THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

DEGREE COURSE

B.A. TAMIL

CBCS PATTERN

(With effect from 2020 – 2021)

The Course of Study and the Scheme of Examinations

S. No.	*Part*	*Study Components* / *Course Title*		*Ins. Hrs /week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
SEMESTER I							***CIA***	***Uni.Exam***	***Total***
1.	I	Language	Paper-1	6	4	தமிழ்/பிறமொழிகள்	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	5	3	இக்கால இலக்கியம் (கவிதை, உரைநடை, நாடகம், புதினம், சிறுகதை)	25	75	100
4.	III	Core Theory	Paper-2	5	3	இலக்கணம் - 1 நன்னூல் (எழுத்ததிகாரம்)	25	75	100
5.	III	ALLIED – 1	Paper-1	6	3	தமிழக வரலாறும் பண்பாடும்	25	75	100
6.	III	PE	Paper-1	6	3	**Professional English I**	25	75	100
7.	IV	Environment Studies		2	2	சுற்றுச் சூழல் பிரிவுகள்	25	75	100
Sem. Total				**36**	**22**		**175**	**525**	**700**
SEMESTER II							***CIA***	***Uni. Exam***	***Total***
8.	I	Language	Paper-2	6	4	தமிழ்/பிறமொழிகள்	25	75	100
9.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
10.	III	Core Theory	Paper-3	4	3	இக்கால இலக்கியம் (கவிதை, உரைநடை, நாடகம், புதினம், சிறுகதை)	25	75	100
11.	III	Core Theory	Paper-4	4	3	இலக்கணம் - 2 நன்னூல் (சொல்லதிகாரம்)	25	75	100
12.	III	ALLIED – 1	Paper-2	6	5	தமிழக வரலாறும் பண்பாடும்	25	75	100
13.	III	PE	Paper-1	6	3	**Professional English II**	25	75	100
14.	IV	Value Education		2	2	மதிப்புக் கல்வி	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
Sem. Total				**36**	**25**		**200**	**600**	**800**

S. No.	*Part*	*Study Components* / *Course Title*		*Ins. Hrs /week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
SEMESTER III							***CIA***	***Uni. Exam***	***Total***
16.	I	Language	Paper-3	6	4	தமிழ்/பிறமொழிகள்	25	75	100
17.	II	English	Paper-3	6	4	ஆங்கிலம்	25	75	100
18.	III	Core Theory	Paper-5	3	3	இலக்கியம் 3 சமயப்பாடல்களும் சிற்றிலக்கியங்களும்	25	75	100
19.	III	Core Theory	Paper-6	3	3	இலக்கணம் - 3 யாப்பருங்கலக்காரிகை	25	75	100
20.	III	ALLIED - 2	Paper-3	7	3	தமிழ் இலக்கிய வரலாறு - 1	25	75	100
21.	IV	Skill based Subject	Paper-1	3	2	பயன்பாட்டுத் தமிழ்	25	75	100
22.	IV	Non-major elective	Paper-1	2	2	தமிழ்மொழி – அடிப்படை இலக்கணம்	25	75	100
			Sem. Total	**30**	**21**		**175**	**525**	**700**
SEMESTER IV							***CIA***	***Uni. Exam***	***Total***
23.	I	Language	Paper-4	6	4	தமிழ்/பிறமொழிகள்	25	75	100
24.	II	English	Paper-4	6	4	ஆங்கிலம்	25	75	100
25.	III	Core Theory	Paper-7	3	3	இலக்கியம் 4 காப்பியங்கள்	25	75	100
26.	III	Core Theory	Paper-8	3	3	இலக்கணம் - 4தண்டியலங்காரம் (பொருளணியியல் மட்டும்)	25	75	100
27.	III	ALLIED - 2	Paper-4	7	5	தமிழ் இலக்கிய வரலாறு - 2	25	75	100
28.	IV	Skill based Subject	Paper-2	3	2	படைப்பிலக்கியமும் மொழிபெயர்ப்பும்	25	75	100
29.	IV	Non-major elective	Paper-2	2	2	இணையம்	25	75	100
			Sem. Total	**30**	**23**		**175**	**525**	**700**
SEMESTER V							***CIA***	***Uni. Exam***	***Total***
30.	III	Core Theory	Paper-9	5	5	சங்க இலக்கியம் (அகம்)	25	75	100
31.	III	Core Theory	Paper-10	6	5	இலக்கணம் 5 (அகம்)	25	75	100
32.	III	Core Theory	Paper-11	6	4	தமிழ்மொழி வரலாறு	25	75	100
33.	III	Core Theory	Paper-12	6	4	இலக்கியத் திறனாய்வு	25	75	100
34.	III	Internal Elective	Paper-1	4	3	**(கீழ்க்கண்ட மூன்றில் ஏதேனும் ஒன்றைத் தெரிவுசெய்துகொள்ளலாம்)** அ. தகவல் தொழில்நுட்பம் ஆ. நாட்டுப்புறவியல் இ. விளம்பரக்கலை	25	75	100
35.	IV	Skill based Subject	Paper-3	3	2	தொல்லியல்	25	75	100
			Sem. Total	**30**	**23**		**150**	**450**	**600**

S. No.	*Part*	*Study Components* / *Course Title*		*Ins. Hrs /week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
SEMESTER VI							*CIA*	*Uni. Exam*	*Total*
36.	III	Core Theory	Paper-13	5	4	சங்க இலக்கியம் (புறம்)	25	75	100
37.	III	Core Theory	Paper-14	6	4	இலக்கணம் 6 (புறம்)	25	75	100
38.	III	Core Theory	Paper-15	6	4	திராவிட மொழிகளின் ஒப்பிலக்கணம்	25	75	100
39.	III	Compulsory Project	Paper-16	5	5	Group / Individual Project	25	75	100
40.	III	Internal Elective	Paper-2	5	3	**(கீழ்க்கண்ட மூன்றில் ஏதேனும் ஒன்றைத் தெரிவுசெய்துகொள்ளலாம்)** அ. இதழியல் ஆ. புத்தகப் பதிப்பியல் இ. தமிழ் உரைநடை வரலாறு	25	75	100
41.	III	Internal Elective	Paper-3	5	3	**(கீழ்க்கண்ட மூன்றில் ஏதேனும் ஒன்றைத் தெரிவுசெய்துகொள்ளலாம்)** அ. தமிழர் அழகுக் கலைகள் ஆ. பெண்ணியம் இ. சுற்றுலாவியல்	25	75	100
42.	IV	Skill based Subject	Paper-4	3	2	தகவல் தொடர்பியல்	25	75	100
43.	V	Extension Activities		-	1	விரிவாக்கச் செயல்பாடுகள்	100	-	100
Sem. Total				**30**	**26**		**275**	**525**	**800**
Grand Total					**140**				**4300**

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
	Complulsory Project (Group/Individiul 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**

திருவள்ளுவர் பல்கலைக்கழகம்

இளங்கலைப் பட்டப்படிப்பு

தமிழ்

2020-2021 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)
		சுந்தரர்	-	திருவதிகை - நொடித்தான் மலைப்பதிகம் தானனை முன்படைத்தான் (1-10)
அலகு 2	:	திருப்பாணாழ்வார்	-	கொண்டல் வண்ணனை (1-10)
		ஆண்டாள்	-	திருப்பாவை (1-10)
அலகு 3	:	பிள்ளைத்தமிழ்	-	மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தாலப் பருவம்
		கலம்பகம்	-	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, சந்திரலேகா வைத்தியநாதன் : தமிழ் இலக்கிய வரலாறு
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 இன்டஸ்டரியல் 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. துரையரசன்,
இணைப்பேராசிரியர் தமிழ்த்துறை,
அரசினர் கலைக்கல்லூரி (தன்னாட்சி), கும்பகோணம்-1.

இசை பதிப்பகம்,
24,சபரிநகர், டாக்டர் குருமூர்த்தி 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 - விக்கிபீடியா - 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
எஸ்.ரவிச்சந்திரன் : இணைய உலகம்,
பாமா பதிப்பகம்,
சென்னை – 24.

4. பவானி : இன்றைய வாழ்க்கையின் இணையம்,
ஜெய்சங்கர் பப்ளிகேஷன்ஸ்,
38, நடேச அய்யர் தெரு,
தி.நகர், சென்னை – 17.

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 செஞ்சுரி 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

தாள் - 1

அ. தகவல் தொழில்நுட்பம்
ஆ. நாட்டுப்புறவியல்
இ. விளம்பரக்கலை

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

அ. தகவல் தொழில்நுட்பம்

பாடநூல் : தமிழ்மொழி மூலம் தகவல் தொழில்நுட்பம்,
A.K. கோகிலன், நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்.,
41-பி, சிட்கோ இன்டஸ்டிரியல் எஸ்டேட்,
அம்பத்தூர், சென்னை – 600 098.

அலகு 1 : தகவல் தொழில்நுட்பம் தொடர்பான அறிமுகம் முதல் கணினிக் களஞ்சியம் வரை
அலகு 2 : நிரற்பகுதி முதல் கணினி மொழிகள் வரை
அலகு 3 : தரவு அனுப்பல் முறைகள் முதல் தரவுத்தள முறைமைகள் வரை
அலகு 4 : முறைமைக்கொள்கை முதல் கணினி வைரஸ்கள் மற்றும் காப்பு மென்னுறுப்புகள் வரை
அலகு 5 : கணினிப் பணியகம் முதல் மின்வர்த்தகம் வரை

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 - சிற்றிலக்கிய 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

திறன் அடிப்படையிலான விருப்பப்பாடம்

தாள் 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 கோட்பாடுள் - 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

தாள் - 16

Core Project (Individual / Group Project)

விருப்பப்பாடம்
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, மானச கங்கோத்தரி, மைசூர் - 570 006.

ஆ. புத்தகப் பதிப்பியல்

பாடநூல் : புத்தகக் கலை - முனைவர் அ. விநயாகமூர்த்தி,
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 - அச்சுத் தொழில் வரலாறு - ஈ புக்ஸ் இன்டர்நெட் பத்திரிகை - அச்சகங்களின் வகைகள் - அச்சு எழுத்துகளின் வடிவம் - அச்சுக் கோத்தல் - அச்சடித்தல் - அச்சிடும் முறைகள் - காகிதம் - காகிதச் சோதனை - அச்சு மைகள் - பட அச்சு - கணினி அச்சு.

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, என். வெங்கடசாமி : கம்ப்யூட்டர் புரோக்ராமிங் & அப்ளிகேஷன்ஸ்,
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

தாள் - 3

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.

திறன் அடிப்படையிலான விருப்பப்பாடம்
தாள் - 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.

