Presentation – Audio-Visual Aids.

Unit II: Presentation Skills

Hours: 6

Presentation Skills: Meaning – Planning a Presentation – Factors affecting Presentation Skills – Strategies to Overcome.

Unit III: Presentation Material

Hours: 6

Presentation Material – Need and Importance – Advantage and Disadvantage of Materials. – Articles – Precautions in the Use of Presentation Materials.

Unit IV: Audience

Hours: 6

Knowing your Audience – Types of Audience – Role of Audience in Presentation – How to handle Emergency and Panic Situations.

Unit V: Power Point Presentation

Hours: 6

Power Point Presentation – Role and Significance – Dos and Don'ts in Power Point Presentation.

Course Outcomes

At the end of the course, the students will be able to

- 1 Use and practice delivery techniques for making presentation
- 2 Structure presentation skills in order to improve presentation
- 3 Understand the importance of presentation materials
- 4 Know the audience to have effective presentation
- 5 Demonstrate the methods for power point presentation

Text Books

- 1 Steve Mandel. (2022). Effective Presentation Skills: A Practical Guide to Better Speaking. A Fifty Minute Series.
- 2 Jennifer Rotondo, & Mike Rotondo. (2001). Presentation Skills for Managers. New Delhi: McGraw-Hill Education.
- 3 Michael Stevens. (2012). How to be Better at giving Presentation. New Delhi: Kogan Page India Pvt Ltd.
- 4 Sandy McMillan. (1997). How to be a Better Communicator. New Delhi: Kogan Page India Pvt Ltd.

5 Alex, K. (2019). *Soft Skills: Know yourself and Know the World*. New Delhi: S. Chand & Co.

Supplementary Reading

- 1 Barun Mitra. (2016). *Personality Development and Soft Skills*. New Delhi: Oxford University Press.
- 2 Gajendra Singh Chauhan, & Sangeeta Sharma. (2015). *Soft Skills: An Integrated Approach to Maximise Personality*. New Delhi: Wiley.
- 3 Prashant, A. Dhanwalkar (Manusmare), Sharma, S. R., & Gunjan Sharma. (2015). *Soft Skills Developments*. Nagpur: Sai Jyoti Publication.

Outcome Mapping

Course Outcome	Programme Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3					
CO2		3				
CO3	3					
CO4	2					
CO5	2					

SEMESTER III							CIA	Uni. Exam	Total
16.	III	Core Theory	Paper-5	5	4	Production and Materials Management	25	75	100
17.	III	Core Theory	Paper-6	5	4	Financial Accounting	25	75	100
18.	III	Core Theory	Paper-7	5	4	Human Resource Management	25	75	100
19.	III	Core Theory	Paper-8	4	4	Managerial Economics	25	75	100
20.	III	ALLIED-2	Paper-3	6	3	(to choose any 1 out of 3) A. Office Management B. Service Marketing C. Tourism Management	25	75	100
21.	IV	Skill based Subject	Paper-1	3	2	Business Communication	25	75	100
22.	IV	Non-major elective	Paper-1	2	2	Management Concepts	25	75	100
				30	23		175	525	700
SEMESTER IV							CIA	Uni. Exam	Total
23.	III	Core Theory	Paper-9	5	4	Organizational Behavior	25	75	100
24.	III	Core Theory	Paper-10	5	4	Taxation	25	75	100
25.	III	Core Theory	Papr-11	5	4	Management Accounting	25	75	100
26.	III	Core Theory	Paper 12	4	4	Operations Research	25	75	100
27.	III	ALLIED-2	Paper-4	6	5	(to choose any 1 out of 3) A. Retail Management B. Project Management C. Hotel Management	25	75	100
28.	IV	Skill based Subject	Paper-2	3	2	Entrepreneurial Development	25	75	100
29.	IV	Non-major elective	Paper-2	2	2	Training and Development	25	75	100
				30	25		175	525	700
SEMESTER V							CIA	Uni. Exam	Total
30.	III	Core Theory	Paper-13	6	4	Marketing Management	25	75	100
31.	III	Core Theory	Paper-14	6	4	Business Law	25	75	100
32.	III	Core Theory	Paper-15	5	4	Research Methodology	25	75	100
33.	III	Core Theory	Paper-16	5	4	Computer Application in Business	25	75	100
34.	III	Elective	Paper-1	5	3	(To choose any 1 out of 3) A. Industrial Relations and Labour Laws B. Reward Management C. Change Management	25	75	100
35.	IV	Skill based Subject	Paper-3	3	2	E-Business	25	75	100
				30	21		150	450	600

SEMESTER III

CORE PAPER - 5

PRODUCTION AND MATERIALS MANAGEMENT

Course Objectives

1. To enable the students to understand the various process of production
2. To enable the students to be aware of techniques of Production Management
3. To familiarize students with quality control techniques used to effectively carry out Production.
4. To sensitize students on the materials management functions - planning, purchasing, store handling and vendor rating
5. To understand the inventory control techniques.

UNIT - I

Production System - Introduction - Production - Productivity - Production Management - Objectives of Production Management - Functions and scope of production management - Relationship of production with other functional areas.

UNIT - II

Production Planning and Control - Routing and Scheduling - Dispatching - Maintenance management - Types of maintenance - Breakdown - Preventive - Routine - Maintenance Scheduling. Plant Location - Introduction - Need for selecting a suitable location - Plant Location problem - Advantage of Urban, suburban and rural locations - Systems view of location - Factors influencing plant location. Plant layout - Plant layout problem - Objectives - Principles of plant layout - Factors influencing plant layout - Types of layout.

UNIT - III

Work and Method Study - Importance of work study - Work study procedures - Time study - Human considerations in work study - Introduction to method study - Objectives of method study - Steps involved in method study Work measurement - Objectives of work measurement - Techniques of work measurement - Computation of standard time - Allowance - Comparison of various techniques.

UNIT - IV

Materials - Meaning - Types - Materials Management - Definition and Functions - Importance of materials Management - Inventory control - Function of inventory - Importance - Tools of Inventory Control - ABC - VED - FSN analysis - Purchase Management - Purchasing - Procedure - Dynamic purchasing - Principles - Store planning.

UNIT - V

Store Keeping and Materials Handling - Objectives - Function of store keeping - Store responsibilities - Location of store house - Centralized store room - Equipment - Security

measures - Protection and prevention of stores - Fire and other Hazards - Bin card - Stock Cards. Vendor rating - Vendor development - Purchase Department - Responsibility - Buyer - Seller relationship - Value analysis.

TEXT BOOKS

Unit 1

Saravanavel P and Sumathi S - Production and Materials Management , Margham Publications.

Paneerselvam - Production and Operations Management - Prentice - Hall of India
Aswathappa,K - Production and Operations Management-Himalaya Publishers

Unit 2

Saravanavel P and Sumathi S - Production and Materials Management , Margham Publications.

Paneerselvam - Production and Operations Management - Prentice - Hall of India
Aswathappa,K - Production and Operations Management-Himalaya Publishers

Unit 3

Saravanavel P and Sumathi S - Production and Materials Management , Margham Publications.

Paneerselvam - Production and Operations Management - Prentice - Hall of India
Chunnawalla and Patel - Production and Materials Management

Unit 4

Saravanavel P and Sumathi S - Production and Materials Management , Margham Publications.

Paneerselvam - Production and Operations Management - Prentice - Hall of India
Menon - Stores Management MacMillan

Unit 5

Saravanavel P and Sumathi S - Production and Materials Management , Margham Publications.

Paneerselvam - Production and Operations Management - Prentice - Hall of India
Gopalakrishnan - Materials Management - Prentice - Hall of India

REFERENCE ITEMS: BOOKS AND JOURNAL

1. Harding HA - Production Management.
2. Buffa - Production Management.
3. Broom - Production Management.
4. Saxena JP -Production and Operations Management
5. SN Chari - Production and Operation Management.
6. Adam and Ebert - Production and Operations Management - Prentice - Hall of India.
7. Muhdnan - Production and Operation Management MacMillan
8. Dutta - Integrated Materials Management
9. England and Leenders - Purchasing and Materials Management
10. Varma - Materials Management

E-Materials

- <http://www.nitc.ac.in/app/webroot/img/upload/Production%20Management%20Module%201%20Course%20notes.pdf>
- https://gurukpo.com/Content/BBA/production_and_Material_Management.pdf
- http://www.vssut.ac.in/lecture_notes/lecture1429900757.pdf
- <http://www.ddegjust.ac.in/2017/Uploads/11/POM-325.pdf>
- <https://www.docsity.com/en/purchase-and-materials-management/4694923/>

Course Outcome

1. After studied unit-1, student will be able to understand the concept of operations and relationship between operations and other business functions.
2. After studied unit-2, student will be able to analyses and evaluate various production and scheduling techniques, and to identify appropriate location for factories.
3. After studied unit-3, student will be able to implement work and method study procedures.
4. After studied unit-4, student will be able to plan and implement suitable materials planning principles and practices in operations.
5. After studied unit-5, student will be able to plan and implement store keeping and material handling. Students will be able to rate vendors.

CORE PAPER - 6

FINANCIAL ACCOUNTING

Course Objectives

The primary objective of the course is to familiar the students with basic accounting principles and techniques of preparing and presenting of accounting for the user of accounting.

UNIT - I

Financial Accounting- Meaning and Definition - Accounting Concepts - Accounting Conventions - Objectives of Accounting - Rules of Accounting -Principles of Double Entry System - Book Keeping- Journal - Ledger - Subsidiary Books - Purchases Book, Sales Book, Returns Book and Cash Books.

UNIT - II

Trial Balance - Meaning and Definition - Method of Trail Balance-Depreciation - Need for Depreciation - Causes of Depreciation - Objectives of Depreciation - Straight Line And Diminishing Balance Methods Of Charging Depreciation Only.

UNIT - III

Final Accounts - Introduction - Preparation Trading Accounting - Profit and Loss Account and Balance Sheet.

UNIT - IV

Single Entry System - Definition - Salient Features - Limitations - Difference Between Double Entry and Single Entry Systems - Ascertainment of Profit - Net Worth Method Only.

UNIT - V

Company Accounts - Meaning of shares - Types of Shares-Issue, Forfeiture and Reissue of Shares - Debentures - Issue of Debentures Only.
(Weightage of Marks: Problems - 80%, Theory - 20%)

TEXT BOOKS

Unit 1

T.S. Reddy & A. Murthy - Financial Accounting , Margham Publishers
Jain.S.P- Introduction to Financial Accounting, Kalyani Publishers

Unit 2

T.S. Reddy & A. Murthy - Financial Accounting, Margham Publishers
Jain.S.P- Introduction to Financial Accounting, Kalyani Publishers

Unit 3

T.S. Reddy & A. Murthy - Financial Accounting , Margham Publishers
Maheswari.S.N - Financial and Management Accounting, Sultan Chand
Jain.S.P- Introduction to Financial Accounting, Kalyani Publishers

Unit 4

T.S. Reddy & A. Murthy - Financial Accounting, Margham Publishers
Bhattacharya- Financial Accounting for Business Managers. PHI Learning
Maheswari.S.N - Financial and Management Accounting, Sultan Chand

Unit 5

T.S. Reddy & A. Murthy - Financial Accounting, Margham Publishers
Bhattacharya- Financial Accounting for Business Managers. PHI Learning
Maheswari.S.N - Financial and Management Accounting, Sultan Chand

Reference Items: Books and Journal

1. Gupta R.L and Radhaswamy - Advanced Accounting.
2. Shukla. M.C & Grewal .T.S- Advanced Accounting.
3. Tulsian - Financial Accounting - Tata McGraw-Hill Pub.
4. N. Vinayakam & B. Charrumathi - Financial Accounting
5. Dr. S. Ganeson & S.R. Kalavathi - Financial Accounting.

E-Materials

- tudocu.com/en-gb/document/lancaster-university/principles-of-financial-accounting/lecture-notes/acf212-principles-of-financial-accounting-lecture-notes/1495870/view
- <https://ocw.mit.edu/courses/sloan-school-of-management/15-511-financial-accounting-summer-2004/lecture-notes/>
- <https://www.topfreebooks.org/principles-of-financial-accounting/>

Course Outcomes

Unit-1: The student is able to know the basic concepts of accounting, principles, convention, rules of accounting and various books of accounting.

Unit-2: The student is able to know the trail balance method, depreciation and their needs and various method of charging depreciation.

Unit-3: The student is able to know the preparation of financial accounting, procedure for preparation of trading and profit and loss accounts and balance sheet.

Unit-4: the student is able to know the need for preparation of single entry system and their uses. To know the different method for calculating the single entry system. To know the difference between single entry system with double entry system.

Unit-5: the student is able to know the meaning of shares and its types. To know the procedure for issue, reissue and forfeiture. To know the meaning debenture and its producers for issue of debenture.

CORE PAPER - 7

HUMAN RESOURCE MANAGEMENT

Course Objectives

1. To understand the concepts and basic functions of Human Resource Management.
2. To learn the implementation of employee recruitment and selection processes.
3. To acquire knowledge in the training needs and methods.
4. To understand the need and methods of performance appraisal.
5. To analyse the key issues related to Compensation, Mentoring, Career Planning, Promotion, Transfers and Termination.

UNIT - I

Definition of HRM - Objectives of HRM - Nature and scope of HRM - Principles of HRM - Difference between Personnel Management and HRM - Duties and Responsibilities of HR Managers - Qualities of HR managers - role of HR managers - importance of HRM - challenges of HRM - Evolution and Growth of HRM - Environment of HRM - Strategic HRM.

UNIT - II

Human Resource Planning - Features of HR planning - objectives - factors influencing HR planning - Recruitment - Principle of recruitment - objectives - steps involved in recruitment process - Sources of recruitment - Selection - definition - importance - process of Selection - Use of various tests - Interview techniques in selection - objectives - types - limitations - guidelines - Recruitment vs selection - Placement.

UNIT - III

Employee Training and Development - Definition - Objectives - need and importance - Identification of Training needs - essentials of good training program - characteristics Process of training - Training Methods - on the job training methods - off the job training methods - Executive development - advantages of training to employees - Techniques - effectiveness of training and development programs.

UNIT - IV

Performance Appraisal - Definition - Features - Objectives - Advantages - limitations - characteristics of an effective performance appraisal systems - Need for Performance Appraisal - Process - Methods - Traditional and modern methods of performance appraisal - merit rating - concepts and methods - BARS - Compensation.

UNIT - V

Transfer objectives - types - merits - demerits - characteristics of an effective transfer policy - Promotion and termination of services - Purpose of promotion - factors influencing promotion - types of promotion - Open and closed system of promotion - advantages, importance of promotion - demotion - Career development - Mentoring - HRM Audit - Nature - Benefits - Scope - Approaches

TEXT BOOKS

Unit 1

Dr. J. Jayasankar - Human Resource Management - Margham Publications

Dr. C.D. Balaji - Human Resource Management - Margham Publications

Aswathappa K - Human Resource and Personnel Management, Himalaya Publishing House.

Unit 2

Dr. J. Jayasankar - Human Resource Management - Margham Publications

Dr. C.D. Balaji - Human Resource Management - Margham Publications

Gupta C B - Human Resource Management - Sultan Chand & Sons.

Unit 3

Dr. J. Jayasankar - Human Resource Management - Margham Publications

Dr. C.D. Balaji - Human Resource Management - Margham Publications

Sundar & Srinivasan J - Essentials of Human Resource Management - Vijay Nicole Imprints

Unit 4

Dr. J. Jayasankar - Human Resource Management - Margham Publications

Dr. C.D. Balaji - Human Resource Management - Margham Publications

Gupta C B - Human Resource Management - Sultan Chand & Sons.

Unit 5

Dr. J. Jayasankar - Human Resource Management - Margham Publications

Dr. C.D. Balaji - Human Resource Management - Margham Publications

Murugesan G - Human Resource Management - Laxmi Publications Pvt. Ltd

Reference Items: Books and Journal

1. Memoria CB - Personnel Management
2. Subba Rao P - Human Resource Management and Industrial Relations
3. Prasad - Getting the right people - MacMillan I Ltd
4. Pattanayak - Human Resources Management - Prentice - Hall of India
5. Decenzo/Robbins - Personnel/Human Resource Management - Prentice - Hall of India
6. Saiyadain Mirza - Human Resource Management
7. Venkataratanam - Personnel Management & Human Resources
8. Saxena - Marketing Management - Tata McGraw Hill Pub
9. A. M. Sheikh - Human Resource Development & Management.
10. Dwivedi RS - Human Relations and Organization Behavior

E- Materials

- www.masters-in-human-resources.org
- alison.com › tag › human-resources
www.oxfordhomestudy.com › ... › HR

Course Outcome

After studied Unit 1, the student understands the concepts and basic functions of Human Resource Management.

After studied Unit 2, the student learns the implementation and evaluation of employee recruitment and selection processes.

After studied Unit 3, the student acquire knowledge in identifying the training needs and methods.

After studied Unit 4, the student understands the need and methods of performance appraisal.

After studied Unit 5, the student will be able to analyse the key issues related to Compensation, Mentoring, Career Planning, Promotion, Transfers and Termination.

CORE PAPER - 8
MANAGERIAL ECONOMICS

Course Objectives

1. To acquaint the students with principles of economics in managerial decision making.
2. To understand the basic concepts of managerial economics and its applications.
3. To understand the basic concepts of demand, supply, and equilibrium and their determinants. To analyse how elasticity affects the revenue.
4. To know the meaning and price output decisions of perfectly competitive firm both short and long run.
5. To understand the concepts of monopolistic and oligopolistic competition.

UNIT - I

Nature and Scope of Managerial Economics - Definition of Economics - Important concept of Economics - Basic Economic problem - Relationship between Micro and Macro economics - Managerial Economics - Nature and Scope - Objectives of the Firm.

UNIT - II

Theory of Consumer behavior - Managerial Utility Analysis indifference curve and analysis Meaning of Demand - Law of Demand - Types of Demand - Determinants of demand - Elasticity of Demand - Demand Forecasting.

UNIT - III

Production and Cost Analysis - Law of returns to scale and Economies of scale - Cost analysis - different cost concepts - Cost - output relationship - Short run and long run - Revenue curves of firms - Supply Analysis.

UNIT - IV

Pricing Methods and Strategies - Objectives - Factors - General Considerations of Pricing - Methods of pricing - Role of Government - Dual pricing - price Discrimination.

UNIT - V

Market forms - Market structure - Basis of Market classification - Output determination - Perfect Competition - Monopoly - Monopolistic Competition - Duopoly - Oligopoly.

TEXT BOOKS

Unit 1

Dr. S. Sankaran - Managerial Economics - Margham Publications

Varshney RL and Maheshwari KL - Managerial Economics. Sultaan Chand & sons

Aryamala T - Managerial Economics - Vijay Nicole Imprints Private Limited

Unit 2

Dr. S. Sankaran - Managerial Economics - Margham Publications
Varshney RL and Maheshwari KL - Managerial Economics. Sultaan Chand & sons
Mankar: Business Economics, Macmilan Ltd.,

Unit 3

Dr. S. Sankaran - Managerial Economics - Margham Publications
Varshney RL and Maheshwari KL - Managerial Economics. Sultaan Chand & sons

Unit 4

Dr. S. Sankaran - Managerial Economics - Margham Publications
Varshney RL and Maheshwari KL - Managerial Economics. Sultaan Chand & sons
Yogesh Maheshwari - Managerial Economics - Prentice-Hall of India.

Unit 5

Dr. S. Sankaran - Managerial Economics - Margham Publications
Varshney RL and Maheshwari KL - Managerial Economics. Sultaan Chand & sons
Jinghan M.L. - Micro Economics, Vrinda Publications (P) Ltd. (Theory).