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THIRUVALLUVAR UNIVERSITY
MASTER OF ARTS
UNDER CBCS
M.A. Tamil
(with effect from 2020 -2021)

The Course of study and the Scheme of Examinations

Sl.no		Study Components	Ins .hrs/ Week	Credit	Title of the paper	Maximum marks		
		Course Title				CIA	Uni Exam	Total
	Semester I							
1.	Core	Paper-1	6	4	இக்காலஇலக்கியம்	25	75	100
2.	Core	Paper-2	6	4	அறஇலக்கியம்	25	75	100
3.	Core	Paper-3	6	4	தொல்காப்பியம்-எழுத்ததிகாரம்	25	75	100
4.	Core	Paper-4	6	4	தமிழ்பண்பாட்டுவரலாறு	25	75	100
5.	Core elective	Paper-1	3	3	1.மொழியியல் அறிமுகம் (அ) 2.தொல்லியல்	25	75	100
6.	Open Elective	Paper-1	3	3	1.இதழியல் தமிழ் (அ) 2.பேச்சுக்கலை	25	75	100
			30	**22**		**150**	**450**	**600**
	Semester II					**CIA**	**Uni Exam**	**Total**
7.	Core	Paper-5	6	4	காப்பியங்கள்	25	75	100
8.	Core	Paper-6	6	4	பக்திஇலக்கியம்	25	75	100
9.	Core	Paper-7	6	4	தொல்காப்பியம் - சொல்லதிகாரம்	25	75	100
10.	Core Elective	Paper -2	5	3	1.சைவசித்தாந்தம் (அ) 2.பெண்ணியப்படைப்புகள்	25	75	100
11.	Open Elective	Paper -2	5	3	1.ஊடகத்தமிழ் (அ) 2.நாடகத்தமிழ்	25	75	100
12.	*Field study		-	2		100	-	100
13.	Compulsory Paper		2	2	Human Rights	25	75	100
			30	**22**		**250**	**450**	**700**
	Semester III					CIA	Uni	Total
14.	Core	Paper – 8	6	6	சங்க இலக்கியம் (அகம்)	25	75	100
15.	Core	Paper – 9	6	6	ஆராய்ச்சி நெறிமுறைகள்	25	75	100
16.	Core	Paper – 10	6	5	தொல்காப்பியம் - பொருளதிகாரம்	25	75	100
17.	Core Elective	Paper – 3	6	3	1.சிற்றிலக்கியம் (அ) 2. தமிழ் இலக்கண வரலாறு	25	75	100
18.	Open elective	Paper – 3	6	3	1.பயன்பாட்டு நாட்டுப்புறவியல் (அ) 2. அறிவியல் தமிழ்	25	75	100
19.	**Mooc Course		-			-	-	100
			30	**23**		**125**	**375**	**600**

	Semester IV							
20.	Core	Paper -11	6	6	சங்க இலக்கியம் புறம்	25	75	100
21.	Core	Paper -12	6	6	தொல்காப்பியம் - பொருளதிகாரம்	25	75	100
22.	Core	Project	6	5	Project with viva voce	100 (75 Project +25 viva)		100
23.	Core Elective	Paper -4	6	3	1.இந்தியத் தத்துவங்கள் (அ) 2.கணினியும் தமிழும்	25	75	100
24.	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 registred 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.

திருவள்ளுவர் பல்கலைக்கழகம்

முதுகலை தமிழியல்

நடைமுறை 2020 -2021

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:	ஐங்குநுறூறு –	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 செஞ்சுரி 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 (ப.ஆ) : ஆராய்ச்சி நெறிமுறைள், உலகத் தமிழாராய்ச்சி நிறுவனம், தரமணி, சென்னை, 1975.
2. டாக்டர் ஈ.சா. விசுவநாதன் : ஆய்வு நெறிமுறைகள், தமிழ்ப்புத்தகாலயம், சென்னை, 1986.
3. டாக்டர் முத்துச்சண்முகம் : ஆய்வுக்கட்டுரை எழுதும் முறை.
   டாக்டர் சு. வேங்கடராமன் : முத்துப் பதிப்பகம், மதுரை, 1979.
4. டாக்டர் பொற்கோ : ஆராய்ச்சி நெறிமுறைகள், ஐந்திணைப் பதிபப்கம். 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, பிராடட்வே, முல்லை நிலையம், சென்னை – 600 108.
2. ச.வே. சுப்பிரமணியம்(ப.ஆ) : தொல்காப்பியம் பொருளாதிகாரம், 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 -	கர்பபுப்பருவம்
கூறு	3	:	பரணி கலிங்கத்துப்பரணி	- கடை திறப்பு (21-74) காடு பாடியது (75-96)
கூறு	4	:	பள்ளு - முக்கூடறபள்ளு	- நாட்டு வளம், நகர் வளம் (16 -26)
கூறு	5	:	குற்றாலக் குறவஞ்சி	- குறத்தி வருதல் முதல் குறி சொல்லுதல் 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. டாக்டா அ. ஆனந்த நடராசன் : தமிழில் தூது இலக்கிய வளர்ச்சி, அண்ணாமலைப் பல்கலைைக் கழகம், அண்ணாமலைநகர், 1997.
4. டாக்டர் நிர்மலா மோகன் : குறவஞ்சி இலக்கியம், மணிவாசகர் பதிபப்கம், சிதம்பரம், 1985.
5. கழகப்புலவர் குழு மாநாடு), : சிற்றிலக்கியச் சொற்பொழிவுகள் (முதல் கழக வெளியீடு, சென்னை, 1958

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.
4. பெ. மாதையன்: அகராதியியல், தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்,முதற்பதிப்பு, 1997.
5. அகராதி கையெடு : அகராதியியல் பயிலரங்குக் கட்டுரைகள், அகராதியியல் துறை, தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர், 2006.
6. எ.ஸ். வையாபுரிப்பிள்ளை : அகராதி நினைவுகள், தமிழ்ப் புத்தகாலயம், சென்னை, முதற்பதிப்பு, 1959.
7. பெ. மாதையன் நெறிமுறைகள், : தமிழ் அகராதிகளில் வினைப்பதிவமைப்பு நியூ செஞ்சுரி 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.

1. சேவியர் அந்தோணி, : ஈர்ப்பு விசை (பயன்பாட்டு நாட்டுபுறவியலும் ஆய்வும்)

வைகறைப்பதிப்பகம், திண்டுக்கல் - 1.

2. சே. ஏ. குணசேகரன் : நாட்டுப்புற நிகழ்கலைகள் ஒரு பார்வை
நியூ செஞ்சுரி 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 இயகடையை வழைகெமும் 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, மொழிபெயர்பபும் 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 (பதிப்பாசிரியர்) : கணக்கதிகாரம்,
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 (பதிப்பாசிரியர்) : தமிழும் பிற துறைகளும்
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
∴பிஷ்கிறீன் 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 தமிழ்க்கழகம் : இலக்கியமும் வேளாண்மையும்
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

ஔவையார் - 91,92.93,94.95,96,97,98,99,100

மாறோக்கத்து 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)

பார்வை நூல்கள்

1. சு. வைத்தியநாதன் : தமிழர் சால்பு,
   பாரி புத்தகப் பண்ணை.
   சென்னை, 2 ஆம் பதிப்பு, 1971. ரூ7.50
2. மா. இராசமாணிக்கனார் : பத்துப்பாட்டு ஆய்வு
   சர்வோதிய இலக்கியப் பண்ணை.
   மதுரை, முதற்பதிப்பு, 1981, ரூ 15
3. மா. இராசமாணிக்கனார் : தமிழ் இலக்கிய வரலாறு (சங்ககாலம்),
   பாரி நிலையம். சென்னை – 108,
   மூன்றாம் பதிப்பு, 1971
4. சைவ சித்தாந்த நூற்பதிப்புக் கழகம் : சங்க இலக்கியச் சொற்பொழிவு வரிசைகள்

5. அ. சீநிவாஸ் : குறிஞ்சி,
பி.கே.எஸ். புக்ஸ, மதுரை, முதற்பதிப்பு, 1977

6. தெ. பொ. மீனாட்சி சுந்தரனார் : பத்துப்பாட்டு ஆய்வு

சர்வோதய இலக்கியப் பண்ணை,

மதுரை, முதற்பதிப்பு, 1981. ரூ. 15

7. டாக்டர் ஆ.இராமகிருஷ்ணன் : அகத்திணை மாந்தர் - ஓர் ஆய்வு,
சங்க இலக்கியப் பண்ணை. மதுரை,
முதற்பதிப்பு, 1982.

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அறிவுப்பதிப்பகம், சென்னை – 14, முதற்பதிப்பு, 2003

9. ப. அரங்கசாமி, (ப.ஆ) : பத்துப்பாட்டில் பைந்தமிழ்வளம்,
பழனியப்பா பிரதர்ஸ், சென்னை, முதற்பதிப்பு, 1967

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

1. மு. சண்முகம் பிள்ளை :தொல்காப்பியம் பொருளாதிகாரம், 184, பிராட்வே, முல்லை நிலையம், சென்னை – 600 108
2. ச.வே. சுப்பிரமணியம்(ப.ஆ) : தொல்காப்பியம் பொருளதிகாரம் (உரை வளங்கள்), உலகத் தமிழாராய்ச்சி நிறுவனம், தரமணி, சென்னை – 600 113.
3. கு.சுந்தரமூர்த்தி(எ.ஆ) : தொல்காப்பியம் பொருளதிகாரம், அண்ணாமலைப் பல்கலைக்கழகம், அண்ணாமலைப் பலக்லைக்கழகம், அண்ணாமலை நகர் - 608 002, 1986
4. ஆ. சிவலிங்கனார் : தொல்காப்பியம் உரைவளம், தரமணி, சென்னை – 600 113
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

1. டாக்டர் சோ.ந. கந்தசாமி : இந்தியத் தத்துவக் களஞ்சியம் (தொகுதி, 1-3), மெய்யப்பன் பதிப்பகம், 53, புதுத்தெரு, சிதம்பரம் - 608 001, முதற்பதிப்பு, 2003.
2. க.நெடுஞ்செழியன் : ஆசிவகமும் அய்யனார் வழிபாடும்
3. க.நெடுஞ்செழியன் : தமிழிலக்கியத்தில் உலகாயதவாதம்
   : ஆசிவகம் 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) – பல்லூடகம் (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) – தரபு மொழியில் (Copus Linguistiics) – 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 – அகரவரிசைப்படுழுத்தல் - ஏனைய மொழிக்கருவிகள் - பக்க வடிவமைப்பு - இடைவெளி அமைத்தல் - பத்தி வடிவமைப்பு – எழுத்துரு – படம், அட்டவணை இணைத்தல் - கோடு போன்றவை வரைதல் - அடைப்புப் பெட்டி உருவாக்குதல் - அடிக்குறி எண்ணிடல் - பொட்டிடல் - அச்சிடுதல்.

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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 - திறனாய்வுள், ஆய்வுகள், நூல்கள், கட்டுரைகள்

கூறு 3 : திருக்குறளில் இலக்கண மொழியியல் பார்வை: எழுத்து, சொல், தொடர், வாக்கியம் - கூற்று: ஒலியன், உருபன், தொடரன், பொருளன், கருத்தாடல் - புணர்ச்சி இலக்கணம் - உருபொலியன்கள்., திருகக்குறள் 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

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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 - நாட்டுப்புறக்களங்கள் - நாட்டுப்புறமாந்தர்கள் - 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

முனைனவர் 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

மார்க்கபந்து சர்மா சிலம்பின் தனித்தன்மை, மணிவாசகர் நூலகம் ,சிதம்பரம்.

ஜீவபந்து ,ஸ்ரீபால் இளங்கோவடிகள் சமயம், ஜைன இளைஞர் மன்றம், சென்னை.

ம.பொ.சிவஞானம் சிலப்பதிகாரஆய்வுரை, பூங்கொடி பதிப்பகம்

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.A. ENGLISH

DEGREE COURSE

CBCS PATTERN

(With effect from 2020 - 2021)

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	5	3	Indian writing in English	25	75	100
4.	III	Core Theory	Paper-2	5	3	Advanced English Grammar	25	75	100
5.	III	ALLIED -1	Paper-1	6	3	Literary forms and glossary of terms	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							**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10.	III	Core Theory	Paper-3	5	3	British Literature I	25	75	100
11.	III	Core Theory	Paper-4	5	3	American literature (classical and modern literature)	25	75	100
12.	III	ALLIED-1	Paper-2	6	5	Social History of England	25	75	100
13.	III	PE	Paper-2	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**

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

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
38.	III	Core Theory	Paper-15	5	3	New Literatures in English	25	75	100
39.	III	Compulsory Project	Paper-16	5	5	Group / Individual Project	25	75	100
40.	III	Internal Elective	Paper-2	4	3	**(to choose one out f two)** A. English Information Technology B. Film appreciation and book review	25	75	100
41.	III	Internal Elective	Paper-3	3	3	**(to choose one out f two)** A. English for Specific Purpose B. Creative Writing	25	75	100
42.	IV	Skill based Subject	Paper-4	3	2	English Language Teaching	25	75	100
43.	V	Extension Activities		-	1		100	-	100
Sem. Total				**30**	**25**		**275**	**525**	**800**
Grand Total					**140**				**4300**

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**

THIRUVALLUVAR UNIVERSITY

B.A. ENGLISH SYLLABUS

CBCS PATTERN

(With effect from 2020 - 2021)

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-urnhttps://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 in and how individuals interact in a group
2. Know why interviews are held and what they and 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 in formation 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, taking 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 anysuitation.
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 suiation
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, ManjuDariwal, LalithaKrishnaswamy(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 LANGUAGE

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 studedents 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, syncopation, 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 descrepency 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

SEMESTER V

CORE PAPER - 9

BRITISH LITERATURE IV

Course Objectives

1. To introduce the 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- Betrand 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 "TollundMan".
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 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 beastial 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. To understand 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 comey
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 what criticism
2. Understand Aristotles's concept of Tragedyt
3. Understand that the end result of novel is 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 Matter- 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. Get introduce to 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 Converstion 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

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

UNIT - V

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-age job they are immediately facing destitution.
2. 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.
3. Understand that low-wage workers are forced to fight an uphill, or even impossible, battle:
4. 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 though 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 awizard
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. analyzethe 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 history development of 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 has a good reporter and capable interpreted 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:

1. Mencher, Melvin; News Reporting and Writing; 7th edition; (1997); Columbia Univ.Press
2. Ed. Boyce, George; Curran, James; Wingate, Pauline; Newspaper History from the 17th century to the present day; (1978); Sage
3. Wilson, John; Understanding Journalism; (1996); Routledge
4. Mazumdar, Aurobindo; Indian Press and Freedom Struggle; (1993); Orient Longman
5. Parthasarthy, Ramaswamy; Here is the News; (1994); Streling
6. Brumley and O'Malley; A Journalism Reader, (1997); Routledge
7. Howard, T; New: A Reader; (1991); OUP
8. Williams, Framcos; Dangerous Estate: (1957); Longman
9. Dhavan, Rajeev; Only the Good News; (1987); bharat Enterprises
10. Sarkar, R.C.S; The press in India; (1984); S. Chand & Co. Ltd.

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
13. Srinivasan. R.; Crusaders of the 4th Esate; (1989); Bhartiya Vidya Bhavan
14. Smith, Anthony; The News an International History; (1979); Thames and Hudson
15. Hohenberg; The professional Journalist
16. Ahuja, B.N., Theory and Practice of Journalism, Surject Publications, Delhi,1979
17. Gunning, Robert, The Technique of Clear Writing, McGraw-Hill Book Co., New York.
18. Johnson, Stanley and Julian Hariss, The Complete Reporter, The MacMillan Co., New York, 1942.
19. Lent, John A. (ed), The Asian Newspaper's Reluctant Revolution, The State University Press, Ames Iowa, 1977.
20. Murthy, Nadig Krishna, Indian Journalism, Prasaranga, University of Mysore, 1966.
21. Natrajan, J., History of Indian Journalism. The Publications Division Government of India.
22. Parikh, R.D., The Press and Society, Popular Prakshan, Bombay, 1965.
23. Parthasarathy, Rangaswami, A Hundred Years of the Hindu; The epic story of Indian Nationalism, Kasturi and Sons Ltd., Madras/
24. Sahni, J.N., Truth About the Indian Press, Allied Publishers, Bombay, 1974.
25. Sethi, Patanjali, Professional Journalism, Orient Longman, Bombay,1974.
26. Wolseley, Roland E. (ed.), Journalism in Modern India, Asia Publishing House, Bombay, 1964.

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 skill scan 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.**
- **Goddard Angelo.** *The language of Advertising***. 1998.**
- **Caston Julia.** *Creative writing: A Practical Guide***. 1998.**
- **Krikpan John.** *Good Style writing for Science*. 1992.

SEMESTER VI

CORE PAPER -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 Bharathiya
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/

https://www.worldcat.org/title/kalidas-abhigyan-shakuntalam/oclc/643914898

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

CORE PAPER -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 Walcot

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 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 FAOs

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
6 To enhance their ability to analyse appreciate and write reviews

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 Encouraged to write scripts for film
6 Learn how myths are used in cinema.
7 Comprehend the potentialities of cinema by concentrating on the sub-text
8 Examine how the marginalized are portrayed through cinema
9 Understand how colours are used to highlight different ideas.
10 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 on 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. Analyse the plot- structure of the movie
6. Able to infuse valuable points through dialogues and impress audience
7. Develop to write reviews for movies.

UNIT V:

1. Develop the habit of book reading
2. Know the nuances and techniques of reading
3. Identify the difference from plot and structure
4. Learn their intricacies of characterization
5. Critically analyse the elements of the novel
6. Able to write reviews fluently on their own

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 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

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 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 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

1Various 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 (five outcomes for each units should be mentioned)

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 grap 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 liter any devices of the poetry
3. The student will be able to understand the features of prose
4. The student will be able of fours 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 forms 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 familiar our students with teaching processes involve 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.mwikipedia.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

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THIRUVALLUVAR UNIVERSITY

M.A. ENGLISH

SYLLABUS

UNDER CBCS

(With effect from 2020-2021)

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 proactivity 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

Sl. No.	*Study Components* / *Course Title*		*ins. hrs / week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
						CIA	*Uni. Exam*	*Total*
SEMESTER I								
1.	**Core**	**Paper- 1**	6	4	British Poetry (Chaucer to 20th century)	25	75	100
2.		**Paper- 2**	6	4	American Literature	25	75	100
3.		**Paper- 3**	6	4	Indian Literature in English	25	75	100
4.		**Paper- 4**	6	4	Advanced Linguistics	25	75	100
Internal Elective for same major students								
5.	**Core Elective**	**Paper-1**	3	3	**(To choose one out of 3)** A. Indian Writing in Translation B. Fourth World Literature C. Folk Tale and Myth	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
6.	**Open Elective**	**Paper-1**	3	3	**(To choose one out of 3)** A. Literature for Social Transformation B. Green Cultural Studies C. Public Speaking and Creative Writing	25	75	100
			30	**22**		**150**	**450**	**600**
SEMESTER II						*CIA*	*Uni. Exam*	*Total*
7.		**Paper- 5**	6	4	British Drama	25	75	100
8.		**Paper- 6**	6	4	Translation Theory & Practice	25	75	100
9.		**Paper- 7**	6	4	Contemporary Literary Theory - I	25	75	100
Internal Elective for same major students								
10.	**Core Elective**	**Paper-2**	5	3	**(To choose one out of 3)** A. Comparative Literature B. New Literature in English.	25	75	100

					C. Subaltern Literary Studies			
External Elective for other major students (Inter/multi disciplinary papers)								
11.	**Open Elective**	**Paper-2**	5	3	**(To choose one out of 3)** A. Technical Writing. B. Indian Diaspora Literature C. Journalism and Mass Communication.	25	75	100
12.	***Field Study**		-	2		100	-	100
13.	**Compulsory Paper**		2	2	**Human Rights**	25	75	100
			30	**22**		**250**	**450**	**700**
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

Great Contemporaries	-	Winstn Churchill (**Detailed)**
Seven Pillars of Wisdom	-	T.E. Lawrence (**Detail)**
Life of Mr. Richard Savage	-	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 in 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 20^{th} 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	–	*Seventh Street Alchemy*
Mary Watson	–	*Jungfrau*
Uma Parameswaran	–	*16th July*
Renee Hulan	–	*Everybody Likes the Inuit*

UNIT – III: DRAMA

Chinua Achebe	–	*Things Fall Apart*
Joan Macleod	–	*Toronto, Mississipp*i

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 Srilankan War - Samanth Subramanian

REFERENCE

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
Edward Lear		2. The Owl and the Pussy cat

UNIT II – PROSE

Anne Frank	–	*The Diary of a Young girl*
TetsukoKuroyanagi	–	Totto Chan*: The Little Girl at the Window* (Translated by Dorothy Britton)
Abdul Kalam	–	*Inspiring Thoughts*

UNIT III – DRAMA

Vijay Tendulker	–	"The King and the Queen want Sweat"
Mark Twain	–	*The Prince and the Pauper*

UNIT IV – FICTION

Laura Ingalls Wilder	–	*Little House on the Prairie*
C.S Lewis	–	*Chronicles of Narnia- The Lion, Witch and the Wardrobe*
Harriet Beecher Stowe	–	*Uncle Tom's Cabin*
Markus Zusak	–	*The Book Thief*
J.R.R Tolkein	–	*The Hobbit*

UNIT V – FOLK LITERATURE, FAIRY TALES AND COMIC STRIPS

Perrault's Fairy Tales	–	1. *Cinderella*
		2. Little Red Riding Hood
		3. Hansel and Gretel
L.Frank Baum	–	*The Wonderful Wizard of OZ*
Jataka Tales	–	*1. The Monkey's Heart*
		2. The Talkative Tortoise
		3. The Mosquito and the Carpenter
		[Translated by Ellen C.Babbit]
Herge	–	*Tintin ; The Secret of the Unicorn*
Lee Falk	–	*The Story of the Phantom*

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 Chidlren'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://wwwgenius.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 Chugtai	:	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: esaay on theory, Film and Fiction*, Bloomington: Indiana Up, 1987. Print
2. Dollinmore, Jonathan, *Sexual Dissidence:Augustine to Wilde, Frued to Foucalt*, Oxford Clarendon, 1991. Print.
3. Foucault, *Micheal. A History of Sexuality, 3vol*s. 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 Litearture.
- ❖ 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 emphasie 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.

PAPER – 13
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	*Much Ado About Nothing Winter's Tale*

UNIT II

Tragedy	*Othello* (**Detail)**

UNIT III

Roman	*Coriolanus* (**Detail**)

UNIT IV

History *Henry IV Part I* (**Detail)**

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, Macmillian, 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: Rennaissance 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 Offerings1996
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. Chaudhiri, 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 dominate 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 Bellear	:	Women's Liberation
Judith Wright	:	At Cooloola
Derek Walcott	:	Ruins of a Great House
Garbriel 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 JameelaBegam, 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 Perspectiveson 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

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. JhimliMukerjee 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
20^{th} 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 & Theodre 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
Indian Parallel Cinema- Satyajit Ray PatherPanchali

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
3. University Press, 2001.
4. Andrew, Dudley. Concepts in Film Theory. Oxford University Press, 1984.
5. Bazin, Andre. What is Cinema? Vol. I. University of California Press, 2005.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.Dixon.
9. 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.phpKuhn.
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

C. 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

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. MATHEMATICS DEGREE COURSE

(With effect from 2020 - 2021)
The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components / Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
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	5	3	Algebra	25	75	100
4.	III	Core Theory	Paper-2	5	3	Trigonometry	25	75	100
5.	III	Allied -1	Paper-1	4	3	**(to choose any 1 out of 4)**	25	75	100
	III	Allied- 1	Practical-1	2	0	(For Practical Allied subjects)	0	0	0
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							**CIA**	**Uni. Exam**	**Total**
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-3	4	3	Calculus	25	75	100
11.	III	Core Theory	Paper-4	4	3	Analytical Geometry of three dimensions	25	75	100
12.	III	Allied-1	Paper-2	4	3	**(to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
13.	III	Allied Practical - 1	Practical-1	2	2	**(to choose any 1 out of 4)** (For Practical Allied subjects)	25	75	100
14.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
15.	IV	Value Education		2	2		25	75	100
16.	IV	Soft Skill		2	1		25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**
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**
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	Complex Analysis - I	25	75	100
34.	III	Core Theory	Paper-11	3	3	Programming in C Language	25	75	100
35.	III	Core Practical	Practical-1	3	2	C Language	25	75	100
36.	IV	Elective	Paper-1	3	3	**(to choose any 1 out of 2)** 1. Linear Programming 2. Special Functions	25	75	100
37.	IV	Skill Based Subject	Paper-3	3	2	Mathematics for Competitive Examinations - III	25	75	100
		Sem. Total		**30**	**22**		**175**	**525**	**700**
SEMESTER VI									
38.		Core Theory	Paper-12	5	4	Linear Algebra	25	75	100
39.		Core Theory	Paper-13	6	4	Real Analysis II	25	75	100
40.		Core Theory	Paper-14	5	4	Complex Analysis - II	25	75	100
41.		Compulsory Project	Paper-15	5	5	Group / Individual Project	25	75	100
42.		Elective	Paper-2	3	3	**(to choose any 1 out of 2)** 1.Graph Theory 2. Discrete Mathematics	25	75	100
43.		Elective	Paper-3/ Elective Practical-1	3	3	**(to choose any 1 out of 2)** 1.Fuzzy Mathematics.(Theory) 2. R Programming (Practical Only)	25	75	100
44.		Skill based Subject	Paper-4	3	2	Operations Research	25	75	100
45.		Extension Activities		0	1		100	0	100
		Sem. Total		**30**	**26**		**275**	**525**	**800**
		Grand Total			**140**				**4500**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	Communicative English & English	2	4	8	100	200
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**

THIRUVALLUVAR UNIVERSITY

B.Sc. MATHEMATICS

SYLLABUS
CBCS PATTERN
(For the candidates admitted from 2020 - 2021)

SEMESTER III

PAPER - 5

DIFFERENTIAL EQUATIONS

Objectives

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 - 2^{nd} 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 COMPETETIVE 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 plae -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. (10^{th}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 (9^{th} 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(42^{nd}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 COMPETETIVE 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 COMPETETIVE 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:

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 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

YEAR - III		**Sub Code**
SEMESTER - V	**ABSTRACT ALGEBRA**	**Hrs / Week: 6**
CORE PAPER - 8		**Credit: 5**

OBJECTIVE:
To learn from basic algebra concepts to higher algebra Concepts

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 - Integral Domain - Homomorphism of Rings - Ideals and Quotient Rings - simple problems.