Reference Items: Books and Journal

1. Dean - Managerial economics - Prentice-Hall of India.
2. Peterson - Managerial Economics - Prentice-Hall of India.
3. Mote Paul Gupta - Managerial Economics - MGH.
4. Mehta P.L. - Managerial Economics.
5. Dr. Shivani Kapoor, Prof. O Shukla - Managerial Economics - Laxmi Publication Pvt. Ltd

E-Materials

- https://www.tutorialspoint.com/managerial_economics/managerial_economics_overview.htm
- http://economicsconcepts.com/managerial_economics.htm
- <http://www.yourarticlelibrary.com/managerial-economics/managerial-economics-meaning-scope-techniques-other-details/24730>
- <https://www.edx.org/course/introduction-to-managerial-economics-2>
- <https://www.mheducation.co.uk/ebook-managerial-economics-9780077164270-emea>
- <https://epdf.pub/managerial-economics84ed28a3e234f607d8b67fd30c1104f456672.html>

Course Outcome

- After studied Unit 1, the student understands the concepts and reasons of existence of firms and optimal decision making.
- After studied Unit 2, the student learns to analyses the market supply and demand on market dynamics.
- After studied Unit 3, the student acquire knowledge on production and cost analysis.
- After studied Unit 4, the student will be able to know the applications of price discrimination.
- After studied Unit 5, the student will be able to analyse the output decision of monopolistic and oligopolistic firms.

ALLIED - 2

PAPER - 3

(to choose one out of 3)

A. OFFICE MANAGEMENT

Course Objectives:

1. To understand the concepts and basic functions of Office.
2. To know the responsibilities and skills required by the office manager.
3. To attain the knowledge of Location, Layout and the Environment of an Office.
4. To learn about various types of office furniture and its uses.
5. To attain the skill of records management.

UNIT - I

Office - Meaning and scope - Office Functions - Qualifications of Office Manager - Office Management - Definition - Elements of Office Management - Functions of Office Management.

UNIT - II

Location of an Office - Office Accommodation - Office Layout - Office Environment.

UNIT - III

Office Furniture - Factors considered in selecting office furniture - Types of office furniture - Office Appliances and Equipments - Importance - Merits and Demerits - Typewriter - Duplicators - Photo Copier - Franking Machine - Communication Equipments : Dictaphone - Intercom - Telephone - Telex - Fax - PABX - PBX - Uses of Computers in Office .

UNIT - IV

Mail service - Handling Inward Mail Service - Handling Outward Mail Service - Communications - Internal and external communication - Mechanical Devices for Oral Communication - Mechanical Devices for written Communication - Office Forms - Principles of Forms Design - Form Control - Continuous Stationery.

UNIT - V

Records Management - Objectives - Filing - Definition - Essentials of a good filing system - Centralised and Decentralised Filing System - Methods of Filing - Classification of Files - Indexing - Definition - Types.

TEXT BOOKS

Unit 1

N.S, Raghunathan - Office Management - Margham Publications

C.B.Gupta - Office Organisation and Management, Sultan Chand & Sons.

V.Balachandran and V.Chandrasekaran - Office Management - Vijay Nicole Imprints Private Limited

Unit 2

N.S, Raghunathan - Office Management - Margham Publications

C.B.Gupta - Office Organisation and Management, Sultan Chand & Sons.

V.Balachandran and V.Chandrasekaran - Office Management - Vijay Nicole Imprints Private Limited

Unit 3

N.S, Raghunathan - Office Management - Margham Publications

C.B.Gupta - Office Organisation and Management, Sultan Chand & Sons.

P.K.Ghosh - Office Management - Sultan Chand & Sons.

Unit 4

N.S, Raghunathan - Office Management - Margham Publications

C.B.Gupta - Office Organisation and Management, Sultan Chand & Sons.

P.K.Ghosh - Office Management - Sultan Chand & Sons.

Unit 5

N.S, Raghunathan - Office Management - Margham Publications

C.B.Gupta - Office Organisation and Management, Sultan Chand & Sons.

Pillai R.S.N, Bhagwathi. V - Office Management, S.Chand Publications.

Reference Items : Books and Journal

1. Denyer JC - Office Management.
2. Littlefield CL and Peterson RL - Modern Office Management.
3. Leffingonnell - Office Management.
4. Chopra PK - Office Management
5. Arora SP - Office Management
6. Dr.T.S. Devanarayan, N.S.Raghunathan - Office Management

E- Materials

- <https://www.kopykitab.com/Office-Management-by-Bagavathi-And-R-S-N-Pillai>
- https://www.researchgate.net/publication/323731787_Office_Management
- alison.com › tag › office-administration
- study.com › office_manager_courses
- snacknation.com › blog › office-manager-training

Course Outcome

After studied Unit 1, the student understands the concepts and basic functions of Office.

After studied Unit 2, the student understands the responsibilities and skills required by the office manager.

After studied Unit 3, the student attains the knowledge of Location, Layout and the Environment of an Office.

After studied Unit 4, the student gains knowledge of various types of office furniture and its uses.

After studied Unit 5, the student learns the skill of records management.

ALLIED - 2

PAPER - 3

B. SERVICES MARKETING

Course Objectives

1. To have thorough understanding of services marketing,
2. To acquire the knowledge of services strategies
3. To understand the service rendered to customers.
4. To identify and fill the service gaps.
5. To understand the challenges in managing and delivering the quality services.

UNIT - I

MARKETING SERVICES

Introduction Growth of the service sector. The concept of services. Characteristics of services - classification of services - designing of the service - blueprinting, using technology developing, human resources, building service aspirations.

UNIT - II

MARKETING MIX IN SERVICE MARKETING

The seven Ps: Product decision, pricing, strategies and tactics, promotion of services and placing or distribution methods for services. Additional dimension in services marketing - people, physical evidence and process.

UNIT - III

EFFECTIVE MANAGEMENT OF SERVICE MARKETING

Marketing demand and supply through capacity planning and segmentation - internal marketing of services - external versus internal orientation of service strategy.

UNIT - IV

DELIVERING QUALITY SERVICES

The customer expectations versus perceived service gap. Factors and techniques to resolve this gap. Gaps in services - quality standards, factors and solutions - the service performance gap - key factors and strategies for closing the gap. External communication to the customers - the promise versus delivery gap - developing appropriate and effective communication about service quality.

UNIT - V

MARKETING OF SERVICES

Marketing of services - Financial - Bank Marketing - Mutual Funds Marketing - Health - Hospital services - Hospitality - hotel services marketing - tourism marketing - airlines services marketing - travel services marketing - railway services marketing - Educational Services - training services marketing - agricultural extension services marketing.

TEXT BOOKS

Unit 1

Services Marketing - Dr. L. Natarajan, Margham Publications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Unit 2

Services Marketing - Dr. L. Natarajan, Margham Publications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Unit 3

Services Marketing - Dr. L. Natarajan, Margham Publications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Unit 4

Services Marketing - Dr. L. Natarajan, Margham Publications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Unit 5

Services Marketing - Dr. L. Natarajan, Margham Publications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Reference Items: Books and Journal

1. Service Marketing. The Indian experience - by Ravi Sankar, Manas Publications, New Delhi.
2. Delivering Quality Services - Zeithaml Parasuraman and Berry. The free press Macmillia.
3. Excellence in services - S. Balachandran, Business Publishing House, Bombay
4. Marketing of Non-Profit Organization by Philip Kotler. Printice Hall of India (P) Ltd. India New Delhi.
5. Services Marketing, Concepts, Strategies & Cases, K.Douglas Hoffman and John E.G. Bateson, Thomson South Western
6. Service Marketing, Roland T.Rust, Anthony J.Zahorik, Timothy L. Keiningham, Addison Wesley

E- Materials

- alison.com › Marketing Courses
- www.edx.org › [learn](#) › [marketing](#)
- www.oxfordhomestudy.com › marketing-courses

Course Outcome

1. After studied Unit 1, the student will have thorough understanding of services marketing,

2. After studied Unit 2, the student acquires knowledge of services strategies including service product and delivery
3. After studied Unit 3, the student gains Customer Service oriented mindset.
4. After studied Unit 4, the student learns to Identify and fill the service gaps.
5. After studied Unit 5, the student acquires in depth understanding of the challenges in managing and delivering the quality services.

ALLIED - 2

PAPER - 3

C. TOURISM MANAGEMENT

Course Objectives

1. To understand the birth, growth and development of tourism.
2. To gain knowledge in both National and International Tourism.
3. To understand the Economic and Cultural environment of tourism.
4. To know the pricing strategy of tourism industry.
5. To learn the Administrative system and Ministry of tourism.

UNIT - I

Definition of tourism and the need for tourism - meaning and nature of tourism - The birth, growth and development of tourism - basic components of tourism- elements of tourism - factors influencing growth of tourism - tourism in India and abroad.

UNIT - II

Tourism - planning - need for planning - coordination in planning - assessment of tourist demand and supply - government's role in planning - environmental planning - tourism under five year plans. Tourism marketing - concepts and importance - marketing functions in tourism - tourist marketing mix - tourist "Product"- tourist market - segmentation - its bases.

UNIT - III

Tourism and culture - tourism and people: tourism and economic development - economic benefits - regional development - tourism and growth of related industry, tourism and employment - cultural resources - cultural tourism in India - Tourism and international understanding.

UNIT - IV

Tourism pricing - methods of pricing - tourism promotion - advertising costs - steps in planning an advertising campaign - tourist publicity - sales support - Public relations - Tourist publicity.

UNIT - V

Tourism and government administrative systems - ministry of tourism - department of tourism - Indian tourism development corporation - world tourism organization - travel agents in India.

TEXT BOOKS

Unit 1

Anand M.M - Tourism and Hotel Industry in India, Prentice - Hall of India

Pran Nath Seth, Successful Tourism Management, Sterling Publishers Private Ltd

Unit 2

Anand M.M - Tourism and Hotel Industry in India
Clib SN - Perspectives of Indian Tourism in India
Pran Nath Seth Successful Tourism Management

Unit 3

Anand M.M - Tourism and Hotel Industry in India
Clib SN - Perspectives of Indian Tourism in India
Pran Nath Seth Successful Tourism Management

Unit 4

Anand M.M - Tourism and Hotel Industry in India
Clib SN - Perspectives of Indian Tourism in India
Pran Nath Seth Successful Tourism Management

Unit 5

Anand M.M - Tourism and Hotel Industry in India
Clib SN - Perspectives of Indian Tourism in India
Pran Nath Seth Successful Tourism Management

Reference Items: Books and Journal

1. Bukart A J -The Management of Tourism - William Heinemann Ltd, London
2. Butler R W - The Social Implications of Tourism Development ,
3. A.K.Bhatia Principles and Practices , Tourism Development , Sterling Publishers Private Ltd.

E- Materials

- www.shiksha.com › [hospitality-travel](#) › [travel-tourism - chp](#)
- alison.com › Business › Tourism and Hospitality Courses

- www.edx.org › [learn](#) › [tourism-management](#)

Course Outcome

1. After studied Unit 1, the student understands the birth, growth and development of tourism.
2. After studied Unit 2, the student gains knowledge in both national and international Tourism.
3. After studied Unit 3, the student acquires in depth understanding of economic and cultural environment of tourism.
4. After studied Unit 4, the student understands the pricing strategy of tourism industry.
5. After studied Unit 5, the student learns the administrative system and ministry of tourism.

SKILL BASED SUBJECT
PAPER - 1
BUSINESS COMMUNICATION

Course Objectives

1. To understand the concepts and basic functions of Communication.
2. To identify the various levels of organizational communication and its process.
3. To train the students in effective business writing.
4. To draft effective business correspondence with clarity.
5. To have knowledge of the various traditional and modern equipments used for communication.

UNIT - I

Meaning and importance of Business Communication - Methods of Communication - Types of Communication - Communication Process - Objectives of Communication - Principles of Effective Communication.

UNIT - II

Business letters - Structure of a letter - Qualities of a good business letter - Business enquiries - Offer and Quotations - Orders - Execution of orders - Cancellation of orders - Letters of Complaints - Collection letters.

UNIT - III

Circular Letters - Bank correspondence - Insurance correspondence - Letters to the Editor - Application for Situations.

UNIT - IV

Correspondence of a Company Secretary - Preparation of Agenda and Minutes - Annual Reports.

UNIT - V

Communication media - Telephone, Telex, Fax, Internet, E-Mail, Video Conferencing and Cell Phones.

TEXT BOOKS

Unit 1

N.S. Raghunathan & B. Santhanam, Business Communication, Margham Publications
Sundar K- Business Communication, Vijay Nicole Imprints (P) Ltd.,

Unit 2

N.S. Raghunathan & B. Santhanam, Business Communication, Margham Publications
Rajendra Pal and Korlehalli - Essentials of Business Communication

Unit 3

N.S. Raghunathan & B. Santhanam, Business Communication, Margham Publications
Sundar K- Business Communication, Vijay Nicole Imprints (P) Ltd.,

Unit 4

N.S. Raghunathan & B. Santhanam, Business Communication, Margham Publications
Pillai and Bagawathi - Commercial correspondence and office management.
N.S. Pandurangan, B. Santhanam - Business Communication.

Unit 5

N.S. Raghunathan & B. Santhanam, Business Communication, Margham Publications
Pillai and Bagawathi - Commercial correspondence and office management.
N.S. Pandurangan, B. Santhanam - Business Communication.

Reference Items: Books and Journal

1. Ramesh M. S. Pattan Shetty - Effective Business English and Correspondence
2. Guffey - Essentials of Business Communication
3. Gart Side L. - Modern Business correspondence.
4. Mazumder - Commercial correspondence.
5. Lesikar & Pettit - Business Communication.
6. Sharma Mohan - Business correspondence and Report writing.
7. Devaraj and Antonysamy K S - Executive Communication

E-Materials

- https://is.muni.cz/el/1456/jaro2016/MPV_COMA/um/E-book_II_Business-Communication.pdf
- <http://www.ddegjust.ac.in/studymaterial/mba/cp-105.pdf>
- <https://aqilkhans.files.wordpress.com/2011/10/business-communication.pdf>
- https://gurukpo.com/Content/BBA/Business_Communication.pdf
- <https://examupdates.in/mba-business-communication/>

Course Outcome

1. After studied Unit 1, the student understands the concepts and basic functions of Communication.
2. After studied Unit 2, the student will be able distinguish among various levels of organizational communication and its process.
3. After studied Unit 3, the student will be trained in effective business writing acquires in depth understanding of economic and cultural environment of tourism.
4. After studied Unit 4, the student will draft effective business correspondence with clarity.
5. After studied Unit 5, the student understands the various traditional and modern equipments used for communication.

NON-MAJOR ELECTIVE
PAPER - 1
MANAGEMENT CONCEPTS

Course Objectives

1. To understand the concepts related to Business.
2. To learn the roles, skills and functions of management.
3. To learn the application of the knowledge in solving organizational problems.
4. To develop optimal managerial skills in planning and in taking decisions.
5. To acquire in knowledge in Communication, Leadership, Controlling, Motivation and Delegation

UNIT - I

Management - meaning and Definition - Importance - nature - scope of management process - Role and Functions of a Manager - levels of management - Taylor's contribution - Fayol's contribution - Elton Mayo's contribution - Systems approach - Contingency approach-

UNIT - II

Planning - meaning and definition of planning - Nature of planning- Purpose of planning - Steps in planning process - Types of plans - Merits and Demerits of Planning - Objectives - nature of objectives - importance of objectives - functions of objectives - MBO - meaning and definition - nature of MBO - process of MBO - Advantages and disadvantages of MBO.

UNIT - III

Organising - meaning and definition of organizing - nature and Purpose of organizing - organizational structure - types of organisation structure - Line and Staff Organisation - Committee Organisation - Departmentation - Span of Control - meaning and definition of span of control - Delegation of Authority - difference between authority and power - types of authority - uses of authority - Centralisation and Decentralisation of Authority - elements of responsibility - differences between authority and responsibility.

UNIT - IV

Directing - nature of directing - purpose of directing - Leadership - nature of leadership - importance of leadership - functions of leadership - qualities of effective leaders - styles of leadership - Motivation - nature of motivation - importance of motivation - theories of motivation - Communication - Process of Communication - principles of effective communication - Barriers of Communication.

UNIT - V

Controlling - meaning and definition of controlling - nature of controlling - objectives of controlling - importance of controlling - Control process - technique of controlling - Co-ordination - Need of coordination - Principles of coordination - technique of coordination - requisites for excellent coordination - Approaches to achieve effective Co-ordination

TEXT BOOKS

Unit 1

1. Sundar - Principles of Management - Vijay Nicole Private Limited
2. Dr.C.D. Balaji -Principles of Management -Margham Publications
3. J.R. Beulah Bharathi, & C. Arunachalam, Principles of Management, Thakur Publications Pvt Ltd

Unit 2

1. Sundar - Principles of Management -Vijay Nicole Private Limited
2. Dr.C.D. Balaji -Principles of Management -Margham Publications
3. J.R. Beulah Bharathi, & C. Arunachalam, Principles of Management, Thakur Publications Pvt Ltd

Unit 3

1. Sundar - Principles of Management -Vijay Nicole Private Limited
2. Dr.C.D. Balaji -Principles of Management -Margham Publications
3. J.R. Beulah Bharathi, & C. Arunachalam , Principles of Management, Thakur Publications Pvt Ltd

Unit 4

1. Sundar - Principles of Management -Vijay Nicole Private Limited
2. Dr.C.D. Balaji -Principles of Management -Margham Publications
3. J.R. Beulah Bharathi, & C. Arunachalam , Principles of Management, Thakur Publications Pvt Ltd

Unit 5

1. Sundar - Principles of Management -Vijay Nicole Private Limited
2. Dr.C.D. Balaji -Principles of Management -Margham Publications
3. J.R. Beulah Bharathi, & C. Arunachalam , Principles of Management, Thakur Publications Pvt Ltd

Reference Items: Books and Journals

1. L.M. Prasad - Priniciples and Practice of Management - Margham Publication.
2. R.N. Gupta - Principles of Management - S.Chand & Co.

E-Materials

- www.managementstudyguide.com
- www.managementconcepts.com
- managementhelp.org
- [www.edx.org › learn › management](http://www.edx.org/learn/management)
- https://gurukpo.com/Content/MBA/Principles_and_Practices_of_Management.pdf
- https://www.tutorialspoint.com/management_principles/management_principles_tutorial.pdf

Course Outcome

1. After studied Unit 1, the student understand the concepts related to Business.
2. After studied Unit 2, the student learns the roles, skills and functions of management.
3. After studied Unit 3, the student analyze effective application of the knowledge to solve organizational problems.

4. After studied Unit 4, the student develop optimal managerial skills in planning and in taking decisions.
5. After studied Unit 5, the student acquires in depth knowledge in Communication, Leadership, Controlling, Motivation and Delegation

SEMESTER IV
CORE PAPER - 9
ORGANISATIONAL BEHAVIOUR

Course Objectives

1. To understand the significance of Organizational Behavior, its historical development and how an organization functions as a social system with an open influences from outside the organizations.
2. To learn the dynamics of groups in the organization: formation of groups - group characteristics - theories of group dynamics - types of groups in organization - group cohesiveness - factors influencing group cohesiveness - group decision making process - small group behavior.
3. To understand the importance of leadership and motivation in organizations: characteristics of leaders, theories and styles of leadership.
4. To know how organizational culture, organizational climate and conflicts influence the functioning of an organization
5. To know the importance of management of change in organizations. Resistance to change - concepts of social change and organizational development.

UNIT - I

Organizational behavior - meaning - Nature - importance - Role - historical development of organizational behavior - organization as a social system - socio-technical system - open system - factors influencing organizational behavior - environmental factors - constraints over organization and managerial performance.

UNIT - II

Meaning of group and group dynamics - reasons for the formation of groups - characteristics of groups - theories of group dynamics - types of groups in organization - group cohesiveness - factors influencing group cohesiveness - group decision making process - small group behavior.

UNIT - III

Leadership concept - characteristics - leadership theories - leadership styles - managerial grid - leadership continuum - leadership effectiveness. Motivation - concept and importance - motivators - financial and Non-financial - theories of motivation. Morale - Meaning - Characteristics - Determinants of Morale.

UNIT - IV

Organizational culture - Definition - Determinants of Organisational culture - Characteristics - Types - Functions. Organisational Climate - Definition - Determinants of Organisational Climate - Distinction between Organisational Culture and Organisational Climate. Organisational Effectiveness - Definition - factors influencing Organisational Effectiveness - Approaches to Organisational Effectiveness. Organisational Conflict - Definition - Features - Sources of Conflict - Different stages of conflict - Measures to stimulate conflicts.

UNIT - V

Management of change: meaning - importance - resistance to change - causes - dealing with resistance to change - concepts of social change and organizational causes - factors contributing to organizational change - organizational development - meaning and process.

TEXT BOOKS

Unit 1

Dr. C.D. Balaji - Organisational Behaviour - Margham Publications
J. Jayasankar - Organizational behavior, Margham Publications
Aswathappa. K. - Organizational behavior - HPH, Bombay.

Unit 2

Dr. C.D. Balaji - Organisational Behaviour - Margham Publications
J. Jayasankar - Organizational behavior, Margham Publications
K.Sundar and J.Srinivasan - Elements of Organisational Behaviour - Vijay Nicole Imprints Private Limited

Unit 3

Dr. C.D. Balaji - Organisational Behaviour - Margham Publications
J. Jayasankar - Organizational behavior, Margham Publications
S.S. Khanka - Organizational Behavior. S.Chand

Unit 4

Dr. C.D. Balaji - Organisational Behaviour - Margham Publications
J. Jayasankar - Organizational behavior, Margham Publications
Dr.P.K.Ghosh, Partho Ghosh - Organisation Behaviour - Laxmi publications Pvt. Ltd.

Unit 5

Dr. C.D. Balaji - Organisational Behaviour - Margham Publications
J. Jayasankar - Organizational behavior, Margham Publications
Dr.P.K.Ghosh, Partho Ghosh - Organisation Behaviour - Laxmi publications Pvt. Ltd.

Reference Items: Books and Journal

1. Sekaran, Uma - Organizational Behavior-text & cases - Tata McGraw Hill Pub Ltd., New Delhi, 1989.
2. Robbins, P.Stephen - Organizational Behavior-concepts, controversies & Applications - Prentice Hall of India Ltd., New Delhi, 1988.
3. Luthans Fred - Organizational Behavior - McGraw Hill Publishers Co. Ltd., New Delhi.
4. Rao, VSP and Narayana, P.S. - Organization Theory & Behavior - Konark Publishers Pvt. Ltd., Delhi, 1987.
5. Prasad, L.M - Organizational Theory & Behavior - Sultan Chand & Sons, New Delhi.

E-Materials

- <https://lecturenotes.in/subject/55/organizational-behaviour-ob>
- <https://examupdates.in/mba-organizational-behaviour-notes/>

- http://www.tmv.edu.in/pdf/Distance_education/BCA%20Books/BCA%20VI%20SEM/BCA-629%20OB.pdf
- https://www.tutorialspoint.com/organizational_behavior/organizational_behavior_tutorial.pdf
- https://www.researchgate.net/publication/307855834_Organisational_Behaviour_Text_Cases

Course Outcomes

1. After studied unit - 1, student will be able to know the importance of organizational behavior, its historical development - appreciate organization as a social system - socio-technical system - open system - factors influencing organizational behavior - environmental factors - constraints over organization and managerial performance.
2. After studied unit - 2, student will be able to know the dynamics of groups in organizations: reasons for the formation of groups - characteristics of groups - theories of group dynamics - types of groups in organization - group cohesiveness - factors influencing group cohesiveness - group decision making process - small group behavior.
3. After studied unit - 3, student will be able to leadership concept - characteristics - leadership theories - leadership styles - managerial grid - leadership continuum - leadership effectiveness. Motivation - concept and importance - motivators - financial and Non-financial - theories of motivation. Morale - Meaning - Characteristics - Determinants of Morale.
4. After studied unit - 4, student will be able to understand the significance of organizational culture in functioning an organization. organizational Climate Organizational Effectiveness and organizational conflicts.
5. After studied unit - 5, student will be able to learn concept of change and its significance in organizations: resistance to change - concepts of social change and organizational development.

CORE PAPER - 10

TAXATION

Course Objectives

1. To acquaint the students with basic principles of underlying provisions of direct and indirect laws
2. To develop a broad understanding of tax laws and accepted tax practices.
3. To enable students to appreciate the wider economic, social, administrative compliance and political context within which taxes are imposed.
4. To instil an awareness on students that taxes can and often do to constitute significant cost to business and households and therefore can have a major impact in economic and other decision making.
5. To provide specialised and updated knowledge in the area of GST in a systematic manner enhancing analytical and problem solving skills for decision making.

UNIT - I

Introduction about Indirect Tax - Constitutional Validity of Indirect Tax Laws- Indirect Tax Structure in India - Canons of Taxation - Difference Between Direct and Indirect Taxation - Merits and Demerits.

UNIT - II

The Central Excise Act, 1944 - Definitions of various terms relating to the Central Excise Act. - Categories of Central Excise Duties - Levy and Collection of Excise Duty - Offences and Penalties - Adjudication of Confiscation and Penalties - Administrative Set up of Excise Department

UNIT - III

Customs Duties - Definitions - Goods - Imported goods - Export goods - Levy of Customs duty - Exemptions from customs Duty - Prohibitions on importation and exportation of goods - Baggage Rules.

UNIT - IV

Authorities of Customs - Appointment of officers of customs - Appointment of Customs Ports, Airports - Refund of Customs Duty and Excise Authorities Powers - Imposition of Fines and Penalties.

UNIT - V

Goods and Services Tax (GST) - introduction - GST Need for GST in India - Salient Features - Objectives - Advantages and disadvantages - SGST and CGST - VAT and GST: A Comparison

TEXT BOOKS

Unit 1

Dinkar Pagare, Business Taxation, Sultan Chand & Sons, New Delhi.
Balachandran V, Indirect Taxation, Sultan Chand & Sons, New Delhi.

Unit 2

Dinkar Pagare, Business Taxation, Sultan Chand & Sons, New Delhi.
Balachandran V, Indirect Taxation, Sultan Chand & Sons, New Delhi.

Unit 3

Dinkar Pagare, Business Taxation, Sultan Chand & Sons, New Delhi.
Govindan M.S, Indirect Taxes Made Easy, Sitaraman& Co, Chennai.

Unit 4

Dinkar Pagare, Business Taxation, Sultan Chand & Sons, New Delhi.
Datey V.S, Indirect Taxes, Taxman Publications, New Delhi.

Unit 5

Dinkar Pagare, Business Taxation, Sultan Chand & Sons, New Delhi.
Jayakumar.A, Indirect taxes, Learntech Press, Trichy.

References Items : Books and Journal

1. Basic Concepts and Features of Good and Service Tax In India' Girish Garg, International Journal of scientific research and management (IJSRM) ||Volume||2||Issue||2||Pages||542- 549||2014||
2. A Primer on Goods and Services Tax in India, published by Centre for Budget and Governance Accountability, 2011
3. Goods And Service Tax - An Introductory Study, CA. Sudhir Halakhandi, April 2007 The Chartered Accountant p. 1595-1601
4. Indirect Tax: Materials and modules drawn by Institute of Chartered Accountants of India
5. K Vaitheeswaran, Students Handbook on Indirect Taxes, Snow White Publications Pvt. Ltd.
6. For Indirect taxes by Institute of Company Secretaries of India.
7. P. Verra Reddy, Central Excise Manual (Law and Procedure), Asia Law House
8. Mukhopadhyay, Essays on Indirect Taxation, Manupatra Information Solutions Pvt Ltd. V S Datey, Student's Guide to Service Tax and VAT, Taxman Allied Services Pvt. Ltd. Books in India.
9. V. Nagaragan, Indirect Taxes, Asia Law House

E-Materials

- www.cbec.gov.in
- www.icai.org
- www.taxlawsonline.com
- www.taxguru.com
- www.tax4india.com/vat/vat.html
- www.india.gov.in/citizen/salestax.php
- www.indiataxes.com
- www.indialawnews.com

Course Outcomes

After studied Unit-1 student will be able to understand the concept of indirect tax and to know current taxation structure prevailing in India.

After studied Unit-2 student will be able to understand the concepts of central sales taxes in India and to know the categories of collection taxes and offence and penalties for not paying sales taxes.

After studied Unit-3 student will be able to understand the concepts of custom duties and know the different meaning of goods. To know the levy of customs and exemption of goods and levy rules.

After studied Unit-4 student will be able to understand the Authorities of customs and excise officers and refund of customs duty and imposing of fines etc.,

After studied Unit-5 student will be able to understand the concept of goods and service tax and to know the different rate of taxes for various goods and services and find the difference VAT and GST

CORE PAPER - 11
MANAGEMENT ACCOUNTING

Course Objectives

1. The objective of the course is to familiarize the students with basic management accounting concept and gain knowledge in marginal costing.
2. Apply the financial perspective of accounting for cost. Identify problems associated with relying on financial accounting information for internal decision making.
3. Organize cost information according to the decision-making needs of the organisation

UNIT - I

Management Accounting - Definition - Objectives and functions - Advantages and limitations - Distinction between Financial Accounting and Management Accounting - Meaning of Financial statements - Tools of Financial Statement Analysis - Comparative Financial Statements - Common Size Financial Statements - Trend Percentages.

UNIT - II

Ratio Analysis: Meaning - Definition - Significance - Limitations - Classification - Liquidity Ratios (Short Term Solvency Ratios) and Long term Solvency Ratios.

UNIT - III

Budget and Budgetary Control - Objectives - uses - limitations - preparation of production, sales, purchase, cash and flexible budget.

UNIT - IV

Fund Flow Analysis: Meaning - Definition - Uses of Fund Flow Statement - Limitations of Fund Flow Statement - Preparation of Fund Flow Statement - marginal costing - definition - advantages and disadvantages - marginal cost statement - contribution - cost - volume profit analysis - P/V ratio - BEP - margin of safety.

UNIT - V

Cash flow Analysis: Meaning - Definition - Uses of Cash Flow Statement - Limitations of Cash Flow statement - Distinction between Fund Flow Statement and Cash Flow Statement - Preparation of Cash Flow Statement.

(Weightage of Marks: Problems - 80%, Theory - 20%)

TEXT BOOKS

Unit 1

T.S. Reddy & Hari Prasad Reddy - Management Accounting - Margham Publications.

Murthy A and Gurusamy S - Management Accounting :Theory and Practice - Vijay Nicole Imprints Private Limited

Unit 2

T.S. Reddy & Hari Prasad Reddy - Management Accounting - Margham Publications.
Murthy A and Gurusamy S - Management Accounting: Theory and Practice - Vijay Nicole Imprints Private Limited

Unit 3

T.S. Reddy & Hari Prasad Reddy - Management Accounting - Margham Publications.
Manmohan & Goyal - Management Accounting - Saithya Bhavan, Agra.

Unit 4

T.S. Reddy & Hari Prasad Reddy - Management Accounting - Margham Publications.
R.S. Pillai & Bhagavathi - Management Accounting - S. Chand & Co. Ltd, New Delhi.

Unit 5

T.S. Reddy & Hari Prasad Reddy - Management Accounting - Margham Publications.
S.N. Maheswari - Management Accounting - Sultan Chand & Sons, New Delhi.

Reference Items: Books and Journal

1. S.P. Gupta - Management Accounting - Sultan Chand & Sons, New Delhi.
2. T.S. Reddy & Hari Prasad Reddy - Management Accounting - Margham Publications, Chennai.
3. R.S.N. Pillai & Bhagavathi - Management Accounting - S. Chand & Co. Ltd., New Delhi.
4. S.P. Jain and Narang - Cost Accounting - Kalyani Publishers, New Delhi.

E-Materials

- http://ebooks.ipude.in/commerce/mcom/term_1/DCOM302_DCOM403_MANAGEMENT_ACCOUNTING.pdf
- http://www.pondiuni.edu.in/storage/dde/downloads/finiii_ma.pdf
- <http://www.gbv.de/dms/zbw/613659759.pdf>
- <http://164.100.133.129:81/econtent/Uploads/Management & Financial Accounting.pdf>

Course Outcome

After studied Unit - 1, Students should acquire the basic knowledge required for application of tools for decision making. To know the financial statement analysis and its tools.

After studied Unit - 2, Describe the fundamental concepts of ratio analysis and uses of ratios. To know short-term and long term solvency ratios.

After studied Unit - 3, students is able to know the budgets and budgetary control. To know the various methods of preparing the budget and its purposes, finally to know the objectives for preparing the budgets.

After studied Unit - 4, student is able to know the concept of fund flow management and its objectives. To know the meaning of marginal costing techniques for decision making process. To know the various method to find out the profit and to select the projects.

After studied Unit - 5, the student is able to know the meaning of cash flow statement and its significance. To know the distinction between cash flow and fund flow statement, finally to know the method for preparing the cash flow statement.

CORE PAPER - 12
OPERATIONS RESEARCH

Course Objectives

1. To familiarize students with the basic concepts in Operation Research
2. To make students understands various tools and techniques like LPP Transportation.
3. To Know principles of construction of mathematical models situations and Mathematical analysis methods of operation research
4. To be able to choose rational options in practical decision making problems using standard mathematical models of operations research
5. To have skills in analysis of operations research objectives mathematical methods and computer systems

UNIT - I

Operation Research - origin - Definition - various model and Modeling - Application and Scope - Merits and demerits. Linear Programming Characteristics - Formulation Graphical Method. Solution to Graphical method Alternative method of solving LPP - (Simple Problems).

UNIT - II

Assignment Problems - Definition, Type of assignment problems, formulation and solutions Assignment Problems. Transportation model Introduction, Definition, Types of transportation problem, methods to solve transportation problem - Degeneracy - Methods of finding initial Basic Feasible Solution - Simple Problems.

UNIT - III

Game Theory - Introduction, terminologies of game theory, game with mixed and pure strategies, Values of Game - Optimum Strategy - with Saddle Point, without saddle point - dominance property (rule), graphical method of solving game.

UNIT - IV

Sequencing - Introduction, sequencing problems, processing n jobs to two machines, processing n jobs to three machines, processing two jobs through m machine, processing n jobs through m machine. Replacement models - Introduction, individual replacement policy, group replacement policy, miscellaneous replacement problems (basic problems).

UNIT - V

Networking - Introduction, critical path method (CPM), Problem Evaluation and Review Technique (PERT), Construction of network diagram - Slack critical path, basic difference PERT and CPM (basic problems)

Proportion of Theory and Problem: 30:70

TEXT BOOKS

Unit - 1

Dr. P.R. Vittal Operations research - Margham Publications.

Gurusamy S - Elements of operation Research - Vijay Nochole Imprints (P) Ltd.

Unit - 2

Dr. P.R. Vittal Operations research - Margham Publications.

Gurusamy S - Elements of operation Research - Vijay Nochole Imprints (P) Ltd.

Unit - 3

Dr. P.R. Vittal Operations research - Margham Publications.

Prem kumar Gupta & D.S.Hira, Operations research - S. Chand & Company

Unit - 4

Dr. P.R. Vittal Operations research - Margham Publications.

R. Paneerselvam, Operations research - PHI Learning Pvt. Ltd.

Unit - 5

Dr. P.R. Vittal Operations research - Margham Publications.

J.K. Sharma, Operations research - Laxmi Publications pvt.Ltd.

Reference Items: Books and Journal

1. Hamdy A.Taha, Operations Research, Prentice Hall of India, New Delhi, 2007.
2. KantiSwarup, P.K.Gupta, Manmohan, Operations Research, Sultan Chand & Sons, New Delhi, 2008.
3. Sasieni, Arthur Yaspan, Lawrence Friedman, Operations Research Methods and Problems, Wiley International Edition, 1959.
4. S.D. Sharma, Operations Research, Kedarnath Ram Nath & Co Publishers, 15thEdition 2007.
5. Gurusamy S - Operations Research - Vijay Nichole Imprints (P) Ltd.

E- Materials

- <file:///C:/Users/Welcome%20Friend/Downloads/14b14198b6e26157b7eba06b390ab763-original.pdf>
- <https://examupdates.in/operation-research-notes/>
- <https://easyengineering.net/operations-research-p-ramamurthy/>

Course Outcome

1. Identify and develop operational research models from the verbal description of the real system
2. Knowledge and understanding the characteristics
3. Understand the mathematical tools that are needed to solve optimization problems
4. Use mathematical tools to solve the proposed model
5. Develop the report that describes the and the solving and techniques, analysis the result an propose recommendations.

ALLIED - 2

PAPER - 4

(to choose one out of 3)

A. RETAIL MANAGEMENT

Course Objectives

1. To illustrate the functions of retailers and to explain the significance of retails as an industry.
2. To know the steps involved in choosing a location for retail stores.
3. To understand the concept of retails marketing mix.
4. To know the concept of retail pricing and factors affecting it.
5. To analyze the key concepts of retails supply chain management

UNIT - I

Definition and scope of retailing - significance - prospects of retailing in India - types of Retailers - characteristics - functions - types of ownership - Franchising

UNIT - II

Location - importance - levels - Determining factors - site selection - factors affecting the demand - store layout - objectives - space planning

UNIT - III

Buying system - objectives - inventory management - budget plan- branding strategies - sourcing decision - connecting with vendors - negotiating - maintaining relationship with vendors.

UNIT - IV

Pricing strategies - objectives - methods - pricing - approaches for setting prices - external factors influencing pricing

UNIT - V

Retail automation and supply chain management - integrated supply chain - retail technology - vending - online retailing

TEXT BOOKS

Unit - 1

Gibson G. Vedamani - Retail Management 4th Edition Jaico Publication 2015

Swapna Pradhan - Retailing Management 4th Edition Tata Mc Graw Hill Education Pvt Ltd 2007

Boom Halpeth, Veena Prasad - Retail Management Himalaya Publishing House - 2017

Unit - 2

Gibson G. Vedamani - Retail Management 4th Edition Jaico Publication 2015

Swapna Pradhan - Retailing Management 4th Edition Tata Mc Graw Hill Education Pvt Ltd 2007

Boom Halpeth, Veena Prasad - Retail Management Himalaya Publishing House - 2017

Unit - 3

Gibson G. Vedamani - Retail Management 4th Edition Jaico Publication 2015

Swapna Pradhan - Retailing Management 4th Edition Tata Mc Graw Hill Education Pvt Ltd 2007

Boom Halpeth, Veena Prasad - Retail Management Himalaya Publishing House - 2017

Unit 4

Gibson G. Vedamani - Retail Management 4th Edition Jaico Publication 2015

Swapna Pradhan - Retailing Management 4th Edition Tata Mc Graw Hill Education Pvt Ltd 2007

Boom Halpeth, Veena Prasad - Retail Management Himalaya Publishing House - 2017

Unit 5

Gibson G. Vedamani - Retail Management 4th Edition Jaico Publication 2015

Swapna Pradhan - Retailing Management 4th Edition Tata Mc Graw Hill Education Pvt Ltd 2007

Boom Halpeth, Veena Prasad - Retail Management Himalaya Publishing House - 2017

Reference Items: Books and Journal

1. Retail Management: Text and Cases U.C. Mathur, ISBN: 9789389307436 International Publishing House Pvt Ltd.
2. Retail Management: A Strategic Approach, Barry Berman Pearson Education.
3. Retail Management, Global Edition Joel Evans & Barry R. Berman Pearson Education.