UNIT - V

RINGS [CONTD]
Prime Ideal and Maximal Ideal - 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 outcome:

At the end of the course

CO1: Students able to identify groups and subgroups.
CO2: Students able to understand homomorphism and isomorphism.
CO3: Students able to do the problems in permutation.
CO4: Students able to study the basics of rings, ideals and integral domain.
CO5: Students able to apply Euclidean rings in theorems**.**

PAPER - 9

REAL ANALYSIS I

Objectives

To understand various limiting behavior of sequences and series

To explore the various limiting processes viz.continuity, uniform continuity, differentiability and integrability and to enhance the mathematical maturity and to work comfortably with concepts.

UNIT - I

FUNCTIONS & 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.

Recommended Text

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 Outcomes

At the end of the course the student should be able to

1. know the concept countability
2. identify convergent, divergent sequences
3. solve conditional convergence and absolute convergence problems
4. evaluate limit of a function
5. know the concepts of open, closed sets.

PAPER - 10

COMPLEX ANALYSIS - I

Objectives

This course provides

(i) a modern treatment of concepts and techniques of complex function theory

(ii) To gain knowledge about the complex number system, the complex function and complex integration.

UNIT - I

COMPLEX NUMBERS, MAPPINGS AND LIMITS.

Complex Numbers - Complex number system - Algebraic properties - Geometric Interpretation - Properties of Moduli - Polar form - Regions in the complex plane - Mappings - Limits - Theorems on Limits - simple problems.

UNIT - II

ANALYTIC FUNCTIONS

Continuity - Derivatives and Differentiation formulas - Cauchy-Riemann equations - Sufficient conditions - Cauchy - Riemann equations in polar form - properties of Analytic functions - Necessary and sufficient conditions for Analytic functions - problems.

UNIT - III

CONFORMAL MAPPINGS

Harmonic functions - Determination of Harmonic conjugate - Conformal mapping - Isogonal mapping - Further properties and examples - transformations of Harmonic functions - simple problems.

UNIT - IV

MAPPING BY ELEMENTARY FUNCTIONS

The transformations $w = z + d,\ w = \frac{1}{z},\ w = z^2,\ w = \sqrt{z},\ w = e^z,\ w = \sin z$ - Bilinear Transformation and special Bilinear Transformation - problems.

UNIT - V

INTEGRALS

Contours - Line Integrals - Cauchy-Goursat's Theorem (without proof) - Cauchy's Integral Formula - Derivatives of Analytic Functions - problems.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Fourth Edition)

UNIT 1	Chapter 1	Section 1 to 5, 8
	Chapter 2	Section 10, 11, 12
UNIT 2	Chapter 2	Section 13 to 19
UNIT 3	Chapter 2	Section 20
	Chapter 8	Section 74, 75, 76, 77
UNIT 4	Chapter 7	Section 63 to 68, 70, 71
UNIT 5	Chapter 4	Section 29 to 33, 38, 39

Reference Books:

1. P. Duraipandian and LaxmiDuraipandian 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, PragatiPrakasham Publishing Company Ltd., Meerut, 1992 - 93.

Course Outcomes

At the end of the course

(i) The students can gain knowledge about Complex functions and its nature, limits and Analytic functions.

(ii) The students can gain knowledge about elementary transformations.

(iii) The students can gain knowledge about line integrals and techniques for solving problems.

PAPER - 11

A. PROGRAMMING IN C LANGUAGE

Objectives

To develop programming skill in the Computer Language C

UNIT - I

C Constants, variables, Data-type, Declaration of variables, assigning values to variables.
Chapter 2: Sections: 2.1 - 2.10

UNIT - II

OPERATORS, EXPRESSION AND INPUT OUTPUT OPERATIONS
Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic operators, Formatted input and output.
Chapter 3: Sections: 3.1 - 3.7, 3.10 - 3.12 and Chapter 4: Sections: 4.1 - 4.5

UNIT - III

DECISION MAKING: BRANCHING AND LOOPING
If, simple if, If else, Nesting of if - else, Else - If ladder, Switch statement, the?: operator, Go to statement. Decision making with looping: While, Do, for statement, Jumps in loops.
Chapter 5: Sections: 5.1 - 5.9, 6.1 - 6.5

UNIT - IV

ARRAYS
One - dimensional array, two - dimensional array, Multi - dimensional arrays.
Chapter 7: Sections: 7.1 - 7.7

UNIT - V

USER-DEFINED FUNCTION
Need for User-defined function, Multi-function program, the form of C-Function, Return Value and their types, Recursion.
Chapter 9: Sections: 9.1 - 9.6, 9.16

POINTERS:
Declaration, initialization of Pointer variables, Pointer expressions**.**
Chapter 11: Sections: 11.4 - 11.5, 11.8

Recommended Text

E.Balagurusamy. *Programming in* ANSI *C*. Fifth Edition Tata McGraw Hill, New Delhi

Reference Books

1. V.Rajaraman. (1995) *Computer Programming in C*. Prentice Hall, New Delhi.
2. AnanthiSheshasaayee and J.G.Sheshasaayee. *(2005)Programming Language C with Practicals*, Margham Publications.
3. H. Schildt, Obsborne. (1994) *Teach Yourself C* McGraw Hill. New York.
4. Mullish Cooper. *The Spirit of C- An Introduction to Modern Programming.*Jaico Publishing House. Delhi. 1998.
5. Yashavantkanetkar, let us C, 16TH edition BPB publication.
6. Dr.P.Rizwan Ahmed, Programming in C, Margham Publications, 2016.

PRACTICAL - 1

A. PRACTICAL IN C LANGUAGE

Objectives

This computer practice course aims to provide strong logical thinking and error-free syntax codes writing, to master the debugging techniques and to present the results in neat form in C Language for numerical methods. Students will be able to solve problems numerically whenever theoretical methods are not available.

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. Square of numbers: Using For loop, While loop, Do-While loop, Goto statement.
2. Solution of a quadratic equation.
3. Characters between two given characters.
4. Counting the number of vowels and consonants in a sentence.
5. 3x3 matrix addition and multiplication.
6. Prime numbers between two give numbers.
7. Simple interest and Compound Interest.
8. Fibonacci series developing and finding the nth tem of Fibonacci series.
9. Factorial numbers- Binomial Coefficient using function recursion.
10. Pascal's triangle development using recursion.
11. Power of a value - use a function in the name power.
12. Print an array of integers in reverse order using pointer.
13. Interchange sort in ascending or descending.

Note: Mathematics faculty should be appointed as an Examiner.

Reference Books

1. AnanthiSheshasaayee and J.G.Sheshasaayee. *(2005)Programming Language C with Practicals*, Margham Publications.
2. The spirit of C, Mullish Cooper, Indian Edition by Jaico Publishers, 1987.
3. Teach yourself C, Herbert Schildt, ObsbomeMegrawhill, 2nd Edition 1994.

Programming in C, Schaum Series.

ELECTIVE

PAPER - 1
(to choose 1 out of the given 2)

A. LINEAR PROGRAMMING

OBJECTIVES

The course aim is to introduce various techniques of Operations Research, linear programming, transportation methods, assignment models, and, game theory.

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 2xn and mx2 games.

UNIT - V

Simulation - application - advantages and disadvantages - Monte Carlo method - simple problems.

Recommended Text

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 Outcomes

At the end of the course the student should be able to

1. formulate any real world problem as LPP
2. understand various techniques of simplex method.
3. understand analogies between transportation problem and assignment models
4. interpret the solutions in game theory.
5. know the concept of simulation.

B. SPECIAL FUNCTIONS

Objectives

To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics.

UNIT - I

Properties of Linear Operators - Simultaneous Linear Differential Equations -

UNIT - II

Special Solvable Types of Nonlinear Equations. Numerical Solutions Using Taylor Series

UNIT - III

Adams and Modified Adams Method - Extrapolation with Differences Properties of Power Series - Examples

UNIT - IV

Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT - V

Bessel Functions - Properties - Legendre Functions.

Recommended Text

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 PrakashanMandir, Meerut.
2. SatyaPrakash. (2004)*Mathematical Physics.* Sultan & Sons. New Delhi.
3. B.D.Gupta (1978) Mathematical Physics, Vikas Publishing House.

SKILL BASED SUBJECT

PAPER - 3

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - III

UNIT - I

Simple Interest.

UNIT - II

Compound Interest

UNIT - III

Logarithms - Races and Games of Skill.

UNIT - IV

Area

UNIT - V

Volume and surface areas.

Text Book:-

Quantitative Aptitude for competitive Examination, R.S.Aggarwal. S.Chand and company Ltd, 152, Anna salai, Chennai. 2001

YEAR - III		**Sub Code**
SEMESTER - VI	**LINEAR ALGEBRA**	**Hrs / Week: 6**
CORE PAPER – 12		**Credit: 5**

Objectives:
Continue to learn Abstract Algebra and we study about Vector Spaces and its linear equations.

UNIT - I

VECTOR SPACES
Linear dependence and independence - Bases – Dimension - Definition and examples.

UNIT - II

VECTOR SPACES [CONTD]
Dual space - Annihilator of a Subspace - inner product spaces - Schwarz Inequality - Orthonormal Vectors - Orthogonal Complement

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 Equation-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 Outcomes:

This paper will make the students to learn to convert Vector Spaces to Algebraic equations.

CO1: Beginning with Linear Dependence and Linear Independence on Vector Space

CO2: Knowing about Dual spaces and Inner product spaces on Vector space

CO3: Learning to study about Algebra of Linear transformations and its characteristic roots

CO4: Converting Linear equations of Vector space to Matrices its canonical and triangular forms

CO5: Deriving Trace and Transpose of Matrices.

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PAPER - 13

REAL ANALYSIS II

Objectives

To understand Integration process of Riemann

To develop the understanding of point wise and uniform convergence of sequence and series of functions.

To enhance the mathematical maturity and to work comfortably with concepts.

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.

Recommended Text

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 Outcomes

At the end of the course the student should be able to

[1] understand the concept of complete metric space
[2] know the difference between continuity and uniform continuity
[3] know Riemann integration and its properties
[4] solve problems related to Rolle's theorem , law of mean
[5] know the convergence of sequences of functions.

PAPER - 14

COMPLEX ANALYSIS II

Objectives:

(1) To gain knowledge about complex Integration and series.

(2) This course provides methods to solve problems in pure as well as in applied mathematics.

UNIT - I

INTEGRALS

Morera's theorem - Maximum Moduli of functions - The fundamental theorem of Algebra - Liouville's theorem and the Fundamental Theorem on Algebra - convergence of sequences and series.

UNIT - II

POWER SERIES

Taylor's and Laurent's theorem - Examples - Integration and differentiation of power series - problems.