E-Materials

- <https://www.wileyindia.com/retail-management-text-and-cases.html>
- https://books.google.co.in/books/about/RETAILING_MANAGEMENT_TEXT_CASES.html?id=nxwE_n1z0NQC&redir_esc=y
- <https://www.sapnaonline.com/books/retail-management-text-cases-sk-baral-8174734449-9788174734440>
- http://www.crectirupati.com/sites/default/files/lecture_notes/Retail%20Management.pdf
- http://newhorizonindia.edu/nhc_kasturinagar/wp-content/uploads/2018/01/VI-SEM-BBA-Retail-Mgt.-notes.pdf

Course Outcome

1. After studied Unit 1, the student will understand the concepts and functions of retailer .
2. After studied Unit 2, the student will gain knowledge about retail property development in India.
3. After studied Unit 3, the student will apply the technology tool that aid merchandise planning.
4. After studied Unit 4, the student will be able to determine retails pricing strategies.
5. After studied Unit 5, the student will be able to identify the opportunities offered in retail as a career.

PAPER - 4

B. PROJECT MANAGEMENT

Course Objectives

1. To familiarize the students with the steps involved in managing a project
2. To help the students to identify feasible projects, the methods of financing such projects and controlling its cost.
3. To recognize issues in a realistic project scenario.
4. To discuss the implementation of project planning and organization.
5. To demonstrate the use of appropriate source of funds in project evaluation and review in projects

UNIT - I

Project - Meaning - Definition - Project Management - Meaning - Definition - Characteristics - Process - Benefit - Project Life Cycle - Classification - Scope and Significance - System Approach - Project Manager - Skills, Role and Responsibilities

UNIT - II

Project Analysis - Market and Demand Analysis - Feasibility Analysis - Technical Analysis - Financial Analysis - Break-Even Analysis - Profitability Analysis - Risk Analysis - Social Analysis - Benefit Analysis

UNIT - III

Project Planning and Organisation - Development of Project Organisation - Forms of Project Organisation - Planning the project Organisation - Structure - Modular Approach to Project Management - Effective and Ineffective Project Management.

UNIT - IV

Project Finance - Sources - Institutional Finance to Entrepreneurs - Financial Institutions - working Capital Management - Incentives and Subsidies.

UNIT - V

Project Evaluation - Techniques for Project Evaluation and Review - Project Control - Performance Control - Cost Control - Control during stages of Project.

TEXT BOOKS

Unit - I

P.Saranavel - Project Mangement - Margham Publications.

Vasant Desai - Project Management - Himalaya Publishing House

Unit - II

P.Saranavel - Project Mangement - Margham Publications.

V.C. Sontakki - Project Management - Himalaya Publishing House

Unit - III

P.Saranavel - Project Mangement - Margham Publications.
Project Management - Choudhary - Tata McGraw Hill Pub.

Unit - IV

P.Saranavel - Project Mangement - Margham Publications.
V.C. Sontakki - Project Management - Himalaya Publishing House

Unit - V

P.Saranavel - Project Mangement - Margham Publications.
Vasant Desai - Project Management - Himalaya Publishing House

Reference Items: Books and Journal

1. Clifford F Gray - Project Management: The Managerial Process (Special Indian Edit.), Oregon State University.
2. Harvey Maylor -Project Management

E- Materials

- <https://www.studocu.com/in/document/guru-gobind-singh-indraprastha-university/bachelors-of-business-administration/lecture-notes/project-management-notes/3321296/view>
- <http://rccmindore.com/wp-content/uploads/2015/06/Project-Management-1.pdf>
- http://ebooks.lpude.in/management/bba/term_5/DMGT302_FUNDAMENTALS_OF_PROJECT_MANAGEMENT.pdf
- <https://www.bachelorsportal.com/studies/220929/business-administration-project-management.html>

Course Outcomes

1. After studied unit-1, the student will be able to apply the fundamentals of project management in their job.
2. After studied unit-2, the student will be able to analyze the projects on various aspects.
3. After studied unit-3, the student will be able to plan and design the approach to project management.
4. After studied unit-4, the student will be able to know about the information on financial sources and project financial institutions.
5. After studied unit-5, the student will be aware of becoming a better project manager.

ALLIED - 2

PAPER - 4

C. HOTEL MANAGEMENT

Course Objectives

1. To provide students with a detailed knowledge on the origin, history and operations of the hospitality industry.
2. To make students to understand the various departments that are operating in the hotels
3. To make students familiar about various job positions, duties and responsibilities of staffs
4. To familiarize students about various equipment's, machineries software applications that are existing in the hotel industries
5. To provide insight into hotel products, guest needs, pricing, marketing, promotion, overall control etc
6. To make students to understand about licensing laws, governments regulations, food and beverage dispensing rules and procedures

UNIT - I

Hotel industry - introduction and evolution - classification of hotels - types of accommodation - intermediary accommodation, grouping of accommodation - Development of Hotel Industry in India - industry define - early history of hotel industry - Hotel Industry vs. Tourism Industry.

UNIT - II

Characteristics of hotels - Major and minor departments in the hotels and its activities. Duties and responsibilities of various department staffs - Major and minor equipment's and tools in various departments, its usage and operations

UNIT - III

Types of hotel guests and their needs - Selection of hotel-Room rates - Hotel brochures and tariffs - Property Management systems - Reservation Management system - Revenue Management system - Guest account Management system - General Management system - Back office and system

UNIT - IV

Marketing functions at its relevance to Hotel Industry - Model of consumer market - Personal characteristics affecting consumer behaviour - Buyers decision process - Defining Customer Value and Satisfaction - Relationship Marketing - Retaining Customers - sales - purchasing - storage system - industry levels - ordering levels - costing - recipe costing - menu pricing - hotel security.

UNIT - V

License - permission from authorities - Labor Department - City corporations - police - State
Exercise - Department of Tourism - ESI - food and beverage service - problems and
prospects of Hotel Industry.

Text Books

Unit-1

Hotel Front office Training Manual-Sudhir Andrews
Hotel Food and Beverage Service Training Manual Sudhir Andrews
Hotel House Keeping Training Manual Sudhir Andrews
Principles of Cookery
Modern Cookery Vol 1, 2-Thangam -E-Philip

Unit-2

Catering Management
Food and Beverage Service-Dennis.R.Lillicrap & John A Cousins
Hotel Housekeeping management-Branson & Lennox
Front office management

Unit-3

Catering Management-Vijay Dhawan
Front office management

Unit-4

Philip Kotler et. all - Marketing for Hospitality and Tourism, Prentice Hall, 2003
Derek Taylor - Hospitality Sales & Promotion Strategies for Success, Reed Educational
& Professional Publishing Ltd., 2001
Cooper et. all - Tourism; Principles and Practice, Prentice Hall, 1998
Bill Marvin - Guest based Marketing - How to increase restaurant sales without breaking
your budget, John Wiley & Sons, 1997

Unit-5

Lea R. Dopson & et al.(2008). Food And Beverage Cost Control. John Wiley & Sons,
Inc., Hoboken, New Jersey

Reference Items: Books and Journal

1. Hotel Front office Training Manual-Sudhir Andrews
2. Hotel Food and Beverage Service Training Manual Sudhir Andrews
3. Hotel House Keeping Training Manual Sudhir Andrews
4. Principles of Cookery
5. Modern Cookery Vol 1, 2-Thangam -E-Philip
6. Catering Management-Vijay Dhawan
7. Food and Beverage Service-Dennis.R.Lillicrap & John A Cousins
8. Hotel Housekeeping management-Branson & Lennox
9. Front office management
10. Philip Kotler et. all - Marketing for Hospitality and Tourism, Prentice Hall, 2003
11. Derek Taylor - Hospitality Sales & Promotion Strategies for Success, Reed Educational
& Professional Publishing Ltd., 2001
12. Cooper et. all - Tourism; Principles and Practice, Prentice Hall, 1998
13. Bill Marvin - Guest based Marketing - How to increase restaurant sales without breaking
your budget, John Wiley & Sons, 1997
14. Lea R. Dopson & et al.(2008). Food And Beverage Cost Control. John Wiley & Sons,
Inc., Hoboken, New Jersey

E- Materials

- https://www.academia.edu/1408229/Hotel_management_and_operations
- https://www.boeken.com/file/ebooksample/9789001878917_h1.pdf
- <https://www.university.youth4work.com/study-material/hotel-management-lecture>

Course Outcomes

1. After the completion of the Unit 1, students will be able to;
 - Understand the historical background of hospitality industry.
 - Appreciate how hotel operates.
 - Identify factors for classifying hotels.
 - Recognize the organizational structure of hotels.
 - Understand the relationship between hotel industry and tourism
2. After completion of the Unit 2, students will be able to;
 - Understand the Major and the minor departments in the hotels
 - Activities that are performed in various departments in the hotels
 - Analyze the importance of inter-departmental communication in hotel operation.
 - Know the duties and responsibilities of staffs working in various departments in the hotels
 - Understand and operate various tools and equipment's used in the hotels.
3. At the end of the Unit 3 students shall be able to:-
 - Understand the different types of guests and their needs
 - Describe guest services and guest accounting tasks appropriate to hotels
 - Identify basic features of front office applications common to property Management system.
 - Explain the function and operation of the various systems such as PMS, RMS, RVMS, GAMS, GMS, etc
 - Understand about the back office management system and its procedures
4. At the end of the Unit 4 the students will be able;
 - To get acquainted with the underlining principles and concepts of marketing and their relevance in hospitality industry
 - To help students understand the different marketing tools to be used in order to create and deliver superior customer value
 - To help students acquire the wisdom of developing an effective hospitality marketing program.
 - To help students see how the marketing mix is applied in a hospitality industry.
5. After the completion of the Unit 5 students shall be able to:-
 - Understand the licensing laws and regulations of the hospitality industries
 - Identify the inspection safety and regulatory bodies
 - Analyze the local area rules and the concerned departments pertaining to license, its renewal and other formalities.
 - Identify the various problems that encounter in the food and beverage service operations

SKILL BASED SUBJECT
PAPER - 2
ENTREPRENEURIAL DEVELOPMENT

Course Objectives

1. To understand the meaning of the term Entrepreneurship
2. To know the history of the concept and identify the changing trends in the business.
3. To know the problems of entrepreneur with the focus on women/ rural/ and small scale entrepreneur.
4. To understand the role placed by government in promotion and develop of entrepreneur and prepare project report.
5. To motivate students to become entrepreneur.

UNIT - I

Introduction - Understanding the meaning of Entrepreneurship - Characteristics of an Entrepreneur - Classification of the Entrepreneurs - Entrepreneurial Scene in India - Factors influencing Entrepreneurship - Functions of an Entrepreneur

UNIT - II

Entrepreneurial growth - Role played by government and Non-Government agencies in promoting Entrepreneurship - Entrepreneurship Development Programmes - SISI, TIIC, SIDBI, DIC, NSIC, IDBI, IFCI Problems of Entrepreneurs: Women entrepreneurs - Rural Entrepreneurs - Small scale entrepreneurs and Export Entrepreneurs.

UNIT - III

How to enter into Market? - Business idea generation Techniques - Identification of Business Opportunities - Marketing Feasibility - Financial Feasibility - Technical Feasibility - Legal Feasibility.

UNIT - IV

Project Appraisal - Methods - Techniques - Preparation of Business Plan - Content of a Business Plan - Project Report.

UNIT - V

Procedure for starting an enterprise - factors involved in selecting new unit - Franchising and Acquisition - Qualities of successful Entrepreneurs - Case Study

TEXT BOOKS

Unit - 1

Jayashree Suresh, Entrepreneur Development, Margham Publications
Khanka - Entrepreneurial Development - S.Chand

Unit - 2

Jayashree Suresh, Entrepreneur Development, Margham Publications

Unit - 3

Jayashree Suresh, Entrepreneur Development , Margham Publications

Unit - 4

Jayashree Suresh, Entrepreneur Development, Margham Publications

Unit - 5

Jayashree Suresh, Entrepreneur Development, Margham Publications

Khanka - Entrepreneurial Development - S.Chand

Reference Items: Books and Journal

- 1 Saini - Entrepreneurship: Theory & Practice, Deep and Deep Publications.
2. Gupta CB - Entrepreneurial Development. Sultan Chand & Sons,
3. Vasant Desai - Dynamics of Entrepreneurial Development and Management.

E- Materials

- <https://www.freebookcentre.net/business-books-download/Entrepreneurial-Development.html>
- https://books.google.co.in/books/about/Entrepreneurial_Development.html?id=rYLd2d6HJisC
- <https://www.krishipanth.com/entrepreneurship-development-pdf-book/>

Course Outcome

1. After studied unit-1, the student will be able to understand the enterprise, entrepreneur and entrepreneurship.
2. After studied unit-2, the student will be able to get the complete picture of government programs available for entrepreneurs.
3. After studied unit-3, the student will be able to understand and prepare business plan make presentation.
4. After studied unit-4, the student will be able to write project report for starting an entrepreneurs.
5. After studied unit-5, the student will be able to assess the qualities of an entrepreneurs and learn to be a successful entrepreneur.

NON-MAJOR ELECTIVE
PAPER - 2
TRAINING AND DEVELOPMENT

Course Objectives

1. To know the in-depth understanding of the role of training.
2. To know the methods of training.
3. To understand the concepts of career development .
4. To know the important concepts used in management development and process and MD programme.
5. To know the institutions offering training programmes in India.

UNIT - I

Concepts of Training and development - Identifying Training Needs - Structure and Functions of Training Department - Evaluation of Training Programme - Role, Responsibilities and Challenges to Training Managers

UNIT - II

Techniques of on the job training - Coaching - Apprenticeship - Job Rotation - Job Instruction Training - Training by Supervisors - Techniques of off the job Training, Lecturers, Conferences, Group Discussion.

UNIT - III

Concept of Career - Career Stages - Career Planning - Need - Importance - Steps in Career Planning - Career Development - Characteristics - Need - Methods of Career Planning and Development.

UNIT - IV

Management Development - Meaning - Definition - Need and importance of Management Development - Characteristics - Levels - Management Development Process and Components of MD Programme.

UNIT - V

Need for Training in India - Government Policy on Training - Training Institutes in India - Management Development Institute.

TEXT BOOKS

Unit-1

Thirumaran D, V.Santhosh - Training and Development, Thakur Publishers Chennai.

Unit-2

Thirumaran D, V.Santhosh - Training and Development, Thakur Publishers Chennai.

Unit-3

Thirumaran D, V.Santhosh - Training and Development, Thakur Publishers Chennai.

Unit-4

Thirumaran D, V.Santhosh - Training and Development, Thakur Publishers Chennai.

Unit-5

Thirumaran D, V.Santhosh - Training and Development, Thakur Publishers Chennai.

Reference Items: Books and Journal

1. Lalitha Balakrishnan& Gowri Ramachandran - Training & Development - Vijay Nicole Imprints Pvt. Ltd.
2. Rao PL: HRD through In-House Training, New Delhi, Vikas Publishing House (P) Ltd.,
3. Reid M.A.: Training Interventions: managing Employee Development London, IPM, 3 rd ed., 1992.
4. Aggarwala, D.V., Manpower Planning, Selection, Training and Development, New Delhi, Deep & Deep Publications (P) Ltd., 1999.

E- Materials

- <https://www.mbaskool.com/business-concepts/human-resources-hr-terms/8685-training-and-development.html>
- <https://businessjargons.com/training-and-development.html>
- <https://corporatefinanceinstitute.com/resources/careers/soft-skills/employee-training-and-development/>
- http://ebooks.lpude.in/management/mba/term_4/DMGT518_TRAINING_AND_DEVELOPMENT_SYSTEM.pdf
- <http://www.pondiuni.edu.in/sites/default/files/training-development-260214.pdf>
- <https://www2.le.ac.uk/projects/oer/oers/psychology/oers/Training%20and%20Development%20Introduction%20and%20Overview/Training%20and%20Development%20Introduction%20and%20Over>

Course Outcomes

1. After studied unit-1, the student will be able to learn the basic concepts of training, identify training needs and functions of training department.
2. After studied unit-2, the student will be able to know the various on-the-job and off the job techniques of training.
3. After studied unit-3, the student will be able to have a clear picture about their career planning and development.
4. After studied unit-4, the student will be able to understand the different techniques of management development programme.
5. After studied unit-5, the student will be able to know the information about the different management training institutes in India.

SEMESTER III							CIA	Uni. Exam	Total
17.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
18.	II	English	Paper-3	6	4	English	25	75	100
19.	III	Core Theory	Paper-6	5	4	Financial Accounting	25	75	100
20.	III	Core Theory	Paper-7	5	4	Human Resource Management	25	75	100
21.	III	ALLIED-2	Paper-3	4	3	(to choose any 1 out of 3) A. Office Management B. Service Marketing C. Tourism Management	25	75	100
22.	IV	Skill based Subject	Paper-1	2	2	Business Communication	25	75	100
23.	IV	Non-major elective	Paper-1	2	2	Management Concepts	25	75	100
				30	23		175	525	700
SEMESTER IV							CIA	Uni. Exam	Total
24.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
25.	II	English	Paper-4	6	4	English	25	75	100
26.	III	Core Theory	Paper-9	5	4	Organizational Behavior	25	75	100
27.	III	Core Theory	Papr-11	4	4	Management Accounting	25	75	100
28.	III	ALLIED-2	Paper-4	5	5	(to choose any 1 out of 3) A. Retail Management B. Project Management C. Hotel Management	25	75	100
29.	IV	NMSDC II : Digital Skills for Employability	Paper-2	2	2	Office Fundamentals	25	75	100
30.	IV	Non-major elective	Paper-2	2	2	Training and Development	25	75	100
				30	25		175	525	700
SEMESTER V							CIA	Uni. Exam	Total
31.	III	Core Theory	Paper-13	6	4	Marketing Management	25	75	100
32.	III	Core Theory	Paper-14	6	4	Business Law	25	75	100
33.	III	Core Theory	Paper-15	5	4	Research Methodology	25	75	100
34.	III	Core Theory	Paper-16	5	4	Production and Management	25	75	100

35.	III	Elective	Paper-1	5	3	(To choose any 1 out of 3) A. Industrial Relations and Labour Laws B. Reward Management C. Change Management	25	75	100
36.	IV	Skill based Subject	Paper-2	3	2	E-Business	25	75	100
				30	21		150	450	600
SEMESTER VI							CIA	Uni. Exam	Total
37.	III	Core Theory	Paper-17	6	5	Strategic Management	25	75	100
38.	III	Core Theory	Paper-18	6	5	International Business	25	75	100
39.	III	Core	Paper-19	6	5	Individual Project *Viva-Voce ** Project Report	25*	75**	100
40.	III	Elective	Paper-2	5	3	(to choose any 1 out of 3) A. Financial Management B. Financial Services C. Investment Management	25	75	100
41.	III	Elective	Paper-3	5	3	(to choose any 1 out of 3) A. Marketing Research B. Rural Marketing Management C. Advertising and Sales Management	25	75	100
42.	III	NMSDC III : Digital banking and Audit Essentials for Employability	Paper-3	2	2	Fintech Course	25	75	100
43.	V	Extension Activities		0	1	Extension Activities	100	0	100
		Total		30	24		150	450	700
					142				4200

SEMESTER V

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: V

Paper type: Core Theory

Paper code: CBA51 Marketing Management

Credit: 4

Total Hours per Week: 6

Lecture Hours: 5

Tutorial Hour: 1

Course Objectives

1. To enable the students to understand the fundamentals of marketing and formulate marketing plan including marketing objectives, marketing mix, and marketing environment.
2. To impart the students information about consumer behavior to inform marketing strategy and tactics.
3. To determine the strategy for developing product life cycle and product portfolio structure that are consistent with evolving market needs.
4. To develop pricing strategy that will be taken into account perceived value, competitive pressures and corporate objectives.
5. To develop strategy for the efficient distribution of product and services.
6. To prepare and deliver sales presentation and to develop messaging for marketing communication.

Course outcome

1. After the study of unit-1, the student will be able to identify the primary marketing activities of an Organisation.
2. After the study of unit-2, the student will be able to use marketing information and research to develop marketing strategies for targeting customers.
3. After the study of unit-3, the student will be able to create and analyse product positioning, brand building process, with appropriate product portfolio structure which contributes to the success of products or services.
4. After the study of unit-4, the student will be able to understand the price elasticity and how it can be used to set price for a product. The student will be able to evaluate how to use distribution channels to market the products / services effectively.
5. After the study of unit-5, the student will be able to use the appropriate promotional tools for the promotion of products/ services.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT– I**Teaching hours: 18**

Definition - Fundamentals of Marketing - Role of Marketing - Relationships of Marketing with other functional areas - Concept of marketing mix - Marketing Management of Product or Services - Marketing approaches - Selling - Various Environmental factors affecting the marketing functions

UNIT– II**Teaching hours: 18**

Buyer Behavior - Buying motives - Buyer Behavior Model - Factors influencing buyer behavior. Market segmentation - Need and basis of Segmentation - Marketing strategy - Targeting - Positioning.

UNIT– III**Teaching hours: 18**

Sales Forecasting - Various methods of Sales Forecasting - The Product - Characteristics - Classifications - Consumer goods - Industrial goods - New product development - process - Product Life Cycle - Product line and product mix decisions - Branding - Packaging.

UNIT– IV**Teaching hours: 18**

Pricing - Factors influencing pricing decisions - Pricing objectives - Pricing policies and procedures - Pricing strategies - Channel of distribution - importance - Various kinds of marketing channels - Factors considered in selecting Channel of Distribution.

UNIT- V**Teaching hours: 18**

Promotion Mix - Advertising - role of advertising - advertising objectives - advertising media-characteristics - media selection and evaluation - effectiveness of advertising - Personal Selling - types - task of sales person - principles of personal selling - elements of selling process - Sales Promotion - planning for sales promotion - sales promotion tools - Public Relations - characteristics and tools of PR - Direct marketing - key features of direct marketing - direct marketing media - limitations - online marketing - objectives - viral marketing - website evaluation - limitation of online media.

Text Books

1. J. Jayasankar - Marketing - Margham Publications, Chennai.
2. Essentials of Marketing - Sundar K, Vijay Nicole Imprints Pvt. Ltd.
3. Rajan Nair - Marketing - Sultan & Chand, New Delhi.
4. Ramaswamy and Namakumari - Marketing Management, Laxmi Publications Pvt. Ltd
5. Adrian Palmer - Introduction to Marketing theory and practice- Oxford University Press- Indian edition, New Delhi.
6. Philip Kotler- Marketing Management, Pearson Publications, New Delhi.
7. Kruti Shah, Alan D'Souza-Advertising and Promotion IMC perspective, Tata MC Graw Hill Education Pvt.Ltd, New Delhi.
8. Dr.C.B.Gupta, Dr.N.Rajan Nair- Marketing Management Sultan Chand and Sons, New Delhi
9. R.S.N.Pillai, Bagavathi- Modern Marketing-S.Chand and Sons, New Delhi.
10. Jain, Neha Singhal- Principles of Marketing-Cengage Delhi Publications.

Reference Books and Journal

1. Varshney RL and Gupta SL - Marketing Management,
2. Dholokia - Marketing Management Cases & Concepts, MacMillan I Ltd.
3. Bender - Secrets of Power Marketing.
4. Philip Kotler and Armstrong - Marketing Management,
5. Saxena - Marketing Management - Tata McGraw Hill Publications.
6. Ajit Kumar Bansal, Ajay Sharma, Marketing Management.
7. L.Natarajan, Marketing , Margham Publications, Chennai.
8. Rudani, Basics of Marketing Management, S. Chand & Co, New Delhi.
9. Dr. Shaila Bootwala, Principles of Marketing, Nirali Prakashan.
10. Venugopal Pingali, Marketing Management, Sage Publications India Pvt Ltd.

E- Materials

- http://dl.ueb.edu.vn/bitstream/1247/2250/1/Marketing_Management_-_Millenium_Edition.pdf
- <https://www.8freebooks.net/download-marketing-management-philip-kotler-pdf/>
- <http://jnujprdistance.com/assets/lms/LMS%20JNU/BBA/Marketing%20Management/Marketing%20Management.pdf>
- http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_mm.pdf

Journal Reference

- Journal of Marketing Vistas published by Institute of Public Enterprise Osmania University Campus, Hyderabad
- Journal of Marketing and Communication published by NIILM - Center for Management Studies, Greater Noida

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: V

Paper type: Core Theory

Paper code: CBA52 Business Law

Credit: 4

Total Hours per Week: 6

Lecture Hours: 5

Tutorial Hour: 1

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Course Objectives

1. To demonstrate understanding and recognition of the requirements of the contract agreement, contract consideration and capacity and genuineness of assent in contract formation.
2. To identify the fundamental legal principles behind performance of contract.
3. To demonstrate an understanding of the legal knowledge to business transaction.
4. To expose the students to legislations relating to sales.
5. To understand commercial contracts transactions and payment methods.
6. To understand international sales and international payment methods.
7. To enable the students familiarize themselves with all aspects of business law establishing a back ground in business law.

Course Outcome

1. After the study of unit-1, the student will be able to understand the fundamental legal principles in developing various contracts.
2. After the study of unit-2, the student will be able to understand the commercial laws in the business world.
3. After the study of unit-3, the student will be able to identify the common forms of business associations and elements of Corporate Governance.
4. After the study of unit-4, the student will be able to understand the legality and statute of frauds in contracts.
5. After the study of unit-5, the student will be able to develop insights regarding the laws and transactions related to sales of goods.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT– I **Teaching hours: 18**
Formation and essential elements of contract - Types of contract and agreements - rules as to offer, acceptance and consideration - capacity to contract - lawful object and free consent.

UNIT- II **Teaching hours: 18**
Performance of contract - Discharge of contract - Breach of contract and remedies - Quasi contract.

UNIT– III **Teaching hours: 18**
Guarantee - features and distinctions - Bailment and pledge - features difference - Rights and duties of bailor and Bailee.

UNIT– IV **Teaching hours: 18**
Contract of agency - definition and meaning - Rights of Principal and agent - relation of Principal with third parties - personal liability of agent - termination of agency.

UNIT– V **Teaching hours: 18**
Sale of goods Act 1930 - definition - sale vs. agreement to sell - express and implied conditions and Caveat and exceptions - Rights of an unpaid seller.

Text Books

1. Dr. J. Jayasankar - Business Law- Margham Publications
2. N.D. Kapoor- Business law- Sultan & Sons
3. Balachandran V and Thothadri S -Business Law - Vijay Nicole Imprints (P) Ltd
4. Dr.M.R.Sreenivasan-Business Law- Margham Publications,Chennai
5. Sheth-Business Law- Pearson Education- New Delhi
6. Kavitha Krishnamurthi-Business Law-Global Academic Publishers- New Delhi.
7. B.S.Moshal, Business and Industrial Law, Ane Books India New Delhi.
8. Daniel V. Davidson, Business Law- Principles and Cases in Legal Environment.
9. G.K. Varshney, Business Law, Sahitya Bhawan Publications.
10. M.C. Kuchhal, Vivek Kuchhal, Business Law, Vikas Publications

Reference Books

1. M.C. Dhandapani - Business Law
2. M.C. Shukla - Business Law, Paperback
3. R.S.N. Pillai & Bagavathi- Business Law
4. P.C. Tulsion - Business Law
5. Mirande Vaibrune, Business Law.
6. Avtar Singh, Business Law, EBC .
7. S.S. Gulshan, Business Law including Corporate Law, New Age International Pvt Ltd
8. Tiwari, Dr.Singh. Business Law, SBPD Publications.
9. O.P. Gupta, Business Law, SBPD Publishing House.

10. Sujit Kumar Das, Business Law, Oxford University Press.

E-Material

- https://www.dphu.org/uploads/attachements/books/books_3498_0.pdf
- <http://www.himpub.com/documents/Chapter1479.pdf>
- <https://www.mobt3ath.com/uplode/book/book-66683.pdf>
- <https://www.freebookcentre.net/Law/Commercial-Law-Books.html>
- <https://www.ebooks.com/en-us/subjects/business-business-law-ebooks/172/>

Journal Reference

- India Business Law Journal published by Vantage Asia Publishing Limited
- Indian Journal of Corporate Law and Policy published by Society for Progress in Research, Education and Development in Law (SPRED LAW), Lucknow.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: V

Paper type: Core Theory

Paper code: CBA53 Research Methodology

Credit: 4

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To familiarize students with basic of research and the research process.
2. To enable the students in conducting research work and formulating research hypothesis.
3. To create a basic knowledge on sampling techniques.
4. To have a basic awareness on tools of data collection and its applications.
5. To impart the knowledge on measurement and scaling techniques as well as quantitative data analysis.

Course Outcome

1. After studied unit-1, the student will be able to understand the basic framework of research process
2. After studied unit-2, the student will be able to develop an understanding of various research designs and techniques.
3. After studied unit-3, the student will be able to identify various sources of sampling techniques.
4. After studied unit-4, the student will be able to identify various sources of information for data collection.
5. After studied unit-5, the student will be able to conduct a research and prepare a report.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
55	YES	YES	YES	YES	YES	YES

UNIT– I**Teaching Hours: 15**

Definition of research - meaning - objectives - types of research - research process - qualities of a researcher - criteria of good research - problems encountered in research

UNIT- II**Teaching Hours: 15**

Defining research problem - research design - features of good research design - types of research design factors affecting research design - hypothesis - meaning - definition - need for hypothesis - formulation of hypothesis - types of hypothesis - test of hypothesis- type I and type II error

UNIT– III**Teaching Hours: 15**

Sampling techniques - types of sampling - merits and demerits

UNIT- IV**Teaching Hours:15**

Collection of primary and secondary data - interview techniques - survey and interview – methods - merits and demerits – questionnaire - pre requisites of using questionnaire - structured and unstructured questionnaire - types of secondary data

UNIT– V**Teaching Hours: 15**

Measurement and scaling techniques

Text books

1. C. R. Kothari Research Methodology Methods and Technique 3rd Edition New Age International Publishers New Delhi.
2. P.Ravilochannan Research Methods - Margham Publications, Chennai
3. Prof. Deepak Chawla- Research Methodology 2nd Edition, Vikas Publishing House
4. Bill Taylor, Sinha, Ghoshal, Research Methodology, Eastern Economy Edition, Prentice-Hall of India, New Delhi.
5. T.V.S.Arun Murthy, T.V.S.Padmaja, A Text book on Research Methodology, Scitech Publications(I) Pvt.Ltd., Chennai.
6. P.Saravanel-Research Methodology-Kitab Mahal-Allahabad
7. Dr.Pawan Kumar Oberoi- Research Methodology-GAPD, New Delhi.
8. Dr. Kirti Gupta, Research Methodology, Nirali Prakashan.
9. Dr. Chaitali Ghosh, Dr. Mamtesh Singh, Research Methodology, Rastogi Publications.
10. Thangamani Ramalingam, S.N. Senthil Kumar, Essentials of Research Methodology- Jaypee Brothers.

Reference Books and Journal

1. B.N.Gosh - Scientific Methods and Social Research 3rd Edition Sterling Publishers Pvt Ltd 2007
2. Dipak Kumar Bhattacharya Research Methodology 2nd Edition Excel Books 2006
3. Ranjit Kumar Research Methodology 4th Edition Sage Publishing New Delhi 2017
4. S. Sachdeva, Research Methodology, Laxminarayan Agarwal.
5. Anubhaa M. Walia, Fundamentals of Research, Notion Press.

6. Panner Selvam , Research Methodology, PHI Learning.
7. Yogesh Kumar Singh, Fundamentals of Research Methodology and Statistics New Age International Publishers.
8. G. Vijayalakshmi, C. Sivapragasam, Research Methodology Tips and Techniques.
9. K.P.R. Chowdary, Research Methodology of Biostatistics Mjp Publishers Pharma Med. Press.
10. Mustafa.A, Research Methodology, AITBS Publishers.

E-Materials

- https://www.researchgate.net/publication/319207471_HANDBOOK_OF_RESEARCH_METHODODOLOGY
- <https://www.modares.ac.ir/uploads/Agr.Oth.Lib.17.pdf>
- <http://manzaramesh.in/prephdbooks/Research%20Methodology%20--20Methods%20and%20Techniques%202004.pdf>
- <http://www.euacademic.org/BookUpload/9.pdf>

Journal Reference

- Journal of Applied Management Research published by KCT Business School, Coimbatore
- KHOJ: Journal of Indian Management Research and Practices published by MIT School of Management, Pune
- Journal of Contemporary Research in Management published by PSG Institute of Management, Coimbatore
- National Journal of Research in Management published by Shrimad Rajchandra Institute of Management and Computer Application, Surat, Gujarat
- National Journal of Research in Management published by Shrimad Rajchandra Institute of Management and Computer Application, Surat, Gujarat

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: V

Paper type: Core Theory

Paper code: CBA54 Computer Application in Business Credit: 4

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To acquaint the students with special applications of IT in business.
2. To familiarize students regarding IT application in documents handling and various other computer application in business.
3. To help students to know the usage of MS word its benefits in business
4. To help students to know the usage of Excel in reporting and research
5. To help students to know the process of designing presentations using ppt.

Course Outcomes

1. After the study of unit-1, the student will know about the emergence of computers and various software solution used for business
2. After the study of unit-2, the student will be learn to use MS word and its functions
3. After the study of unit-3, the students will learn the application of Excel in problem solving and decision
4. After the study of unit-4, the student will be familiar with uses of PPT and also learn to design presentations
5. After the study of unit-5, the student will know about the emerging trends of computer applications in business

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT– I**Teaching hours:15**

Information Technology Basics - Information definition, Meaning of Data and information - Difference between data and information - Prerequisites of Information - need for Information - components of information Technology - Role of Information Technology in Business. Various business application software: Windows operating system, Open source software, Tally, SPSS - Emergence of computers and evolution of computers.

UNIT– II**Teaching hours:15**

Word processing with MS Word: Features, Starting Ms word - MS word environment - working with word documents - working with tools - MS word working with tables - Short cut keys - checking spelling and grammar - printing adocument - Format options.

UNIT– III**Teaching hours:15**

Spreadsheets and Ms Excel: meaning, Features, Starting MS Excel - Ms Excel environment - Working with Excel workbook - Purpose or uses of excel - working with worksheet: creating, opening, Data management- Formulas and functions - Charting: Meaning and types of charts - Inserting charts - printing in Excel. Excel for data analysis

UNIT– IV**Teaching hours:15**

MS power point: Meaning of PPT, features of PPT Making presentation with MS power point - uses of power point - starting MS power point - MS power point environment - working with power point - PPT tools - working with different views - designing presentation - Animation options of PPT - preview and printing in powerpoint.

UNIT– V**Teaching hours:15**

Electronic Commerce - meaning features, Types - Advantages and disadvantages - Electronic data interchange (EDI) - How EDI works - EDI benefits - EDI limitations - SMART card - SMART card applications. Recent trends: Business intelligence, cloud computing, quantum computing, Banking platforms: FICO, FINACLE - CIBIL: Meaning, Features and uses

Text books

1. Leon & Leon - Computer Application in Business - Vijay Nicole Imprints Pvt.Ltd
2. Dr.P. Rizwan Ahmed - Computer Application in Business with Tally - MarghamPublications
3. Mohan Kumar - Computer Application in Business - Vijay Nicole Imprints Pvt.Ltd.
4. Ananthi Sheshasayee - Computer Application in Business - MarghamPublications.
5. Prof. Satish Jain, M.Geetha, Kratika, MS Office 2010 Training Guide, BPB Publications.
6. Ravi Kalakota, Andrew B. Whinston, Frontiers of Electronic Commerce, Pearson.
7. Dr.K. Abirami Devi, Dr. M. Alagammal, E-Commerce, Margham Publications, Chennai.

Reference Books

1. Introduction to Information Technology, ITL ESL, Pearson Education
2. AitJohri, Business Application Software, Himalaya Publication House, First Edition 2016
3. Asok K. Nadhani, Simple Tally 9 , BPB Publications
4. Introduction to Information Technology, ITL Education Solutions Limited, Research and development Wing,2016,PearsonEducation
5. Gary Shelly, Thomas J. Cashman, Misty Vermaat , Microsoft Office 2007: Introductory Concepts and Techniques, ,2007,Thomson Learningpublishers

E-Materials

- <https://www.spss-tutorials.com/spss-what-is-it/>
- <https://stats.idre.ucla.edu/spss/>
- https://study.com/articles/Business_Computer_Applications_Courses_and_Training_Programs.html
- <https://tallysolutions.com/>
- <https://www.udemy.com/course/the-fundamentals-of-business-intelligence/>

Journal Reference

- International Journal of Research in Computer Application and Management published from Jagadri, Haryana.
- Indian Journal of Computer Science, New Delhi.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: V

Paper type: Elective

Paper code: CEBA55A A. Industrial Relations and Labour Laws Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To understand and apply the concept of industrial relations and the system in which it operates.
2. To understand the various process and procedures connected with collective bargaining workers participation, grievance Redressal and employee discipline and dispute resolution.
3. To know the development and judicial set up of Labour laws.
4. To learn the laws relating to industrial relations, social security, factories act and working conditions.
5. To learn the salient features of welfare and wage legislations and the present state of industrial relations and its laws in India.

Course Outcomes

1. After the study of unit-1 student will be able to understand the importance of industrial relation and know the role of trade union and the industrial disputes and their resolutions.
2. After the study of unit-2 the student will be able to understand the meaning of participative management and its structure and know the different committee and find the pre requisite for successful participation in collective bargaining systems.
3. After the study of unit-3 the student will understand the meaning of industrial unrest and the reasons for employee dissatisfaction and disciplinary action. The student also understand the various method of strike and prevention.
4. After the study of unit-4 the student is able to understand the Indian factories Act and provisions regarding welfare, safety and health of workers.
5. After the study of unit-5 the students is able to understand the concepts of workmen's compensation act and its provisions and also know the international labour organisation role and its various functions.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT- I**Teaching hours :15**

Industrial Relations - Meaning And Definition - Role - Importance - Trade Unions - Importance of Trade Union- Industrial disputes - types - and their Resolutions.

UNIT- II**Teaching hours :15**

Participative Management - Structure - Scope - Collective Bargaining - Works Committee - Joint Management Councils - Pre-Requisite for successful participation - Role of Government in Collective Bargaining.

UNIT- III**Teaching hours :15**

Industrial unrest - employee dissatisfaction - Grievances - Disciplinary Action - Domestic Enquiry - Strikes - lockout - Prevention of Strikes - Lockouts.

UNIT- IV**Teaching hours :15**

Factories Act: Meaning, Definition - importance of factories act -need -provision relating to Welfare - Safety - Health Measures.