UNIT - III

SINGULARITIES AND RESIDUES

Singularities and classifications - Isolated singularties- Removable singularity, Pole and essential singularity - Residues - Cauchy's Residue theorem - problems.

UNIT - IV

CONTOUR INTEGRATION

Evaluation of Improper Real Integrals - Improper integrals involving Trigonometric functions - simple problems.

UNIT - V

ANALYTIC CONTINUATION

Zeros of Analytic functions - Poles and zeros - Essential singular points -Number of zeros and poles - The Argument principle - Rouchestheorem -simple problems.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Fourth Edition)

Unit 1	Chapter 4	Section 40 to 42
	Chapter 5	Section 43
Unit 2	Chapter 5	Section 44, 45, 46, 49
Unit 3	Chapter 6	Section 54 to 57
Unit 4	Chapter 6	Section 59, 60, 61
Unit 5	Chapter 5	Section 53
	Chapter 12	Section 106, 107, 108, 109

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, 17^{th} Edition, Pragati Prakasham Publishing Company Ltd., Meerut, 1992 - 93.

Course Outcomes

1. The students can gain knowledge about Contour integration and problem solving techniques.
2. The students can learn about singularities and Residues.
3. The students can gain knowledge about power series expansions of analytic functions.

COMPULSORY PROJECT

A Project in under graduate level should be submitted by the students with the guidance of allotted guide.

ELECTIVE
(to choose 1 out of the given 2)

PAPER - 2

A. GRAPH THEORY

Objectives

To study and develop the concepts of graphs, subgraphs, connectivity, Eulerian and Hamiltonian graphs, Ramsey numbers and trees.

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.

Recommended Text

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 Outcomes

(i) After studying this course the students know about the basic foundations of graphs, subgraphs and trees.

(ii) The students can learn about connected graphs, Eulerian graphs and Hamiltonian graphs.

B. DISCRETE MATHEMATICS

Objectives

This course aims to develop mathematical maturity and ability to deal with abstraction and to develop construction and verification of formal logical manipulation.

UNIT - I

RECURRENCE RELATIONS AND GENERATING FUNCTIONS
Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite OrderHomogeneous [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 remarkPp 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 5and 6 variables)

Recommended Text
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.Chakraborthy [2002] Discrete Mathematics [2nd Edition,] Books and allied private Ltd., Kolkata.

ELECTIVE
(to choose 1 out of the given 2)

PAPER - 3 (THEORY)

A.FUZZY MATHEMATICS

Objectives

1. To know the fundamentals of fuzzy Algebra.
2. To know the basic definitions of fuzzy theory
3. To know the applications of fuzzy Technology.

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.

Recommended Text

S.Nanda and N.R.Das "Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi.

B. R Programming (Practical)

Objectives:

After taking the course, students will be able to

• Use R for statistical programming, computation, graphics, and modeling,

• Write functions and use R in an efficient way,

• fit some basic types of statistical models

• use R in their own research,

• be able to expand their knowledge of R on their own.

List of exercise:

Using R Programming develop the programmes 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)

Textbooks and References:

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.

SKILL BASED SUBJECT

PAPER - 4

OPERATIONS RESEARCH

Objectives

To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and obtaining optimal solutions to the problems.

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- Cost consideration in PERT and CPM -Crashing

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/∞/∞) .

Recommended Text: 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 Out Comes:

1. Interpret the solutions in network analysis
2. Knowledge about optimal use of resources
3. Understand to sequence the machines to do the job effectively
4. Analyze the system given and interpret the solutions

ALLIED SUBJECTS FOR MATHEMATICS STUDENTS

To choose any two out of the following Four Allied subjects as Allied I and Allied II. Each Allied subject consists of two papers as paper I and Paper II and one Practical paper.

1. Mathematical Statistics (Paper I and II)
2. Numerical Methods (Paper I and II)
3. Physics (Paper I and II)
4. Chemistry (Paper I and II)

ALLIED

MATHEMATICAL STATISTICS - I

Objective

To apply Statistics Methods for Mathematical Problems.

UNIT - I

Concept of Sample Space - Events - Definition of Probability (Classical, Statistical and Axiomatic) - Addition and Multiplication laws of Probability - Independence of Events - Conditional Probability - Baye's Theorem - Simple Problems.

UNIT - II

Random Variables (Discrete and Continuous) - Distribution Function - Expectation and Moments - Moment Generating Function - Probability Generating Function - Cumulant Generating Function - Simple Problems.

UNIT - III

Characteristic Function - Properties - Uniqueness and Inversion Theorem (Statement only) Chebychev's Inequality - Simple Problems

UNIT - IV

Concept of Bivariate Distribution - Correlation - Karl Pearson's Coefficient of Correlation - Rank Correlation - Linear Regression.

UNIT - V

Standard distributions: Discrete distributions - Binomial, Poisson, Hyper Geometric and Negative Binomial Distributions - Continuous Distributions Normal, Uniform, Exponential.

Recommanded text book:

S.C. Gupta & V.K. Kapoor : Fundamentals of Mathematical Statistics, Sultan & 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

ALLIED

MATHEMATICAL STATISTICS II

Objective

To apply Statistics for Mathematical problems

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.

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.

UNIT - III

Point estimation - Concept of unbiasedness, consistency, efficiency and sufficiency - Cramer- Rao Inequality - Methods of Estimation - Maximum Likelihood Estimation - Method of Moments.

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

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.

Recommended Text:

S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan & 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. Kempthone - Design of Experiments
7. Das and Giri : Design of Experiments Wiley Eastern

ALLIED PRACTICAL

MATHEMATICAL STATISTICS

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. Confidence Interval 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.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan &sons
6. S.C. Gupta & V.K. Kapoor: Fundamentals of Applied Statistics, Sultan & sons
7. Wilks . S. S. Elementary Statistical Analysis, Oxford and IBH
8. O. Kempthone - Design of Experiments.

ALLIED PAPERS

NUMERICAL METHODS - I

Objectives

This course will cover basic methods for finding the Finite differences, Central differences, Inverse interpolation, Summation of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical result.

UNIT - I

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 ▲,▼and E-Interpolation - Newton - Gregory forward & backward formulae for interpolation.

UNIT - II

CENTRAL DIFFERENCES

Central difference Operators - Central differences formulae: Gauss Forward and Backward formulae - Sterling's formula - Bessel's formula.

UNIT - III

INTERPOLATION FOR UNEQUAL INTERVALS

Divided differences - Newton's divided differences formula and Lagrange's - Estimating the Missing terms (With one or more missing values).

UNIT - IV

INVERSE INTERPOLATION

Lagrange's method 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.

UNIT - V

SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

Gauss elimination method-matrix inversion method-Gauss-Jordan Method, Gauss-Seidal method (Three unknowns only).

Recommended Text

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.

Reference Books

1. S. Arumugham. (2003) *Numerical Methods*, New Gamma Publishing, Palamkottai.
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 difference & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

NUMERICAL METHODS II

Objectives

This course covers the techniques of Numerical Differentiation and Numerical Integration. It also deals with solution of difference equations, Algebraic and Transcendental equations and Numerical solution of Ordinary differential equations of first order.

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 equation with constant co-efficient-Particular integrals for a^x, x^m, sinax, cosax and a^x f(x).

UNIT - IV

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection method-Iteration method-Regula-falsi method (False Position Method)-Newton-Rapson 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).

Recommended Text

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.

Reference Books

1. Gupta-Malik, Calculus of finite differences and numerical Analysis, KrishbaPrakashanMandir, Meerut Seveenth 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 Difference & Numerical Analysis, S.Chand& Company Ltd., New Delhi-55.

ALLIED PRACTICAL

NUMERICAL METHODS

LIST OF PROBLEMS

1. Derivatives by Newton’s method
2. Gauss elimination method.
3. Gauss-Jacobi method.
4. Gauss-Siedel 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.

ALLIED
PHYSICS
PAPER-1

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 forYoung'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 stimulatedemission – 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,Murugeshan, 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/elecmagnetism/growth-and-delay-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
PHYSICS
PAPER-2

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 ofCNT's.

Text Books

Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, 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_lIkSB9s
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=mPxoJz6treE (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 PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

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

PAPER - 1

CHEMISTRY - I

Objective:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT - I

General Metallurgy - Extraction of Metals - Minerals and Ores - Difference between Minerals and Ores - Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation - Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining - Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT - II

Cycloalkanes - Preparation - Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes - Substitution and Ring opening reactions - Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength) - Stereoisomerism - Types - Cause of Optical Activity - Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution - Definition and Methods - Geometrical isomerism - Definition and example - Maleic and Fumaric acid - Differences.

UNIT - III

Chemical Kinetics - Rate of a reaction - Definition of Order and Molecularity - Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction - Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons - Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts - Photochemistry - Grothus-Draper's law - Stark-Einstein's law - Quantum yield -

Photosynthesis - Phosphorescence - Fluorescence.

UNIT - IV

VSEPR Theory - Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6. - Fuels - Classification of Fuels - Calorific value of Fuels - Water gas, Carbureted Water gas and Producer gas - Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels - Oil gas, Natural gas and LPG - Uses - Osmosis - Osmotic pressure - Reverse osmosis - Definition - Desalination of Sea water.

UNIT - V

Nuclear Chemistry - Atomic number, Mass number - Isotopes, Isobars and Isotones - Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries - Carbon Dating - Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking - Naphthalene - Preparation - Haworth's method - Properties - Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary) - Conductors, Insulators, Semiconductors, N - and P - Type Semiconductors - Definitions and Examples.

ALLIED PAPER – 2

CHEMISTRY - II

OBJECTIVE:

Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II-semester.

UNIT - I

Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion - Definition and Examples - Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll - Industrial Chemistry - Fertilisers and Manures - Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime - Contents in Match Sticks and Match Box - Industrial making of Safety Matches - Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT - II

Carbohydrates - Definition and Examples - Classification - Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate - Amino Acids - Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis - Properties - zwitterion and Isoelectric point - Structure of Glycine - Proteins - Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) - Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning - Chrome Tanning.

UNIT - III

Electrochemistry - Electrolytes - Definition and Examples - Classification - Specific and Equivalent Conductance - their determination - Variation of Specific and Equivalent conductance with Dilution - Ostwald's Dilution Law and its Limitations - Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations - pH - Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT - IV

Paints - Components of Paint - Requisites of a Good Paint - Pigments - Classification of Pigments on the basis of Colour - Examples - Dyes - Definition - Chromophores and Auxochromes - Examples - Colour and Dyes - Classification based on Constitution and Application - Examples - Vitamins - Definition - Classification - Water Soluble and Fat Soluble - Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones - Definition and Examples - Biological Functions of Insulin and Adrenaline - Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT - V

Drugs - Sulpha Drugs - Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol - LSD - Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS - Electrochemical Corrosion and its Prevention - Electroplating - Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl - Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH - Standard Oxalic Acid.
4. Estimation of $FeSO_4$ - Standard FAS.
5. Estimation of Oxalic acid - Standard $FeSO_4$.
6. Estimation of FAS - Standard Oxalic Acid.
7. Estimation of Oxalic acid - Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

Reference Books

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia - Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry - R. Gopalan, Universities Press - 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd - 2012.

- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra- Vikas Publishing House - 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company - 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co - 2006.
- Understanding Chemistry - C. N. R. Rao, Universities Press - 2011.

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THIRUVALLUVAR UNIVERSITY
MASTER OF SCIENCE

M.Sc. MATHEMATICS
DEGREE COURSE
UNDER CBCS
(With effect from 2020-2021)

The Course of Study and the Scheme of Examination

Sl. No.	*Study Components*		*ins. hrs / week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
	Course Title					*CIA*	*Uni. Exam*	*Total*
SEMESTER I								
1.	Core	Paper -1	6	5	Algebra-I	25	75	100
2.		Paper -2	6	5	Real Analysis –I	25	75	100
3.		Paper -3	6	4	Ordinary Differential Equations	25	75	100
Internal Elective for same major students (Choose any one)								
4.	Core Elective	Paper-1	6	3	(to choose one out of 3) A. Probability Theory B. Mechanics C. Graph Theory	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
5.	Open Elective	Paper-1	6	3	(to choose one out of 3) A. Basic Mathematics B. Mathematical Foundations C. Mathematical Modeling	25	75	100
			30	**20**		**125**	**375**	**500**
SEMESTER II						*CIA*	*Uni. Exam*	*Total*
6.	Core	Paper-4	6	5	Algebra-II	25	75	100
7.		Paper-5	6	5	Real Analysis –II	25	75	100
8.		Paper-6	6	4	Partial Differential Equations	25	75	100
Internal Elective for same major students (Choose any one)								
9.	Core Elective	Paper-2	5	3	(to choose one out of 3) A. Mathematical Statistics B. Fuzzy Set Theory C. Difference Equations	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
10.	Open Elective	Paper-2	5	3	(to choose one out of 3) A. Fundamentals of Insurance B. Numerical Methods C. Fundamentals of Business Statistics	25	75	100
11.	*Field Study		-	2		100	-	100
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 *viva voce*	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 registred 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

COMPLEX ANALYSIS - I

Course Objectives:

The objectives of the course is to

- introduce the notions of differentiability and analytic functions.
- discuss the elementary functions and complex integration.
- educate the conformal mappings and Mobius transformations.
- inculcate the concepts of Maximum Principle, Schwarz' Lemma And Liouville's Theorem.
- indoctrinate the applications of Classification of Singularities.

Unit – 1: Analytic Functions and Power Series **18 Hours**

Differentiability and Cauchy–Riemann Equations –Harmonic Functions –Power Series as an Analytic Function – Exponential and Trigonometric Functions – Logarithmic Functions – Inverse Functions. (Chapter 3, Sections: 3.1 to 3.6)

Unit – 2: Complex Integration **18 Hours**

Curves in the Complex Plane – Properties of Complex Line Integrals – Cauchy–Goursat Theorem – Consequence of Simply Connectivity – Winding Number or Index of a Curve – Cauchy Integral Formula – Taylor's Theorem – Zeros of Analytic Functions – Laurent Series. (Chapter 4, Sections: 4.1 to 4.5, 4.7, 4.10 to 4.12)

Unit – 3: Conformal Mappings and Mobius Transformations **18 Hours**

Principle of Conformal Mapping – Basic Properties of Mobius Maps – Fixed Points and Mobius Maps – Triples to Triples under Mobius Maps – The Cross-Ratio and its Invariance Property – Conformal Self-maps of Disks and Half-planes. (Chapter 5, Sections: 5.1 to 5.6)

Unit – 4: Maximum Principle, Schwarz' Lemma AndLiouville's Theorem **18 Hours**

Maximum Modulus Principle - Hadamard's Three Circles/Lines Theorems - Schwarz's Lemma and its Consequences - Liouville's Theorem - Doubly Periodic Entire Function - Fundamental Theorem of Algebra - Zeros of certain Polynomials (Chapter 6, Sections: 6.1 to 6.7)

Unit – V: Classification of Singularities

Isolated and Non-isolated Singularities – Removable Singularities – Poles – Further Illustrations through Laurent's Series – Isolated Singularities at Infinity – Meromorphic Functions – Essential Singularities and Picard's theorem. (Chapter 7, Sections: 7.1 to 7.7)

Prescribed Book

S. Ponnusamy, *Foundations of Complex Analysis*, Second Edition, Narosa Publishing House, New Delhi, 2012.

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 differentiability and analytic functions.
- comprehend the elementary functions and complex integration.
- acquire the knowledge of conformal mappings and Mobius transformations
- discuss the Maximum Principle, Schwarz' Lemma And Liouville's Theorem.
- procure the applications of theClassification of Singularities.

PAPER - 8
TOPOLOGY

Course Objectives:

The objectives of the course is to

- introduce the mathematical analysis of open and closed sets and the significance of the topological spaces.
- give an insight about the continuous functions on topological spaces, product topology and topology induced by the metric.
- educate the connected spaces, connected subspaces, components and local connectedness.
- inculcate the notions of compactness, compact subspaces, limit point compactness and local compactness.
- indoctrinate the strong theoretical background about the countability axioms, the separation axioms and the consequences theorems.

Unit–1 :Topological Spaces **18 Hours**

Topological Spaces - Basis for a Topology - The Order Topology - The Product Topology on XxY - The Subspace Topology - Closed Sets and Limit Points.
(Chapter 2 - Sections: 12-17)

Unit–2 :Continuous Functions **18 Hours**

Continuous Functions - The Product Topology - The Metric Topology.
(Chapter 2 - Sections: 18-21)

Unit–3 :Connectedness **18 Hours**

Connected Spaces - Connected Subspaces of the Real Line - Components and Local Connectedness. (Chapter 3 - Sections: 23-25.)

Unit–4 :Compactness **18 Hours**

Compact Spaces - Compact Subspaces of the Real Line -Limit Point Compactness - Local Compactness. (Chapter 3 - Sections: 26-29.)

Unit–5 :Countability And Separation Axioms **18 Hours**

The Countability Axioms - The Separation Axioms - Normal Spaces - The Urysohn Lemma - The Urysohn Metrization Theorem - The Tietz Extension Theorem.
(Chapter 4 - Sections: 30-35)

Prescribed Book

James R. Munkres, *Topology*, 2nd Edition, Pearson Education Pvt. Ltd., Delhi, 2002.

Reference Books:

1. J. Dugundji, *Topology*, Prentice Hall of India Pvt. Ltd., New Delhi, 1975.
2. G.F. Simmons, *Introduction to Topology and Modern Analysis*, McGraw Hill Education, New York, 1963.

3. J.L. Kelley, *General Topology*, Van Nostrand Reinhold Company, New York, 1955.
4. L.A. Steen and J.A. Seebach, *Counterexamples in Topology*, Holt, Rinechart and Winston, New York, 1970.
5. S. Willard, *General Topology*, Addison–Wesley Publishing Company, USA, 1970.

E-Materials:

1. https://ocw.mit.edu/courses/mathematics/18-901-introduction-to-topology-fall-2004/index.htm
2. https://ocw.mit.edu/courses/mathematics/18-904-seminar-in-topology-spring-2011/index.htm
3. https://swayam.gov.in/nd2_cec20_ma12/preview

Course Learning Outcomes

After the successful completion of this course, the students will be able to:

- know the basics of open and closed sets and the significance of the topological spaces.
- comprehend the continuous functions on topological spaces, product topology and topology induced by the metric.
- understand the connected spaces, connected subspaces, components and local connectedness.
- acquire the notions of compactness, compact subspaces, limit point compactness and local compactness.
- understandthe various countability axioms and the separation axioms.

PAPER - 9

DIFFERENTIAL GEOMETRY

Course Objectives:

The objectives of the course is to

- introduces space curves and their intrinsic properties of a surface and geodesics.
- studythe non–intrinsic properties of a surface
- study the differential geometry of surfaces.

Unit-1: Space Curves **18 hours**

Definition of a space curve – Arc length – Tangent – Normal and binormal – Curvature and torsion – Contact between curves and surfaces – Tangent surface – Involutes and evolutes – intrinsic equations – Fundamental existence theorem for space curve – Helices.
(Chapter 1: Sections 1 to 9)

Unit-2:Intrinsic Properties of a Surface **18 hours**

Definition of a surface – Curves on a surface – Surface of revolution – Helicoids – Metric – Direction coefficients – Families of curves – Isometric correspondence – Intrinsic properties. (Chapter 2: Sections 1 to 9)

Unit-3: Geodesics **18 hours**Geodesics – Canonical geodesic equations – Normal properties of geodesics – Existence theorem – Geodesic parallels – Geodesic curvatures – Gauss Bonnet theorem – Gaussian curvature – Surface of constant curvature. (Chapter 2: Sections 10 to 18)

Unit-4: Non–Intrinsic Properties of a Surface **18 hours**
The second fundamental form – Principal curvature – Lines of curvature – Developable – Developable associated with space curves and with curves on surface – Minimal surfaces – Ruled surfaces. (Chapter 3: Sections 1 to 8)

Unit-5: Differential Geometry of Surfaces **18 hours**

Fundamental equations of surface theory – Fundamental existence theorem for surfaces – Compact surfaces whose points are umbilics– Hilbert's lemma – Compact surfaces of constant curvature – Complete surfaces.
(Chapter 3: Sections 9 to 11, Chapter 4: Sections 1 to 5)

Prescribed Book

T.J.Willmore, An Introduction to Differential Geometry, Oxford University Press,(17th Impression) New Delhi 2002. (Indian Print)

Reference Books:

1. Struik, D.T. Lectures on Classical Differential Geometry, Addison - Wesley, Mass. 1950.
2. Kobayashi. S. and Nomizu. K. Foundations of Differential Geometry, Interscience Publishers, 1963. 3. Wilhelm Klingenberg: A course in Differential Geometry, Graduate Texts in Mathematics, Springer-Verlag 1978.
3. J.A. Thorpe Elementary topics in Differential Geometry, Under - graduate Texts in Mathematics, Springer - Verlag 1979.

E-Materials:

http://www.math.ku.dk/noter/filer/geom1.pdf

Course Learning Outcomes

After the successful completion of this course, the students will be able to:

- understand the characteristics of curves and surfaces in space and also the fundamental existence theorem for space curves.
- discussthe intrinsic properties of surface.
- analysethe geodesics and its normal properties and familiar with GaussBonnet Theorem.
- discussthe developable.
- understand Hilbert's Lemma and the fundamental existence theorem for surface theory.

CORE ELECTIVE
PAPER - 3
(to choose one out of 3)
A. LaTeX

Course Objectives:

The objectives of the course is to

- inculcatethe computer knowledge.
- introduce the LaTeXsoftware
- train in the Preparation of Project and dissertations using LaTex.
- educate the Latex coding.

Unit – I: Basic Document and Bibliography 18 hours

Whats is LATEX – Simple typesetting – Fonts Type size – Document class – page style – page numbering – Formatting lengths – parts of a document – Dividing the document – what next? – Introduction – natbib – The BIBTEX program – BIBTEX Style files – Creating a bibliographic database. (Chapter 1 to 4)

Unit - II: Contents, Index, Glossary, Text, Row and Column 18 hours

Table of contents – Index – Glossary. Borrowed words – Poetry in typing – Making lists – When order matters – Description and definitions. (Chapter 5 to 6)

Unit – III: Typesetting Equations and Theorems 18 hours

Keeping tabs – Tables – The basics – Custom commands – More on mathematics – mathematics miscellany – New operations– The many fact of mathematics – Symbols – Theory in LATEX – Designer theorem-the amsthm package – Housekeeping.
(Chapter 7 to 9)

Unit - IV: Several Kinds of boxes and Floats, 18 hours

LR boxes – Paragraph boxes – Paragraph boxes with specific height – Nested boxes – Role boxes – The figure environment – The table environment. (Chapter 10 to 11)

Unit – V: Cross References in LATEX, Footnotes, Marginpars and Endnotes 18 hours

Why cross reference? – Let LATEX do it – Pointing to a page-the package varioref – Pointing outside-the package xr – Lost the keys? Use lables.tex – Footnotes – Marginal notes – Endnotes. (Chapter 12 to 13)

Prescribed Book

A Primer, Latex Tutorials, Indian TEX users group, Trivandrum, India.

www.tug.org.in

Reference Books:

1. Peter Flynn, A beginner's introduction to typesetting with LATEX,Silmaril Consultants, Textual Therapy Division, 2003.
2. George Gratzer,More Math Into LATEX, 4th Edition, Springer Science (2007).
3. Frank Mittelbach,Michel Goossens,TheLaTex Companion, Second Edition, Addison-Wesley, 2004.

E-Materials:

1. https://www.latex-tutorial.com/tutorials/
2. https://www.latex-tutorial.com/
3. http://www.tug.org.in/tutorials.html

Course Learning Outcomes

After the successful completion of this course, the students will be able to:

- prepare the LaTeX document and the e-contents.
- Able to construct structures, tables inclusions, header and footer, bibliography management, etc.
- Understand about the mathematics document preparation.