UNIT- V**Teaching hours :15**

Workmen's Compensation Act - meaning and definition and International Labor Organization- importance of ILO- - Role and Function of ILO

Text books

1. Sreenivasan M.R - Industrial Relations & Labor legislations
2. Aswathappa K - Human Resource and Personnel Management
3. Subba Rao P - Human Resource Management and Industrial Relations
4. Monoppa - Industrial Relations
5. Srivastava SC- Industrial Relations and Labour Laws –Vikas Publishing Pvt.Ltd.Noida
6. S.D.Punekar, S.B.Deodhar,Saraswathi Sankaran-Labour Welfare,Trade Unionism and Industrial Relations-Himalaya Publishing House-Mumbai.
7. Dr. Satish Kumar Saha, Dr. Anju Agarwal, Industrial Relations and Labour Laws, SBPD Publications.
8. C.S. Venkata Ratnam, Industrial Relations, Oxford University Press.
9. Dr.Jose Mamman, Prof. Bose Tom, Industrial Relations and Labour Laws, Takur Publications Pvt Ltd.
10. Dr. Ajit Kumar Ghosh, Industrial Relations Text and Cases, Manas Publications.

Reference Books

1. Michael V Industrial Relations in India and Workers Involvement in Management Cowling - Essence of Personnel Management and Industrial Relations - Prentice - Hall of India.
2. Mamoria C.B and Sathish Mamoria,Dynamics of Industrial Relations, Himalaya Publishing House,New Delhi,1998.
3. Dwivedi.R.S Human Relations Organisational Behaviour, Macmillan India Ltd., New Delhi,1997.

4. Pylee.M.V and Simon George ,Industrial Relations and Personnel Management ,Vikas Publishing House (P) Ltd.,New Delhi,1995
5. N.G.Nair,Lata Nair,Personnel Management and Industrial Relations,S.Chand,2001
6. Srivastava,Industrial Relations and Labour Laws,Vikas ,4TH edition,2000
7. C.S.Venkata Ratnam,Globalisation and Labour Mangement Relations,Response Books,2001
8. T.N. Chhabra, R.K. Suri, Industrial Relation Concepts and Issues, Dhanpat Rai & Co.
9. Tripathi. P.C, Gupta.C.B, Kapoor.N.D, Industrial Relations and Labour Laws, Sultan Chand & Sons.
10. Shamshuddin.M, Nadaf, Yasmin Begum.S, Nadef, Industrial Relations- Current Publications.

E- Materials

- http://www.ebooks-for-all.com/bookmarks/detail/Labour-Laws-in-India/onecat/Electronic-books+Law+Law-by-Country+Asia/0/all_items.html
- <https://www.kopykitab.com/Industrial-Relations-and-Labour-Laws-6th-Edn-by-S-C-Srivastava>
- <https://www.freebookcentre.net/Law/Labour-and-Employment-Law-Books.html>
- <http://elearning.nokomis.in/uploaddocuments/Industrial%20Relations.%20&%20Labour%20laws/Chp%2016%20Labour%20Laws%20An%20Overview/PPT/Chapter%2016.pdf>
- http://www.pondiuni.edu.in/storage/dde/downloads/hrmiii_irm.pdf

Journal Reference

- Indian Labour Journal published by Government Of India Ministry of Labour And Employment Labour Bureau Shimla/Chandigarh
- Indian Journal of Industrial Relations published by Sri Ram Centre for IR and HR
- National Journal of Labour and Industrial Law (NJLIL), Noida

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	M	S	M	S	S	S	S
CO2	S	M	S	M	S	S	M	S	S	S
CO3	S	S	S	S	M	S	S	S	M	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	M	S	S	S	S	M

PO – Programme Outcome, CO – Course outcome
 S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: V

Paper type: Elective

Paper code: CEBA55B

B. Reward Management

Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. The course is designed to promote understanding of issues related to the reward or compensation system and practices of corporate sector.
2. To learn the basic compensation concepts and the context of compensation practice.
3. To illustrate the different ways of wage determination.
4. To understand legally required employee benefits.
5. To learn the concepts of wage incentives
6. To learn some of the implications for reward issues and possible employer approaches to manage legally required benefits.

Course Outcome

1. After the study of unit-1, student is able to understand the importance of employee compensation and equity. To know the wages policy and its structure and different levels of wages and major decisions.
2. After the study of unit-2, the student is able to understand the factors of fixation of wages and job pricing. To know the rationalizing and developing wages structures.
3. After the study of unit-3, the student is able to understand the concepts of fringe benefits and other allowances and know the consumer price index and bonus regulations.
4. After the study of unit-4, the student is able to know wages incentives and linking wages to productivity. To know the different types of incentives and productivity sharing plans.
5. After the study of unit-5, the student is able to understand meaning of reward and statutory provision.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT- I**Teaching hours :15**

Introduction - significance - behavioral aspects of employee compensation and concepts of equity - economic theories. Wages policy - meaning - types - wage structure - wage differentials - wage levels - wage policies - decisions

UNIT- II**Teaching hours :15**

Wage determination - factors influencing wage fixation, job evaluation - methods - job pricing - wage and salary surveys - rationalizing and developing wage structures.

UNIT- III**Teaching hours :15**

Components of pay - fringe benefits - house rent allowance - dearness allowance - money and real wages - consumer price index. Bonus - concept - bonus regulations - negotiations with unions.

UNIT- IV**Teaching hours :15**

Wage incentives - wage and motivation - linking wages with productivity - individual and group incentives - plant. Wide schemes - Scanlon Plan and other productivity gains sharing schemes - experience in India.

UNIT- V**Teaching hours :15**

Reward issues - statutory provision - institutions like wages boards and pay commissions - machinery for resolving disputes - compensative of managers - domestic and multinational companies - rewarding women.

Text Books

- 1.Narain, Laxmi: 'Managerial Compensation & Motivation in Public Enterprises, (Oxford Pub. House).
- 2.Sibson: 'Wages & Salaries', (American Management Association).
- 3.Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall,
- 4.William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey:McGrawHill.
- 5.Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed
- 6.Narain, Laxmi: 'Managerial Compensation & Motivation in Public Enterprises, (Oxford Pub. House).
- 7.Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed
- 8.Michael Armstrong, Reward Management, Kogan Page.
- 9.B.D. Singh, Compensation & Reward Management, Excel Books.
10. Geoff White, Janet Druker, Reward Management a Critical Text, Rowledge.

Reference Books

1. Michael V Industrial Relations in India and Workers Involvement in Management Cowling - Essence of Personnel Management and Industrial Relations - Prentice - Hall of India.
2. Frans Poets, The Art of HRD - Job Evaluation & Remuneration, Crest Publishing, Volume7 1st Edition
3. Michael Armstrong, Helen Murlis, The Art of HRD - Reward Management, Crest Publishing
4. Michael Armstrong, Employee Reward, (University Press)
5. P.Zingheim, The New Pay, Linking Employee & Organization Performance, Schuster, (Jossey-Bass)

5. Sara Rynes, Compensation in Organization, Gerhart (Jossey BASS)
6. Wendell L French, "Human Resource Management", USA, Houghton Mifflin Company, 1994.
6. David D. Decenzo and Stephen P. Robbins, "Human Resource Management", New Delhi, Prentice Hall, 3rd Edn., 1988.

E-Materials

- https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_CRM_NOTES.pdf
- https://www.academia.edu/22247490/Reward_management
- <https://www.doccity.com/en/lecture-notes/management/compensation-management/>
- <https://www.coursehero.com/file/14598021/HND-BM-HRM-7/>

Journal Reference

- Indian Labour Journal published by Government Of India Ministry of Labour And Employment Labour Bureau Shimla/Chandigarh
- Indian Journal of Industrial Relations published by Sri Ram Centre for IR and HR
- National Journal of Labour and Industrial Law (NJLIL), Noida
- The Indian Journal of Labour Economics published by An Organ of the Indian Society of Labour Economics
- India Wage Report, published by ILO, 2018

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong, M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: V

Paper type: Elective

Paper code: CEBA 55C

C. Change Management

Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course objectives

1. To introduce the students the concept of Organizational Change
2. To enable the students to learn change management techniques
3. To identify and overcome obstacles to change.
4. To understand the impact of Organisation culture and change in the Organisation.
5. To understand the requirement for a sound change process within the Organisation.

Course Outcome

1. After the study of unit-1, the student will be able to provide an over view of the change process.
2. After the study of unit-2, the student will be able to review the spectrum of reactions to change.
3. After the study of unit-3, the student will be able to offer techniques for preparing for change.
4. After the study of unit-4, the student will be able to create and stimulate the culture for change.
5. After the study of unit-5, the student will be able to give suggestion for managing uncertainty.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT- I

Teaching Hours: 15

INTRODUCTION

Concept of organizational change - forces - micro and macro perspective - the process - Requisite for successful change - dimensions of planned change.

UNIT- II

Teaching Hours: 15

RESISTANCE TO CHANGE

Introduction - sources of resistance - individual - organizational overcoming resistance to change - Role of HRD in managing change - change agents and their role in change management.

UNIT- III

Teaching Hours: 15

MANAGING ORGANIZATIONAL CHANGE

Model of change - Lewin's three step model - Kotler's eight step model - organizational development - organizational change implementation process - evaluation of organizational change program

UNIT- IV

Teaching Hours: 15

ORGANIZATIONAL CULTURE AND CHANGE

Creating and sustaining culture - Creating a culture for change - stimulating a culture of innovation.

UNIT- V

Teaching Hours: 15

CONTEMPORARY ISSUES IN ORGANIZATIONAL CHANGE

Technology and its impact in the work place - work stress - creating a learning organization - organizational change in Indian businesses - case studies related to organizational change.

Text books

1. K. Sundar - Essentials of Human Resource Management, Vijay Nicole Imprints
2. Tripathy P.C -.Organization Change - Sultan Chand, 2010.
3. Mark Hughes, Change Management in Organisations, Jaico Publishing House
4. Dawson P-Understanding Organizational Change: The Contemporary Experience of People at work , London, Sage Publications.
5. Robbins S.P- Organizational Behaviour, 11th Edition, New Jersey Pearson Prentice Hall.
6. Senior B, Fleming J- Organizational Change, Harlow Prentice Hall.
7. Brown A – Organizational Culture, 2nd Edition, London, Pitman Publishing .
8. Carnell C.A – Managing Change in Organisations , 4th Edition , Harlow Prentice Hall
9. Collins D - Organizational Change – A Sociological Perspective, London.
10. Hodgetts R.M - Organizational Behaviour, Theory and Practice, New York, MacMillan.

Reference Books

1. Kavita Singh, Organisation Change and Development -Excel Books,
2. Kondalkar V. G, Organisation Effectiveness and Change Management- PHI Learning, 2009.
3. Capon.C, Understanding Organisational Context, Inside and Outside Organisations.
4. Richards T- Creativity and Management of Change, Oxford, Bkchwell Business.
5. Watson T – Organising And Managing work, Harlow Prentice Hall.
6. Tichy. N.M – Managing Strategic Change, Technical, Political and Cultural dynamics, New York, John Wiley and Sons.
7. Creativity And Leading Fundamental Change in Organistion, San Francisco, Jossey Bass.
8. Cunnings T G and Worley C.G – Organisational Development and Change .
9. Daft R L – Organisational Theory and Design , Minneapolis, St.Paul, West Publishing .
10. Finchem R, Rhodes P- Principles of Organisational Behaviour, Oxford University Press.

E-Materials

- <https://bbamantra.com/organizational-change-types-process/>
- <https://searchcio.techtarget.com/definition/change-management>
- <https://www.studocu.com/en-au/document/curtin-university/managing-change/lecture-notes/lecture-notes-all-lectures/513582/view>
- <http://www.mahavirlibrary.org/files/change-management.pdf>

Journal Reference

- Journal of Change Management published by Taylor and Francis.
- Journal of Organizational Change Management published by Emerald

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: V

Paper type: Skill based subject

Paper code: CSBA56

E-Business

Credit: 2

Total Hours per Week: 3

Lecture Hours: 2

Tutorial Hour: 1

Course Objectives

1. To understand the concept of doing business through electronics and appreciating its difference with traditional business
2. To help them know the Infrastructural requirement to conduct Business
3. To learn the methodology of performing various business functions using electronics
4. To familiarize students with the EDI role in business and the importance of Web in Business
5. To introduce various payment methods of electronic banking and How Government uses electronic mode to reach publics.

Course out Comes

1. After the study of unit-1, the student will be able to define appreciate the difference between traditional and electronic business
2. After the study of unit-2, the student will know basic infrastructure required to build an E-Business and secure it
3. After the study of unit-3, the student will be equipped with using electronic as a tool to perform business effectively
4. After the study of unit-4, the student will be familiar electronic data interchange and how does it help in transaction besides learning the importance of Web.
5. After the study of unit-5, the student will be able to use various electronic governance media and tools.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT- I

Teaching Hours : 9

E- Business Introduction

Fundamentals of E-commerce and E-business: Meaning, Definitions, Features and benefits - E-business Components: People, Hardware, Software, Network and organization - E-business Advantages and disadvantages - E-Commerce Framework - Comparison between Traditional vs. E-Business Applications - Major Categories of E-Commerce - B2C, B2B, C2B and C2C Applications.

UNIT- II

Teaching Hours : 9

Communication Network & Security

Overview of Communication Network - Types of Networks - Wireless Networks - Wireless Internet Access ISDN - Dial-Up - Broadband - Wi-Fi. OSI Models - Network Security and Firewalls: Meaning and features of network security - Protocols - Types of Protocols - Client Server Network Security - Firewalls and Network Security. Security measures of internet payment system: Authentication, public key cryptography, digital signatures,

UNIT- III

Teaching Hours : 9

E-Business Application

e-Business applications - Fintech (Financial Technology): Meaning, Features of Fintech, Importance of Fintech, Emergence of Fintech, Areas of Fintech - Regtech (regulatory Technology) Meaning and importance in India - E-marketing: Meaning, Types of E-marketing - E-CRM: Meaning, Features and Process. E-retailing: Meaning, Features, Advantages and disadvantages of E-tailing, Trends in E-retailing - Electronics Application in HR

UNIT- IV

Teaching Hours : 9

WEB AND EDI

World Wide Web basics: Meaning of WWW, Features of a Web - Web application components - Electronic Data Interchange (EDI) - meaning, Importance of EDI, Advantages and benefits of EDI system - EDI Applications in Business - Meaning of Benefits and features of Intranet - Intranet Application in Business. Cyber crime: cases in India and Indian regulations

UNIT- V

Teaching Hours : 9

E-Payment Systems & Electronic Governance

Electronic banking: Mobile banking meaning and features - Online Payment - Payments Cards - Electronic Cash - Electronic Cheques - Electronic Wallets - Debit Cards- Credit Cards - Smart Cards - Stored Value Cards - E-Governance: Meaning, Features and importance - application of Electronics in Governance - E-tax, E-seva, E-certificates - Advantages and disadvantages of electronic governance.

Text books

1. Dr. P.RizwanAhmed , E-Business & E-Commerce, MarghamPublications
2. Dr.K.Abirami Devi and Dr. M. Algammai , E-Commerce -MarghamPublications
3. Srinivasa Vallabhan SV, E-Commerce,Vijay Nicole Imprints Pvt.Ltd.
4. Mamta Bhusry , E-Commerce, Laxmi Publications Pvt.Ltd.
5. U.S.Pandey, Rahul Srivastava, Saurabh Shukla, E-Commerce and its applications, S.Chand, NewDelhi.
6. Kalakota , Robinson – E-Business2.0 – Pearson Education –New Delhi.
7. L.T.Joseph - E-commerce A managerial perspective - Prentice Hall publications , 2004

8. Murthy C.S.V., E-Commerce - Concepts, Models and Strategies.
9. David Whitley, E-Commerce Strategy, Technology and Application, Tata McGraw Hill Publications, 2004.
10. Dennis P.Curtin, E-Commerce Principles and Introduction Technology, Tata McGraw Hill Publication, 2004

Reference Books

1. Pete Loshin, John Vacca - Electronic Commerce -LaxmiPublications
2. R.Kolkata and A.B.Whinston: Frontiers of Electronic Commerce, New Delhi, Addison Wesley.
3. P.T.Joseph: Electronic Commerce: A Managerial Perspective, Prentice Hall of India Learning, New Delhi, 3rd Edition,2008.
4. Efraim Turbon, Jae Lee, David King, H.Michael Chung, Electronic Commerce, AManagerial Perspective, Pearson Education Asia,2001.
5. Greenstein, Feinman, E-Commerce, Tata McGraw Hill Publications, 2001
6. Mathewson, E-.Business, BHPublishers.

E-Content

- <https://smude.edu.in/smude/programs/bba/e-commerce.html>
- <https://csistudyabroadmaterials.files.wordpress.com/2015/10/e-business-syllabus.pdf>
- <https://www.indiastudycenter.com/Other/Syllabus/...E-Business/default.asp>
- <https://targetstudy.com/courses/diploma-in-e-business.html>
- <https://www.toppr.com/guides/business-studies/...of-business/e-business/>

Journal Reference

- International Journal of Electronic Business (IJEB) published by Inderscience

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low

SEMESTER VI

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115 BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Core Theory

Paper code: CBA61

Strategic Management

Credit: 5

Total Hours per Week: 6

Lecture Hours: 5

Tutorial Hour: 1

Course Objectives

1. To know the importance of strategic management in an organization.
2. To learn the corporate strategy, strategic planning, formulation of strategy, project life cycle and SWOT analysis.
3. To know generic strategic alternatives, horizontal and vertical diversification.
4. To understand the external growth strategy, mergers, acquisition, amalgamation, joint ventures, problems of an organizational structure and corporate development
5. To learn the implementation of strategy, organizational climate, planning and control of implementation.

Course Outcome

1. After the study of unit-1, student will be able to understand objectives, mission and vision. Appreciate strategic analysis of corporate goals and its capabilities.
2. After the study of unit-2, student will be able to understand the corporate strategy, process of strategic planning, formulation of strategy, project life cycle, portfolio analysis and SWOT analysis.
3. After the study of unit-3, student will be able to learn generic strategic alternatives - horizontal and vertical diversification.
4. After the study of unit-4, student will be able to understand external growth strategy, mergers, acquisition, amalgamation, joint ventures, problems of organizational structure and the management of change.
5. After the study of unit-5, student will be able to learn the implementation of strategy, elements of strategy, significance of leadership and organizational climate, planning and control of implementation.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT– I**Teaching Hours :18**

The business system - objectives of the business - setting up and balancing the objectives mission - vision - goals strategic analysis of functional areas production - marketing - human resources - finance - analyzing corporate capabilities.

UNIT– II**Teaching Hours : 18**

Corporate strategy - nature and scope - characteristic of corporate strategy - process of strategic planning - formulation of strategy - project life cycle - Portfolio analysis - SWOT.

UNIT– III**Teaching Hours : 18**

Generic strategic alternatives - Michael Porter's generic strategies - Grand strategies/ Directional Strategy - horizontal, vertical diversification - active and passive alternatives.

UNIT- IV**Teaching Hours : 18**

External growth strategy - merger acquisition - amalgamation - joint venture - problems organizational structure and corporate development - line and staff function - evaluation of organization structure - management of change.

UNIT– V**Teaching Hours : 18**

Strategy Implementation and control - elements of strategy - interrelationship between strategy formulation and implementation - issues in strategy implementation - Strategic Business Unit(SBU) and core competencies - leadership and strategic implementation - strategic change - steps to initiate strategic change - Kurt Lewin change process - strategic control - types of strategic control - organizational climate - planning and control of implementation.

Text books

1. Dr. C.B. Mamoria & Dr. Satish Mamoria, Business Planning and Policy (1987) Himalaya Publishing House, Mumbai.
2. Dr. S.Sankaran -Strategic Management,Margham Publications
3. S.C. Bhattacharya - Strategic Management Concepts & Cases - S.Chand & Co
4. Dr.M. Jeyarathnam – Strategic Management – Himalaya Publishing House, New Delhi.
5. Charles. W. L. Hill, Gareth R. Jones – An Integrated Approach to Strategic Management- Cengage Learning , New Delhi.
6. Rustagi P R – Strategic Financial Management – Sultan Chand Publishers NewDelhi.
7. S.P. Singh – Strategic Management, AITBS Publishers,Delhi.
8. L.M.Prasad - Strategic Management, Sultan Chand Publishers NewDelhi

Reference Books

1. Kazmi - Business Policy & Strategic Management - Tata McGraw-Hill.
2. Azhar Kazmi, Strategic Management- Mc Graw Hill.
3. Kazmi Adela, Strategic Management, Mc Graw Hill.
4. Dess, Strategic Management, MHE.
5. Thomas L. Wheelen, Strategic Management of Business Policy, Pearson.
6. John Pearce, Strategic Management, Mc Graw Hill Education.
7. Fred R. David, Strategic Management Concepts, Pearson.
8. Thomas, Strategic Management, Pearson Education India.
9. Carpebter, Salwan, Strategic Management- A Dynamic Perspective.
10. R.M. Srivastava, Shubhra Verma, Strategic Management Concepts- Skills&Practices, PHI.

E-Materials

- http://www.crectirupati.com/sites/default/files/lecture_notes/Strategic%20Management%20Notes-CREC.pdf
- <https://examupdates.in/mba-strategic-management/>
- <http://www.pondiuni.edu.in/sites/default/files/Part%20I%20Startegic%20%20Management.pdf>
- <http://www.geektonight.com/strategic-management-notes-pdf/>

Journal Reference

- Jagannath International Management School published by Jagannath International Management School
- Journal of Strategy and Management published by Emerald

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome
S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Core Theory

Paper code: CBA62

International Business

Credit: 5

Total Hours per Week: 6

Lecture Hours: 5

Tutorial Hour: 1

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Course Objectives

1. To enable the students to understand the meaning and importance of globalization and international business
2. To familiarize them with various modes of entering global markets.
3. To help them understand how trade policies are used and how trade is restricted
4. To impart the students with regional economic integrations.
5. To examine the international monetary, strategy & marketing environment.

Course Outcome

1. After the study of unit-1, the student will be able to define and explain the importance of globalization and international business
2. After the study of unit-2, the student will be known the options used and various modes of entering global markets.
3. After the study of unit-3, the student will understand how governments use trade policies to restrict movement of goods abroad
4. After the study of unit-4, the student will be familiar with how various regional co operational organization work and their functions.
2. After the study of unit-5, the student will be able make decisions of setting up MNCs and know how to invest abroad to establish MNC

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT- I

Teaching hours: 18

INTRODUCTION TO INTERNATIONAL BUSINESS

International Business: Meaning, Objectives - Domestic Vs International Business - understanding LPG (Liberalization, Privatisation and Globalisation - Globalisation: Definition, Features and drivers of globalisation - Impediments in International Business, International Business Environment - Political, Legal system, Cultural, Economic, Governments,

UNIT- II

Teaching hours: 18

ENTRY MODES

Modes of International Business - Exports & Imports - Licensing - Franchising - Management Contracts - Joint Ventures - Turnkey Projects - Wholly - owned Subsidiaries - Strategic Alliances - Mergers & Acquisitions - Contract Manufacturing - International Trade theories : Mercantilism, Comparative Advantage Theory - Absolute advantage theory, Heckscher - Ohlin Theory, Product Life cycle theory

UNIT- III

Teaching hours: 18

TRADE POLICIES and WTO

Trade policies: Meaning of trade restrictions, Reasons for trade restrictions tools - Various Trade Restriction tools or policies: Tariffs, Import quota, Voluntary export restraints, Local content requirement, Administrative policies and Anti-dumping policies - GATT (General agreement on tariff and trade: Meaning, Emergence of GATT, Objectives of GATT - Emergence of WTO (World trade organization: Functions, Objectives

UNIT- IV

Teaching hours: 18

REGIONAL ECONOMIC INTEGRATION

Regional Economic Integration: Meaning, Objectives - Levels of Economic Integration - NAFTA - Features & Impact - ASEAN - Vision, Free Trade Areas & Economic Community - SAARC - Objectives- Principles - Potential Areas of Cooperation - Problems - Role of India - BRICS - Objectives - Focus of BRICS - Target Sectors for BRICSTrade.

UNIT- V

Teaching hours: 18

FOREIGN DIRECT INVESTMENT AND MNCS

Foreign Direct Investments: Meaning, Features - Growth of FDI - FDI Sources - Forms of making FDI: Greenfield, Horizontal and vertical - Why Organizations go for FDI? - FDI & Host Nation Advantages and Drawbacks - FDI & Home Nation Advantages - MNC & MNE: Meaning, Features - Types of MNCs: Polycentric, Ethnocentric, region-centric and global centric.

Text books

1. K. Aswathappa, International Business, Tata Mc-Graw Hill,2012
2. Francis Cherunilam, International Business Environment, Himalaya Publishing House Pvt. Ltd., 2015
3. Sanjay Misra, P.K. Yadav, International Business : Text & Cases, PHI Learning, New Delhi,2009
4. John Daniels, International Business : Environments & Operations, Pearson Education,2009
5. Francis Cherunilam, International Business- Text & Cases, PHI Learning.
6. Helen Deresky, International, Textbooks.com
7. John Wild, International Business, Textbooks.com
8. Thingan, International Economics, Vrinda Publications, Pvt Ltd, New Delhi.
9. Subba Rao.P, International Business Text and cases, HPH Mumbai.
10. Bhalla.T.K, International Business, Anmol Publication, New Delhi.

Reference Books

1. Paul Justin, *International Business*, Prentice Hall of India Pvt. Ltd., New Delhi, 5th Edition, 2011
2. Charles W.I. Hill and Arun Kumar Jain, *International Business*, 6th edition, Tata Mc Graw Hill, 2009.
3. Michael R. Czinkota, Ilkka A. Ronkainen and Michael H. Moffet, *International Business*, Thomson, Bangalore, 8th edition, 2009.
4. Aravind V. Phatak, Rabi S. Bhagat and Roger J. Kashlak, *International Management*, Tata Mc Graw Hill, 2nd edition, 2008.
5. Oded Shenkar and Yaong Luo, *International Business*, John Wiley Inc, Noida, 2nd edition, 2007.
6. Anant Sundaram, *The International Business Environment*, PHI, New Delhi.
7. Sumati Varma, *International Business*, Pearson Education.
8. Gary Knight, S. Tamer Cavusgil, *International Business*, Pearson.
9. Marios & Spyros, *International Business- A Global Perspective*, BH.
10. Bholanath Dutta, *International Business Management*, Excel Books.

E- Materials

- <https://www.wto.org/>
- <https://bbamantra.com/introduction-to-international-business/>
- ebooks.lpude.in/.../term.../DCOM501_INTERNATIONAL_BUSINESS.pdf
- https://www.academia.edu/.../BBM_475_NOTES_INTRODUCTION_TO_INTERNATIONAL_BUSINESS
- <https://www.stuvia.com/.../international-business-and-management-studies - ibms>

Journal Reference

- Global Business Review published by SAGE Publications
- FOCUS: Journal of International Business published by Journal Press India
- Indian Journal of International Business and Finance published by Serials Publications Pvt. Ltd.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Core

Paper code: CPBA66

Research Project

Credit: 5

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To help students to apply the concepts studied in the institution.
2. To gain 'on the field' experience and identify present problems faced by the industry
3. To help students gain career development skills
4. To gain practical exposure that will bridge the gap of industrial expectation.

INDIVIDUAL / GROUP PROJECT WORK

Each candidate has to undergo Project work for not less than 15 days in any organization, market, industry or institutions in the areas of Business and management during the 6th Semester and has to submit the report for the same in the end of the 6th Semester.

Guidelines For Project Work

- Project can be in any field of specialization (HR, Finance, Systems, Marketing and related Management based topics)
- The project report should be neatly presented in not more than 80 pages.
- Paper size should be A4 1.5 spacing should be used for typing the general text. The text should be 'justified' and typed in the font style (Font: Times New Roman, Font Size:12pt for text, 14pt for sub-headings)
- The candidate should submit the periodical report of the project to the supervisor.
- TWO reviews would be conducted before the viva-voce. (
- Each candidate should submit 2 hard copies and one soft copy in CD to the Department. After the evaluation of the project report one hard copy would be returned to the candidate.

EVALUATION SCHEME

Internal - 20 Marks (10 marks each for reviews)

Project Evaluation - 50 marks

Viva voce - 30 marks

Total Marks - 100

Important NOTE: If a candidate fails to submit the Project report or fails to appear for the viva-voce examination then it will be considered as 'Arrear' Paper and the candidate can appear for Viva-voce next year.

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Elective

Paper code: CEBA63A

A. Financial Management

Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To gain basic understanding about financial management and its concepts
2. To know the various sources of finance
3. To know how to calculate cost of various capitals and to compare on various project finances.
4. To understand the various uses for finance
5. To familiarize oneself with the techniques used in financial management.

Course Outcome

1. After the study of unit-1, the student will be able to calculate time value for money
2. After the study of unit-2, the student will be able to explain Capital structure decision and suggest the best mix of capital structure using theories
3. After the study of unit-3, the student will calculate cost of capital how it is affected
4. After the study of unit-4, the student will be familiar with capital budgeting and develop a basic budget format.
5. After the study of unit-5, the student will know how to make funds available for routine operations.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT- I

Teaching hours:15

INTRODUCTION TO FINANCIAL MANAGEMENT

Basics concepts of Financial Management: Definition, Importance, scope, objectives, functions of financial management - Various Financial decisions - Types - role of the finance manager - relationship of financial management with other functional areas of management - sources of finance - time value of money: Present value, Future value, Annuity due, Ordinary annuity and perpetual.

UNIT- II

Teaching hours:15

FINANCIAL PLANNING AND LEVERAGES

Financial planning: meaning, process and factors - capitalization: - Capital structure: meaning and factors determining the capital structure decision - Capital structure decision theories: Net Income (NI) approach, Net operating income (NOI) approach, Traditional approach and (MM) Modigliani Miller approach. - Problems: Calculation of Indifference Point EBIT - Leverages: Meaning, Types - Problems from Leverages: operating, financial, Composite leverage.

UNIT- III

Teaching hours:15

COST OF CAPITAL

Understanding Cost of Capital: Meaning, significance, types of cost of capital - various measures of cost of capital: cost of debt, cost of preference shares, and cost of equity, cost of retained earnings, and weighted average cost of capital - Capital Asset Pricing Model

UNIT- IV

Teaching hours:15

CAPITAL BUDGETING

Introduction to Capital Budgeting: Meaning, features and importance of capital budgeting - Various techniques of capital budgeting - Investment Evaluation criteria - Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), Payback Period, Accounting Rate of Return (ARR) - NPV and IRR comparison.

UNIT- V

Teaching hours:15

WORKING CAPITAL MANAGEMENT

Working Capital Management: meaning and significance- constituents of current assets and liabilities - Operating Cycle - classification of working capital - factors determining working capital - Management of working capital - estimation of working capital requirement. Financing of Working Capital and norms of Bank Finance - Sources of Working capital - Factoring services- Various committee reports on Bank Finance - Dimensions of Working Capital Management.

Note: The proportion between Theory and Problem shall be 80:20

Text books

1. Dr. A. Murthy, Financial Management - Margham Publications, Chennai
2. Maheshwari S.N. Financial Management, Sultan & Sons Publications, Delhi
3. S.N. Maheshwari, Elements of Financial Management - Sultan Chand & Sons, Delhi
4. J. Srinivasan, Sridhar & Ramalingam - Financial Management - Vijay Nicole Imprints, Chennai
5. R.K. Sharma, Shashi and K.Gupta, Financial Management -, Kalyani Publication
6. Prasanna Chandra, Fundamentals of Financial Management - Tata McGraw Hills Publishing Company Limited.

Reference Books

1. Periasamy - Financial Management, Vijay NicoleImprints
2. I.M. Pandey, Financial Management - Vikash Publishing House Pvt.Ltd.
3. M.Y.Khan & P.K. Jain, Theory and Problems in Financial Management - Tata McGraw Hills Publishing CompanyLimited.
4. P.V. Kulkarni Financial Management - Himalaya Publishing House

Journal reference

- Journal of Managerial Finance & Research published by Institute of Public Enterprise, Osmania University Campus, Hyderabad
- WEALTH - International Journal of Money, Banking and Finance published by ITM-SIA B-School, Mumbai
- International Journal of Financial Management published by Publishing India Group, New Delhi
- Indian Journal of Research in Capital Markets published by Associated Management Consultants Private Limited, New Delhi

E - Materials

- <https://www.businessmanagementideas.com/notes/financial-management-notes/lecture-notes-on-financial-management/3769>
- <https://examupdates.in/financial-management-notes/>
- https://gurukpo.com/Content/MBA/Financial_Management.pdf
- <https://www.docsity.com/en/financial-management-lecture-notes/4340569/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome
S – Strong, M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Elective

Paper code: CEBA63B

B.Financial Services

Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To equip the students with the basic understanding of financial services and its types
2. To enable the student to understand merchant banking , mutual funds concepts
3. To familiarize the students with the leasing, and venture capital concepts.
4. To help them understand the process of Hire purchasing
5. To familiarize oneself with factoring and its types.

Course Outcome

1. After the study of unit-1, the student will be able to define Financial services and have knowledge on its types, will also be able explain in the Indian context
2. After the study of unit-2, the student will be able to explain how merchant banking works and how securitization is done
3. After the study of unit-3, the student will gain understanding on hire purchasing and leasing finance
4. After the study of unit-4, the student will be familiar with Factoring and RBI regulates them.
5. After the study of unit-5, the student will gain skills on venture capital process.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT– I

Teaching Hours : 15

BASICS OF FINANCIAL SERVICES

Financial Services Basics: Definitions, Meaning and importance of financial services - Functions of Financial services - Types of financial services - Overview of Financial Service Market - Growth of Financial Services in India - Problems in Financial Services Sector
Financial services and economic environment - Players in Financial Services Sector.

UNIT- II

Teaching Hours : 15

MERCHANT BANKING

Understanding Merchant Banking: Definitions and Meaning - Functions of Merchant banking - Merchant banking Origin - SEBI Guidelines - Classification of Merchant Bankers - Role of Merchant bankers - Issue management: public issue - right issue - Prospectus, pricing - Functions - drawbacks. Securitization - Meaning – process - Benefits and securitization in India

UNIT– III

Teaching Hours : 15

HIRE PURCHASING AND LEASING

Hire purchasing and leasing concept - Legal aspects - merits and demerits of leasing - Types of Leasing - Financial lease Vs Operating Lease - the Indian leasing scenario - Hire purchase: meaning - Features, benefits - Hire purchase Vs Installment - lease vs hire purchase - Housing Finance - Introduction - advantages - Methods of Housing Finance - NHB - NHB - role and functions - powers, rights - HDFC & HUDCO

UNIT– IV

Teaching Hours : 15

FACTORING

Factoring - Meaning, Features, - Types of Factoring - Advantages and Disadvantages of factoring - Functions of Factoring - Factoring Vs. Bills Discounting - Factoring in India - Recommendations of Kalyanasundaram committee - RBI Guidelines - Forfeiting - Working of Forfeiting - Benefits and Drawbacks of Forfeiting - Factoring vs forfeiting

UNIT– V

Teaching Hours : 15

VENTURE CAPITAL

Basics of Venture Capital Funds - Meaning, Features of Venture Capital - Financing Stages - Types of Venture capitalism - Investment criteria - Importance of venture capital - Limitations of Venture capitalism - Private Equity - Angel investors - Venture Capital Investment process - Disinvestment mechanisms. - Credit rating agency - Meaning - basis - merits & defects - credit Rating symbols - types of credit rating - Credit Rating Agencies - CRISIL - IICRA - CARE - Credit Rating Process.

Text Books

1. Dr.S. Gurusamy - Financial Services - Vijay Nicole Imprints Private Ltd, Chennai.
2. B. Santhanam - Financial Services, Margham Publications, Chennai.
3. M.Y. Khan - Indian Financial System - Tata Mc Graw Hill, New Delhi.
4. H. R. Machiraju - Indian Financial System - Vikas Publishing House, Mumbai.
5. Anbarasu Joseph, Boominathan, Financial Services, Sultan Chand and Sons.
6. M.Y. Khan - Financial Services – Paperback, Mc Graw Hill.
7. K.Natarajan and E. Gordan, Financial Markets and Services Education, HPH, Mumbai.
8. Tripathy Nalini Prava, Financial Services, PHI Learning.

9. Shanmugam.R, Financial Services, Wiley India Pvt Ltd.
10. Sandeep Goel, Financial Markets, Institutions and Services, PHI Learning

Reference Books and Journal

1. Dr. N. Premavathy - Financial Services and Stock Exchange -Sri Vishnu Publications
2. E. Gordon and E.Nataraj - Financial Markets & Services, HPH, Mumbai.
3. M.Y.Khan, Financial Services, Amer Media International.
4. S. Mohan, Financial Services, Deep & Deep Publications.
5. G.S. Batra, Financial Services, New Innovations, Deep & Deep Publications.
6. Rajesh Kotari, Financial Services, SAGE Publications.
7. Gopal C. Rama, Management of Financial Services, Vikas Publishing House.
8. Thummuluri Siddaiah, Financial Services, Pearson Learning.
9. Ahluwalla Hemant.S, Banking and Financial Services, Adhyayan Publishers and Distributors.
10. Prasanna Chandra, Financial Services, Mc Graw Hills.

E-Materials

- <https://accountlearning.com/financial-services-meaning-importance/>
- <https://www.businessmanagementideas.com/notes/financial-management-notes/lecture-notes-on-financial-management/3769>
- <https://bbamantra.com/financial-services/>
- https://gurukpo.com/Content/MBA/Financial_services.pdf
- <https://www.docsity.com/en/financial-services-lecture-notes/4340569/>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome
 S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Elective

Paper code: CEBA63C

C. Investment Management

Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To impart skill on the fundamentals of Investment and Security Analysis.
2. To identify the risk and returns involved in managing investment.
3. To understand different investment alternatives in the market
4. To understand how securities are traded in the market
5. To be able to analyze and price different securities

Course Outcome

1. After the study of unit-1, the student will be able to understand the various alternatives available for investment
2. After the study of unit-2, the student will be able to measure risk and return.
3. After the study of unit-3, the student will be able to find the relationship between risk and return.
4. After the study of unit-4, the student will be able to value the equity and bonds
5. After the study of unit-5, the student will be able to gain knowledge of the various strategies followed by investment practitioners.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT– I

Teaching Hours : 15

Investment - Meaning - Objectives - Investment Vs. Speculation - Investment Process - Investment information - Management of Investment.

UNIT– II

Teaching Hours : 15

Investment Alternatives - Meaning - variable Income Securities - Fixed Income Securities - Tax Sheltered Saving Schemes -Mutual Funds -Real Assets - Modern Investment -Arts and Techniques.

UNIT– III

Teaching Hours : 15

Risks and Returns - Meaning - Systematic Risks - Unsystematic Risks - Risk Measurement - Capital Returns and Revenue Returns -Computation of Expected Risks and Returns.

UNIT– IV

Teaching Hours : 15

Investment Valuation - Time Value for Money - Bond Valuation - Yield to Maturity - Equity Valuation - capital asset pricing model.

UNIT– V

Teaching Hours : 15

Investment Analysis - Fundamental Analysis -Economic Analysis - Industry Analysis - Company Analysis - Financial Analysis.