CORE ELECTIVE
PAPER - 3
B. DISCRETE MATHEMATICS

Course Objectives:

The objectives of the course is to

- explore the topics like lattices and its applications in switchingcircuits
- study the finite fields, polynomials and coding theory.

Unit-1: Lattices **18 hours**

Properties and examples of Lattices - Distributive lattices - Boolean algebras - Boolean polynomials - Minimal Forms of Boolean Polynomials. (Chapter 1: 1 – 6).

Unit-2: Applications of Lattices **18 hours**

Switching Circuits- Applications of Switching Circuits (Chapter 2: 7 – 8)

Unit -3: Finite Fields and Polynomials **18 hours**

Finite fields (Chapter 3: 13 only)

Unit -4: Finite Fields and Polynomials **18 hours**

Irreducible Polynomials over Finite fields - Factorization of Polynomials over Finite fields (Chapter 3: 14 – 15)

Unit -5: Coding Theory **18 hours**

Linear Codes - Cyclic Codes(Chapter 4: 17 – 18)

Prescribed Book

Rudolf Lidl& Gunter Pilz. Applied Abstract Algebra, Second Indian Reprint 2006, Springer Verlag, NewYork, (2006).

Reference Books

1. A.Gill, Applied Algebra for Computer Science , Prentice Hall Inc., New Jersey.
2. J.L.Gersting, Mathematical Structures for Computer Science (3 rdEdn.), ComputerScience Press, New York.
3. S.Wiitala, Discrete Mathematics- A Unified Approach, McGraw Hill Book Co.

E-Materials:

1. http://archives.math.utk.edu/topics/discreteMath.html
2. http://www.discrete-math-hub.com/resources-and-help.html

Course Learning Outcomes

After the successful completion of this course, the students will be able to:

- understand about Lattices, applications of Lattices
- discuss the Boolean algebras and polynomials
- procure strong theoretical background on Finite Fields and Polynomials.
- analsye the concept of coding theory and factorization of polynomials
- identify the various types of codes

CORE ELECTIVE
PAPER - 3
C. OPERATIONS RESEARCH

Course Objectives:

The objectives of the course is to

- introduce decision theory and tree analysis
- study the project management of PERT and CPM
- study the deterministic and probabilistic inventory systems, queues, replacement and maintenance problems.

Unit-1: Decision Theory **18 hours**

Steps in Decision theory Approach – Types of Decision Making Environments –Decision Making Under Uncertainty – Decision Making under Risk – Posterior Probabilities and Bayesian Analysis – Decision Tree Analysis– Decision Making with Utilities.
(**Chapter 11:** Sections 11.1 to 11.8)

Unit-2: Project Management: PERT And CPM **18 hours**

Basic Differences between PERT and CPM – Steps in PERT/ CPM Techniques – PERT / CPM Network Components and Precedence Relationships – Critical path Analysis – Probability in PERT Analysis – Project time –Cost Trade off – Updating the Project – Resource Allocation. (**Chapter 13:** Sections 13.1 to 13.7)

Unit-3: Deterministic Inventory Control Models **18 hours**

Meaning of Inventory control – Functional Classification – Advantage of Carrying Inventory – Features of Inventory System – Inventory Model building – Deterministic Inventory Models with no shortage – Deterministic Inventory with Shortages.
(**Chapter 14:** Sections 14.1 to 14.8)

Unit-4: Queueing Theory **18 hours**

Essential Features of Queuing System – Operating Characteristic of Queuing System – Probabilistic Distribution in Queuing Systems Classification of Queuing Models – Solution of Queuing Models – Probability Distribution of Arrivals and Departures –Erlangian Service time Distribution with k–phases.(**Chapter 16:** Sections 16.1 to 16.7,16.9.)

Unit-5: Replacement and Maintenance Models **18 hours**

Failure Mechanism of items– Replacement of Items Deteriorates with Time – Replacement of items that fail completely – other Replacement Problems
(**Chapter 17:** Sections 17.1 to 17.5)

Prescribed Book

J.K. Sharma, Operations Research (Second Edition), Macmillian (India), New Delhi, 2003.

Reference Books

1. F.S.Hillier and J.Lieberman, Introduction To Operations Research, (Eighth edition), Tata McGraw Hill Publishing Company, New Delhi, 2006.

2. C. Beightler, D.Phillips, and B. Wilde, Foundations of Optimization, (Second edition), Prentice Hall New York, 1979.
3. M.S. Bazaraa, J.J.Jarvis, and H.D.Sharall, John Wiley and sons, New York, 1990.
4. D. Gross and C.M. Harris, Fundamentals Of Queuing Theory [3rd Edition], Wiley and Sons, New York, 1998.
5. HamdyA.Taha, Operations Research, (Sixth edition), Prentice–Hall of India Private Limited, New Delhi.

E-Materials:

http://www2.math.umd.edu/~jmr/241/calc.htm

Course Learning Outcomes

After the successful completion of this course, the students will be able to:

- analyse various inventory control modules
- understand the concepts of network techniques
- discuss the maintenance models in replacements
- understand inventory control and functional role of inventory
- analyse various performance of queueing models

OPEN ELECTIVE
PAPER - 3
(to choose one out of 3)

1. MATHEMATICAL BIOLOGY

Course Objectives:

The objectives of the course is to

- understand and know the discrete population growth models.
- study the continuous growth models and qualitative behavior of populations
- know the mathematical models in epidemiology

Unit-1: Discrete Population Growth Models **18 hours**

Arithmetic Growth Model - Geometric Growth Model - Generalizations – AgeStructured Populations.(Chapter 2: 2.2 to 2.5)

Unit-2: Continuous Growth Models **18 hours**

The Linear Model - The Exponential Model - Model for the Distribution of drugs inthe body - Coalition Models.(Chapter 3: 3.2 to 3.5)

Unit-3: Continuous Growth Models (contd.) **18 hours**

Environmental Resistance - A Model for the Spread of Technological Innovations -The Gomertz Model - Bertalanffy Growth Model.(Chapter 3: 3.8 to 3.11)

Unit-4: Qualitative behavior of Populations **18 hours**

Autonomous Equations - Steady and Equilibrium State - Stability of Equilibrium State-Logistic Model with Harvesting - Fixed Points and their stability - The Logistic Map.(Chapter 5: 5.2 to 5.7)

Unit-5: Mathematical Models in Epidemiology **18 hours**

Plant Epidemics - Some features of Human Epidemics - A Simple Deterministic Epidemic Model - A more General Epidemic: SIR Disease.(Chapter 7: 7.2 to 7.5)

Prescribed Book

C. R. Ranganathan, A First Course in Mathematical Models of Population Growth (with MATLAB Program), Associated Publishing Company, New Delhi, 2006.

Reference Books:

1. Pundir, Bio Mathematics, APragati Edition, 2006.
2. J.N. Kapur, Mathematical Models in Biology and Medicine, Affiliated East-West Press Pvt. Ltd., New Delhi, 1985.
3. Nicolas F. Britton, Essential Mathematical Biology, Springer International Edition, First Indian reprint, 2004.
4. Murray, Mathematical Biology, Springer International Edition, First Indian reprint, 2004.

E-Materials:

1. https://www.smb.org/
2. https://web.archive.org/web/20080827161431/http://www.biostatsresearch.com/repository/

Course Learning Outcomes

After the successful completion of this course, the students will be able to:

- Formulate the mathematical models for real world problems
- understand the concepts of Discrete Population Growth Models
- discuss the Continuous Growth Models
- analyse the Qualitative behavior of Populations and Mathematical Models in Epidemiology

OPEN ELECTIVE
PAPER - 3

B. QUANTITATIVE TECHNIQUES

Course Objectives:

The objectives of the course is to

- study the linear programming problem
- understand the transportation problem and assignment problem
- know the inventory control and PERT and CPM.

Unit – I: Linear Programming Problem **18 hours**

Introduction – Graphical Solution Method – Some Exceptional Cases – General Linear Programming Problem – Fundamental Properties of Solution – The Computational Procedure - Simplex Method. (Chapter 3: Sections: 3.1 to 3.4 and Chapter 4: Sections: 4.1 to 4.3)

Unit –II: Transportation Problem **18 hours**

Introduction - L.P Formulation of the Transportation Problem – Existence of Solution in T.P – Transportation Table – Solution of a Transportation Problem – Finding Initial Basic Feasible Solution - Test for optimality – Economic Interpretation of u_j's and v_j's – Degeneracy in Transportation Problem – Transportation Algorithm (Modi Method) . (Chapter 10: Sections: 10.1 to 10.3, 10.5, 10.8 to 10.13)

Unit – III: Assignment Problem **18 hours**

Introduction - Mathematical Formulation of the Problem - Solution Methods of Assignment Problem – Special Cases in Assignment Problems – Travelling Salesman Problem. (Chapter 11: Sections: 11.1 to 11.4, 11.7)

Unit – IV: Inventory Control **18 hours**

Introduction – Types of Inventories – Reasons for Carrying Inventories – The Inventory Decisions – Objective of Scientific Inventory Control – Costs Associated with Inventories – Factors Affecting with Inventory Control – An inventory Control Problem - Deterministic Inventory problem with No shortages. (Chapter 19: Sections: 19.1 to 19.10)

Unit – V: Network scheduling by PERT and CPM **18 hours**

Introduction – Network: Basic Components – Logical Sequencing - Rules of Network Construction – Concurrent Activities – Critical Path Analysis – Probability Considerations in PERT- Distinction between PERT and CPM. (Chapter 25 only)

Prescribed Book

KantiSwarup, P.K. Gupta, Man Mohan, Operations Research, Sultan Chand &Sons, New Delhi, 2008.

Reference Books

1. P.K. Gupta, Operations Research, 8-e, Krishna PrakasamMandir, Meerut, 1993.
2. P.K.Gupta and D.S. Hira, Operations Research, S. Chand & Company, New Delhi, 2000.
3. J.K.Sharma, Operations Research Theory and Applications, 2-e, Macmillian Business Books, 2003.
4. Hamdy A. Taha, Operations Research, Pearson Education, New Delhi, 2002.

E-Materials:

http://mathworld.wolfram.com

Course Learning Outcomes

After the successful completion of this course, the students will be able to:

- understand the linear programming problems(LPP)
- discuss the simplex method to solve LPP
- analyse the transportation and assignment problems
- acquire the knowledge of resource leveling
- study inventory control and functional role of inventory.
- learn PERT-CPM technique for project management

OPEN ELECTIVE
PAPER - 3

C. SCILAB

Course Objectives:

The objectives of the course is to

- acquire the practical knowledge of SCILAB
- solve the matrics, polynomials and differential equations.

Unit - I: **18 hours**

Login - Talking between Scilab and the Editor - Basic Commands - Linear Algebra - Loops and Conditionals - Help in Scilab. (Chapter 1: Sections 1.1 to 1.7).

Unit – II: **18 hours**

Matrices and Vectors - Solving Equations - Creating Matrices - Systems of Equations. (Chapter 2: Section 2.2).

Unit – III: **18 hours**

Plotting Lines and Data - Adding a Line - Hints for Good Graphs – Graphs - Function Plotting - Component Arithmetic - Printing Graphs - Saving Graphs. (Chapter 3: Sections 3.2, 3.3).

Unit – IV: **18 hours**

Evaluation of Polynomials – Polynomials - Linear Least Squares (Heath Computer Problem).(Chapter 6: Sections 6.2, 6.3, 6.4).

Unit – V: **18 hours**

Differential Equations - Scalar ODE's - Order 2 ODE's . (Chapter 8: Sections 8.2).

Prescribed Book

Graeme Chandler and Stephen Roberts, Scilab Tutorials for Computational Science, 2002.

Reference Books:

1. Scilab for very beginners, Scilab Enterprises, S.A.S, 143, bis rue Yves Le Coz – 78000 Versailles (France).
2. K. S. Surendran, SCILAB FOR DUMMIES, Version 2.6.
3. Some notes on SCILAB, Universit´e de Nice Sophia-Antipolis.