Text books

1. Dr. L. Natarajan - Investment Management - Margham Publications
2. V.K.Bhala, Investment Management, S. Chand Publishing.
3. Gurusamy S, Security Analysis and Portfolio Management, Vijay Nicole Imprints Pvt Ltd, Chennai.
4. Geoffrey Hirt and Stanley Block, Fundamentals of Investment Management, Mc Graw Hill
5. Ramanna Vishwanath, Chandra Sekhar Krishnamurthi, Investment Management: A Modern Guide to Social Security Analysis and Stock Selection, Springer.
6. Robert Strong, Practical Investment Management, South Western Publishers.
7. Rustagi.R.P, Investment Management Theory and Practice, Sultan Chand and Sons, New Delhi.
8. Ranganathan, Madhumathi, Investment Analysis and Portfolio Management, Pearson India.
9. Mageswari, Yogesh, Investment Management, PHI Learning.
10. Peter L. Bernstein, Aswath Damodaran, Investment Management, Wiley Frontiers.

Reference Books

1. Prasanna Chandra - Investment Analysis and Portfolio Management ,Tata Mc Graw Hill
2. R.P.Rustagi ,Security Analysis and Portfolio ,HPH
3. S.Kevin,Security Analysis and Portfolio Management ,Prentice Hall
4. Dr.L Natarajan – Investment Management – Margham Publications, Chennai.
5. V.A. Avadhani, Investment Management, HPH Mumbai.
6. Dhanesh Kumar Khatri, Investment Management & Security Analysis – Text and Cases, Laxmi Publications.

E-Materials

- <http://www.himpub.com/documents/Chapter1893.pdf>
- <https://www.studocu.com/in/document/university-of-mumbai/financial-accounting-and-auditing-vii-financial-accounting/lecture-notes/mba-iii-investment-management-notes/4351504/view>
- <https://lecturenotes.in/subject/450/investment-management-im>
- http://www.universityofcalicut.info/SDE/BBA_finance_investment_mgmnt.pdf

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	M	S

PO – Programme Outcome, CO – Course outcome
 S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Elective

Paper code: CEBA64A

A. Marketing Research

Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To learn why marketing managers, use marketing research to help them make better decisions.
2. To define marketing research.
3. To establish the importance of collecting accurate data and the problems in doing so.
4. To understand the concept of sampling techniques in marketing research
5. To study the areas of applying the concept of marketing research

Course Out Comes

1. After studied unit-1, the student will be able to understand scope and concept of marketing research.
2. After studied unit-2, the student will be able to define the Marketing Research process.
3. After studied unit-3, the student will be able to identify the appropriate tool for collecting data.
4. After studied unit-4, the student will be able to choose the correct sampling method.
5. After studied unit-5, the student will be able to apply the concepts of marketing research in sales, product, market and advertising.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes	Yes	Yes

Unit-1

Teaching Hours: 15

Introduction to Marketing Research - Definition - Objectives - Growing importance of Marketing Research - Main Divisions of Marketing Research - Uses of Marketing Research - Limitations and Threats to Marketing Research.

Unit-2

Teaching Hours: 15

Marketing Research Process - steps- Problem Definition - Research Purpose - Research Objective - Research Design - data collection methods - research instruments - data analysis - report preparation

Unit-3**Teaching Hours: 15**

Data Collection - Methods of Data Collection - Secondary Data - Sources of Secondary Data - different types of secondary data - sources of external secondary data - Primary Data - Collection of Primary Data - types - structured questionnaire - unstructured questionnaire - Questionnaire - Designing a Questionnaire - determining type of questions - sequencing the questions - revising and pretesting the questions - Interviewing - Interviewing skills on the part of the investigator - observation method - disguised vs undisguised - controlled vs uncontrolled observation - limitations.

Unit-4**Teaching Hours:15**

Basics of Sampling - methods of sampling - Advantages and Limitations of Sampling - Sampling Process - Sampling Techniques - define universe - sampling frame - sampling methods - sampling size - Probability sampling - types - and Non-Probability Sampling - types.

Unit-5**Teaching Hours: 15**

Applications of Marketing Research - Product Research - new product research - test marketing - commercialization - Advertising Research - product appeal research - copy testing - media selection research - Motivation research - nature - kinds of information sought - techniques - limitations of motivation research.

Text book

1. Dr.P. Ravilochanan - Marketing Research - Margham Publications, Chennai.
2. Sharma D.D - Marketing Research - Marketing Research - Sultan Chand and Sons, New Delhi.
3. S.L. Gupta - Marketing Research
4. Harper.W.Boyd, Ralph West Wall, Stanley F. Stasch – Marketing Research – AITBS Publishers, Delhi.
5. 5.Ramanuj Majumdar – Marketing Research.
6. 6.William G. Zikmund, Barry, Babin, Business Research Methods, Cengage India Pvt Ltd.
7. 7.Karl Mc Daniel, Marketing Research Essentials, Wiley.
8. Pamila.S Schindler, Business Research Methods, Mc Graw Hill Education India Pvt Ltd.
9. Rajendra Nargundkar, Marketing Research Text and Cases, Tata Mc Graw Hill Education.
10. 10.Barry Babin, Exploring Marketing Research, South Western College Publishing.

Reference Books

1. Tull and Hawkings - Marketing Research, Pearson Education.
2. Boyd and Westfall- Marketing Research, Richard Irwin INC.
3. David A. Aaker - Marketing Research, John Wiley & Sons.
4. David. J.Luck, Ronald S. Rubin, Marketing Research . Prentice Hall of India. New Delhi.
5. Harper W Boyd-Marketing Resarch Text and Cases , Mc Graw Hill.
6. Paul Hague- Market Research In Practice-Kogan Page; 4th edition
7. 7.Dawn Iacobucci-Marketing Research Methodological foundations-Thomson South Western
8. Prof. Dr.A Mustafa – Marketing Research – AIBTS Publishers Delhi.
9. Naresh K. Malhotra, Satyabhushan Dash- Marketing Research- Pearson Education , New Delhi.
10. Naval Bajpai, Marketing Research, Pearson Education.

Course Material: website links, e-Books and e-journals

- <http://www.pondiuni.edu.in/sites/default/files/MARKETING%20RESEARCH200813.pdf>
- <https://bbamantra.com/market-research-process-techniques/>
- <http://www.gupshupstudy.com/classnotes/management-32/bba-3130/marketing-research-313030>
- [https://gurukpo.com/Content/BBA/Marketing%20Management\(BBA\)P-2.pdf](https://gurukpo.com/Content/BBA/Marketing%20Management(BBA)P-2.pdf)
- http://164.100.133.129:81/econtent/Uploads/Marketing_Research.pdf

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	M	S	S	S	S	S	M	S	S
CO4	S	S	M	M	M	M	M	S	M	S
CO5	S	M	S	M	M	M	M	M	M	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Elective

Paper code: CEBA64B

B. Rural Marketing Management

Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To enable the students to understand the elements of the unexplored rural market.
2. To identify the significance and strategies of rural market.
3. To equip the students in appropriate concepts and techniques in the area of rural marketing.
4. To understand the marketing mix in the area of rural marketing.
5. To identify the challenges and opportunities in the field of rural marketing.

Course Out Comes

1. After the study of unit-1, the student will be able to explore the special areas in rural marketing environment and to identify opportunities and emerging challenges in upcoming rural markets.
2. After the study of unit-2, the student will be able to aware of categorizing the rural products and branding the products in rural areas.
3. After the study of unit-3, the student will be able to make sound marketing decisions n pricing strategies in rural market.
4. After the study of unit-4, the student will be able to analyse the distribution channels marketing strategies etc in the context of rural markets in India
5. After the study of unit-5, the student will be able to identify the appropriate promotion mix for rural market.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

Unit-I**Teaching Hours: 15**

Understanding rural economy - Defining rural India - Evolution of rural marketing - Rural Market Structure - Constitution of rural market - Size of rural market - rural marketing - concept Rural Market Environment - characteristics of rural consumers - rural vs urban markets - buying decision process - rural marketing information system - potential and size of the rural market - challenges of rural marketing.

Unit-II**Teaching Hours: 15**

Segmentation - definition - bases of segmentation - Product Strategy - concept and classification - Rural Product Categories - New Product Development - Packaging - levels of packaging - Branding in rural India.

Unit-III**Teaching Hours: 15**

Pricing Strategy - what is price? - importance of pricing - significance of price factor - price as a measure of value - multistage price determination process - Rural Pricing Strategy - Market Entry Strategy.

Unit-IV**Teaching Hours: 15**

Channel of Distribution - Evolution of Rural Distribution System - Behaviour of Channels - Prevalent Ideal Rural Distribution Model

Unit-V**Teaching Hours: 15**

Promotion - Promotion Mix - advertising - publicity - personal selling - sales promotion - process of communication in marketing - Creating the Advertisement of Rural Audiences - Rural Media - Conventional and Non- Conventional Media - Innovation in Rural Markets.

Text books

1. P. Kashyap , The Rural Marketing, Perason Education India.
2. C.S.G. Krishnamacharyulur, Rural Marketing - Text and Cases, Perason Education India.
3. Sukhpal Sing, Rural Marketing on Agricultural Inputs, Vikas Publishing.
4. Balaram Dogra & Karminder Ghuman, Rural Marketing: Concept & Cases, Tata McGraw-Hill Publishing Company, New Delhi, 2008.
5. Philip Kotler, Marketing Management, Prentice - Hall India Ltd. New Delhi.
6. Bajaj, Chetan, Bajaj Nandhini, Shenoy, Veena, Introduction to Rural Marketing, New Age International Pvt Ltd Publishers.
7. Rural Marketing 16 November MS 611, Help Book Edition.
8. Dinesh Kumar, Rural Marketing Challenges & Opportunities, Sage Publication.
9. Dogra-. Rural Marketing, Tata Mc Graw Hill Education.

Reference Books

1. M. Kamath & R. Ramakrishnamurthy - A Text Book on Rural Marketing, Himalaya Publishers.
2. Shipra Chawla , A Text of Rural Marketing, Dominant Publishers and Distributors.
3. Rama Bijapurkar (2007), We are Like That Only, the logic of Consumer India, Penguin Books
4. Prahalad C.K (2008), Fortune at the Bottom of the Pyramid, Pearson Publication
5. R V Badi, N V Badi, Rural Marketing, 2008, Himalaya Publishing House.
6. U C Mathur, Rural marketing, Text and Cases, 2008, Excel books
7. CSG Krishnamacharyulu, Lalitha Ramakrishnan, Cases in Rural Marketing, An Integrated Approach, 2006, Pearson Publication.
8. Sanal Kumar, Velayudham, Rural Marketing: Targeting on Non-Urban Consumer, Sage Response.
9. G.Srinivasa Rao, Rural Marketing in India, Anmol Publications.
10. Madhusudan Narayan, Rural Marketing, Scientific Publishers.

E- Materials

- http://www.pondiuni.edu.in/storage/dde/downloads/markiv_rm.pdf
- <http://jnujprdistance.com/assets/lms/LMS%20JNU/MBA/MBA-Rural%20&%20Agri%20Business%20Management/Sem%20III/Rural%20Marketing/Rural%20Marketing.pdf>
- https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_RM_NOTES_2.pdf
- <http://www.ddegjust.ac.in/studymaterial/mba/mm-310.pdf>
- https://sg.inflibnet.ac.in/bitstream/10603/74309/4/04_chapter%201.pdf

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Elective

Paper code: CEBA64C

C. Advertising and Sales Management

Credit: 3

Total Hours per Week: 5

Lecture Hours: 4

Tutorial Hour: 1

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Course Objectives

1. To enable the students to learn the fundamentals of advertising and its strategies.
2. To analyze the creative strategies used in different advertising campaigns and be able to apply the basic principles in designing advertising programs for a given brand or product.
3. To introduce the students to the concepts of media planning and measuring effectiveness of different media.
4. To identify the importance of sales management and salesman oriented promotion techniques.
5. To study the various techniques of sales promotion.

Course out Comes

1. After the study of unit-1, the student will be able to set up advertising objectives and know the legal implications of advertising.
2. After the study of unit-2, the student will be able to design copy of advertisement.
3. After the study of unit-3, the student will be able to select the appropriate media for promotion.
4. After the study of unit-4, the student will be able to know the functions of salesmen.
5. After the study of unit-5, the student will be able to discover and demonstrate various sales promotion technique and their advantages.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

Unit-1**Teaching Hours: 15**

Definition - concept and functions of advertising - types of advertising - evolution and steps in development of advertising - social, economic and legal implications of advertising.

Unit-2**Teaching Hours: 15**

Advertising design - types of advertising appeals - structure of advertisement copy - message strategies - advertising effectiveness - AIDA Model.

Unit-3**Teaching Hours: 15**

Media planning - importance of media - media plan - media objectives - reach and frequency of advertisement - cost of advertisement related to sales - media strategy and scheduling - effectiveness

Unit-4**Teaching Hours: 15**

Sales management - definition- objectives - functions of sales men - qualities and skills of salesmen - personal selling - management of sales territories and Quotas.

Unit-5**Teaching Hours: 15**

Scope and role of sales promotion - definition - objectives of sales promotion - Importance and functions of sales promotion- techniques in sales promotion - online sales promotion.

Text books

1. S. Raj Kumar, V. Rajagopalan Sales and Advertisement Management - - S. Chand and Co
2. G.R. Basotia, N.K.Sharma, Advertising and Sales Management - Mangal Deep Jaipur
3. Chunawallah K.C Sethia, Advertising-Himalaya Publishing House, New Delhi
4. R.S.N.Pillai and Bagavathi,Modern Marketing- (Principles and Practices) S.Chand & Co, New Delhi.
5. S.H. H. Kazmi and Sathish K. Batra Advertising and Sales Promotion, Excel Book India.
6. Still, Cundiff, Goroni – Sales Management, Pearson Education New Delhi.
7. Sanjay Gupta, Pooja Nasa, Advertisement Management,SBPD.
8. Batra Myer, Aaber, Advertisement Management, Pearson India.
9. Mahendra Kumar Padhy, Advertisement Management and Theory And Practice Laxmi Publishers
10. Dr. Martin Khan, C.B and Advertising Management New Age International Pvt.,Ltd.,

Reference Books

1. George Belch, Michael Belch, and KeyoorPurani, Advertising & Promotion - An Integrated Marketing Communications Perspective, Tata Mc Graw Hill,
2. Kruti Shah & Alan DSouza, Advertising and Promotions: An IMC Perspective, Tata Mc Graw Hill,
3. Dr. Varma & Aggarwal Advertising Management, King Books
4. Kotler & Armstrong Principles of Marketing, Prentice-Hall of India, New Delhi.
5. S. A. Chunawalla Advertising: An Introduction Text, Himalayan Publishing House, Mumbai.
6. Wells Burnett Moriarty Advertising Principles and Practice, PHI, New Delhi.
7. S.A. Chunawalla, KC Sethia Foundations of Advertising, Himalayan Publishing House, Mumbai

Course Material: website links, e-Books and e-journals

- http://www.pondiuni.edu.in/storage/dde/downloads/markiv_esp.pdf
- http://ebooks.lpude.in/management/mba/term_3/DMGT507_SALES_AND_PROMOTIONS_MANAGEMENT.pdf
- <http://www.eiilmuniversity.co.in/downloads/Advertising-Management.pdf>
- <http://www.himpub.com/documents/Chapter1060.pdf>
- <http://jnujprdistance.com/assets/lms/LMS%20JNU/MBA/MBA%20-%20Marketing%20Management/Sem%20IV/Advertising%20and%20Sales%20Promotion/Advertising%20and%20Sales%20Promotion.pdf>

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low

THIRUVALLUVAR UNIVERSITY, VELLORE – 632 115
BACHELOR OF BUSINESS ADMINISTRATION– 2022-2023

Semester: VI

Paper type: Skill based subject

Paper code: CSBA65 Creativity and Innovation Management Credit: 2

Total Hours per Week: 3 Lecture Hours: 2 Tutorial Hour: 1

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Course Objectives

1. To learn What is Creativity
2. To understand the various Thinking Hats Methods
3. To enable practice of Creativity Exercises
4. To understand creative problem-solving techniques: Analogies - Lateral Thinking .
5. To learn the differences between various Creativity Techniques.

Course Outcome

1. After the study of unit-1, the student will be able to define Creativity .
2. After the study of unit-2, the student will be able to think creativity .
3. After the study of unit-3, the student will be able to practice Creativity Exercises.
4. After the study of unit-4, the student will be able to learn Innovation.
5. After the study of unit-5, the student will be able to compare various creativity techniques.

Matching Table

Unit	i. Remembering	ii. Understanding	iii. Applying	iv. Analyzing	v. Evaluating	vi. Creating
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	YES	YES	YES
3	YES	YES	YES	YES	YES	YES
4	YES	YES	YES	YES	YES	YES
5	YES	YES	YES	YES	YES	YES

UNIT– I**Teaching hours: 9**

What is Creativity - Individual and Group Creativity - Convergent Thinking - Divergent Thinking and Generation of Creative Ideas?

UNIT- II**Teaching hours: 9**

Thinking Hats Methods - Redefinition Techniques - Random Stimulus - Generation of Creative Ideas in Groups - Brainstorming - Reverse Brainstorming - Synaptic - Morphological Method.

UNIT– III**Teaching hours: 9**

Creativity Exercises - Mental Gym - The Way the Mind Works - Difference Between Lateral and Vertical Thinking - Attitudes Towards Lateral Thinking - Basic Nature of Lateral Thinking - Techniques - The Generation of Alternatives - Challenging Assumptions.

UNIT- IV**Teaching hours: 9**

Innovation - Suspended judgment - Analogies - Lateral Thinking - What is a Problem - Defined Problems - Creative Problem Solving - Models of Techniques of Creative Problem Solving

UNIT- V**Teaching hours: 9**

Comparison of Creativity Techniques - Mental Gym Quiz - Blocks of Creativity - Fears and Disabilities - Energy for your Creativity - Creative - Making Your Environment More Creative - The Creative Life Quiz - Case Study

Text books

1. Dr.P.Rizwan Ahmed,Creativity and Innovation Management,Margham Publications, Chennai
2. Rastogi - Managing Creativity for Corporate Excellence - Mc Millan
3. Pradip NCTE and Khandwalla - Lifelong Creativity - Tata Mc Graw Hill.
4. Arvind Kumar Bhat – Innovation and Entrepreneurship, Lakshmi Publications Pvt. Ltd.
5. Ashwini Kumar Singh – Creativity and Innovation – Notion Press.
6. Madan Birla – Unleashing Creativity and Innovation, Wiley India
7. Jonathan Littman, Wiley, Tom Kelley, The Art of Innovation, Profile Books.
8. Managing Creativity- Harvard Business School.
9. Dr.M.Adithan – Management of Innovation and Creativity, Atlantic Publishers and Distributors Pvt. Ltd.

Reference Books

1. Davis Gary and Scot - Training creative Thinking - New York Publishers.
2. Edward de Bono - Lateral Thinking -Penguin Publishers.
3. Peter F. Drucker - Innovation and Entrepreneurship, Harper Collins Publishers India.
4. James Harrington – Creativity, Innovation and Entrepreneurship .C Tony Wagner – Creativity Innovation- Scribner.
5. Johnathan A. Plucker, Creativity and Innovation: Theory, Research and Practice, Routledge.
6. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins e-books
7. Brian Clegg, Creativity and Innovation for Managers, Routledge
8. Jonathan A. Plucker Creativity and Innovation Theory, Research, and Practice, Routledge.
9. Michael L. Ray, Rochelle Myers, Creativity in Business, Goodreads
10. S.S. Khanka Creativity and Innovation in Entrepreneurship, Sultan Chand & Sons

Creativity and Innovation Management Wiley online library

E- Materials

- <https://www.cambridgeinternational.org/Images/426483-chapter-4-innovation-and-creativity.pdf>
- <https://www.creativityatwork.com/2014/02/17/what-is-creativity/>
- <https://study.com/academy/lesson/types-of-creativity-descriptions-examples.html>
- <https://www.destination-innovation.com/what-is-the-difference-between-creativity-and-innovation/>

Mapping with Programme Outcomes

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CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome

S – Strong , M – Medium, L – Low