E-Materials:

https://www.scilab.org/

Course Learning Outcomes

After the successful completion of this course, the students will be able to

- acquire the practical knowledge of SCILAB
- analyse the matrices, polynomials in SCILAB
- solve the solutions of differential equations
- visualize the mathematical objects in 2D and 3D

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 – Rouche'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, irrational 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 algebraand Hilbert Spaces
- providethe 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 nnBanach 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 $r(x) = \lim \left\| x^n \right\|^{1/n}$ - 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
- analyseKnapsact, 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:**Sections2.4 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:**Sections4.5 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:**Sections5.2, 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. Scarboraugh, 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/stepsa.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 VARIATION 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: VariationalProblems 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 –Fredholmalternative – 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:3.1to 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 theconcept of calculus of variation and its applications
- discuss the various types of integral equations
- analysethe 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 – JointProducts - Generalization to m variables - (Chapter 4: Sections 4.1 to 4.6)

Unit-2: CES Production **15 hours**
Homogeneous Production functions – CESProduction Function.
(Chapter 5: Sections5.1 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 ofIndia, New Delhi, 1978
2. A.C.Chiang, Fundamental Methods of Mathematical Economics, McGraw Hill, NewYork, 1984
3. Michael D. Intriligator, Mathematical Optimization and Economic Theory, PrenticeHall, New York, 1971.

4. A. Kautsoyiannis, Modern Microeconomics (2 ndedn) MacMillan, New York, 1979

E –Materials

1. 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 – Manipolators – 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.

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++

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. PHYSICS
DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
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	Mechanics	25	75	100
	III	Core Practical	Practical-1	4	-		-	-	-
4.	III	Allied -1	Paper-1	4	3	Chemistry I or Biochemistry I	25	75	100
	III	Allied Practical	Practical-1	2	0		0	0	0
5.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9.	III	Core Theory	Paper-2	4	4	Heat and Thermodynamics	25	75	100
10.	III	Core Practical	Practical-1	3	2	Practical - I	25	75	100
11.	III	Allied-1	Paper-2	4	3	Chemistry II or Biochemistry II	25	75	100
12.	III	Allied Practical	Practical-1	2	2	Practical-Allied	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**		**225**	**675**	**900**
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**
SEMESTER V									
29.	III	Core Theory	Paper-5	6	6	Atomic and Molecular Physics	25	75	100
30.	III	Core Theory	Paper-6	6	6	Relativity and Quantum mechanics	25	75	100
31.	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
32.	III	Elective	Paper-1	4	3	Group (A) or (B) or (C)	25	75	100
33.	IV	Skill Based Subject	Paper-3	2	2	Cell Phone Technology	25	75	100
		Sem. Total		**30**	**23**		**125**	**375**	**500**
SEMESTER VI									
34.	III	Core Theory	Paper-8	5	4	Nuclear and Particle Physics	25	75	100
35.	III	Core Theory	Paper-9	4	4	Solid State Physics	25	75	100
36.	III	Core Practical	Practical-3	3	3	General Practical	25	75	100
37.	III	Core Practical	Practical-4	3	3	Electronics Practical	25	75	100
38.	III	Elective	Paper-2	4	3	Group (A) or (B) or (C)	25	75	100
39.	III	Elective	Paper-3	4	3	Group (A) or (B) or (C)	25	75	100
40.	III	Compulsory Project	Paper -10	5	5	Group / Individual Project	25	75	100
41.	IV	Skill based Subject	Paper-4	2	2	Weather forecasting	25	75	100
42.	V	Extension Activities		0	1		100	0	100
		Sem. Total		**30**	**28**		**300**	**600**	**900**
		Grand Total			**140**				**4200**

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 studentsfor 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

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 ofa 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 ofcharge in a circuit containing C and R-Measurement of High resistance byleakage-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 Galvanometermethod 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 Murugeshan- Electricity and magnetism, S Chand & Co., New Delhi, 2006.

Unit 4 and Unit 5

1. R Murugeshan- 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.learncbse.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–ACElectricity-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-Lechlanche 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 Wheastone'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, 201.4
2. V.Devanathan, Nuclear Physics, ,Narosa Publishing House, New Delhi, 2013.
3. D.P. Kothari,K.C. Singal&RakeshRanjan, 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 aliquid -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. Murugeshan, Optics & Spectroscopy, S.Chand&Co.Ltd, New Delhi, 2016.

Reference Books

1. R. Murugeshan, 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 - Guass, 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 Pvt Ltd, 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. Murugeshan, 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 Pvt Ltd, New Delhi, 2016.
3. R. Murugeshan, 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.smartbmicalculator.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. Spectometer -i-d curve-μ of a Prism.
6. Spectometer -Grating -N and λ -Normal incidence method.
7. Spectometer -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.

SEMESTER V

CORE PAPER-5

Atomic and Molecular Physics

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

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

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

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.

UNIT- IV

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.

UNIT- V

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.

Text Books

Unit 1 to Unit 4

1. R. Murugeshan and KiruthigaSivaprasath, Modern Physics, 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. Murugeshan and KiruthigaSivaprasath, Modern Physics, S.Chand&Co.,Ltd, New Delhi,2016
2. R. Murugeshan, 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.

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/~bhasbapat/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.

CORE PAPER-6

Relativity and Quantum Mechanics

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

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

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

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, Energyand 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

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

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_lIkSB9s
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.

CORE PAPER-7
Basic and Applied Electronics

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

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

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

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

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

OP-AMP APPLICATIONS & TIMER

OPAMP -Sign and Scale changer -Adder, subtractor and average-Integrator and differentiator -OP AMP Logarithmic amplifier -Antilogarthmic 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 Thalapathi, 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.

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.

SKILL BASED SUBJECT

PAPER-3

Cell Phone Technology

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

THE 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

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

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

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 tomobile phonehandsets - replacement of Various components ICS.

UNIT- V

MOBILE SERVICE TOOLS

Ultrasonic Cleaner - Computer Connectors - SIM Card Reader – MemoryCard Reader - Mobile Virus - Virus Prevention - Removing Virus – HealthHazards with Mobiles - SAR.

Text Books

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)
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.

SEMESTER VI

CORE PAPER-8

Nuclear and Particle Physics

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

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

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

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

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

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. Murugeshan 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.

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/sailakshmipullookkar/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.

CORE PAPER-9

Solid State Physics

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

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

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

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

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

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 Phsics, New Age International Publishers,New Delhi,2015

Reference Books

1. Gupta and Kumar, Solid State Physics,
2. R. Murugeshan and KiruthigaSivaprasath, Modern Physics,S Chand & Co.,2006
3. M. Arumguarn, 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://tiiciiitm.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 tounderstand 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 togain the knowledge of magnetism in materialsand able to distinguish different magnetic materials. Also able to understand the phenomena of superconductivity and their applications
5. 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.

SKILL BASED SUBJECT
PAPER - 4
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 and idea about weather forecasting

UNIT- I

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- II

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- III

WEATHER SYSTEMS
Global wind systems; air masses and fronts: classifications; jet streams; local thunderstorms; tropical cyclones: classification;-naming tropical cyclonestornadoes; hurricanes

UNIT- IV

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- V

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 AtomsphericScience,PHI Learning Pvt Ltd, New Delhi,2010.
2. Howard J Critcchfield, 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/
12. https://www.youtube.com/watch?v=Q4-Ufqv6kLo (Tamil video)

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.

GROUP (A)

INTERNAL ELECTIVE

PAPER-1

Digital Electronics

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 logiccircuits 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

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

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

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

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring CounterJohnson'sCounter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit BinaryDow Counter-4-Bit Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

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)
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.

GROUP (A)

INTERNAL ELECTIVE
PAPER-2

Fundamentals of Microprocessor-8085

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

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

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

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

MEMORY AND I/O INTERFACE

Memory interface basics-Demultiplexing address/data bus-Generation control signals-2K × 8 ROM/RAM Interface - Direct I/O Interface-In FE 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

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 Book

Unit 1 to Unit 5

1. Fundamental of Microprocessor - 8085 - Architecture, Programming and interfacing – V. Vijyendran, 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=MIx6khOFFoU (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.
5. 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.

GROUP (A)

INTERNAL ELECTIVE

PAPER-3

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- I

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– Quantumdots - Quantum wire - Quantum well - Exciton confinement in quantum dots-surface to volume ratio-semiconducting and magnetic nanoparticles.

UNIT- II

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- III

FABRICATION OF NANOMATERIAL

Synthesis of nanoparticles- wet chemical precipitation method-Synthesis of metal oxide nanoparticles by sol-gel method –Hydrothermal method-Sonochemical method-Electrochemical depositionmethod–Ball milling method.

UNIT- IV

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

APPLICATIONS

Nanoelectronics–OLEDs-OTFTs-SWNT FETs-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 ofNanoscience 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:
3. 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 nanomaterial by electrochemical method, lithographic techniques, atomic layer deposition method etc.
4. After studied unit-4, the student will be able to learn the characterization techniques like 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.

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GROUP (B)

INTERNAL ELECTIVE

PAPER-1

Digital Electronics

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

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

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

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

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring CounterJohnson's Counter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit Binary Dow Counter-4-Bit Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

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. Tauband D. Schilling , Digital Integrated Electronics -, McGraw-Hill Book Company.
5. T.L. Floyd , Digital Fundamentals -, Pearson Education, 8/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)
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.

GROUP (B)

INTERNAL ELECTIVE

PAPER-2

Materials Science

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

ENGINEERING MATERIALS AND CHEMICALBONDING

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

MECHANICAL AND THERMAL BEHAVIOUR OFMATERIALS

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, thermalconductivity, thermal expansion of materials.

UNIT- III

POLYMERS, CERAMICS AND NANOMATERIAL

Polymers - Polymerization mechanism - Polymer structures - Deformation of polymers - Behaviour of polymers-Ceramics-Ceramic phases - Structure - classes - Effect of structureon 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 -fullurences-Carbon nanotubes- Fabrication and structure of carbon nanotubes

UNIT- IV

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

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.

GROUP (B)

INTERNAL ELECTIVE

PAPER-3

Medical Physics

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

X - RAYS

Electromagnetic spectrum, production of x-rays, x-ray spectra-Brehmsstrahlung, Characteristic x-ray- Coolidge tube, x-ray tubedesign, tube cooling stationary mode, Rotating anode x-ray tube, Tube rating, qualityand 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 frequencygenerator, exposure timers and switches, HT cables, HT generation.

UNIT- II

RADIATION PHYSICS

Radiation units exposure, absorbed dose, units: rad, gray,relative biological effectiveness, effective dose, inverse square law- Interaction ofradiation with matter Compton & photoelectric effect, Rem & Sievert, linear attenuationcoefficient - Radiation Detectors: Thimble chamber, condenser chambers, GeigerMuller counter, Scintillation counters and Solid State detectors, ionization chamber, Dosimeters, survey methods, area monitors, TLD, Semiconductor detectors.

UNIT- III

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 (OnlyPrinciple, function and display)

UNIT- IV

RADIATION THERAPHY 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

RADIATION PROTECTION

Principles of radiation protection,protective materials-radiation effects, somatic, genetic stochastic and deterministiceffect. Personal monitoring devices: TLD film badge -pocket dosimeter, OSL dosimeter- Radiation dosimeter- Natural radioactivity, Biological effects of radiation, Radiationmonitors-Steps to reduce radiation to Patient, Staff and Public-Dose Limits forOccupational 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 Theraphy, Third edition,2003.

Reference Books

1. Chandra-LippincotWillams 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.

GROUP (C)

INTERNAL ELECTIVE

PAPER-1

Digital Electronics

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

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

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

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

REGISTERS & COUNTERS

Registers-Shift Registers- Shift Right and Shift Left Shift Registers-Ring CounterJohnson's Counter-Asynchronous/Ripple Counter-Mod-2, Mod-4, Mod-8 and Mod-16 Counter-4-Bit Binary Dow Counter-4-Bit Up/Down Counter-Synchronous Counters-Design of Synchronous Counters-Mod-3, Mod-5 Counter- Synchronous BCD counter.

UNIT- V

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. Tauband D. Schilling , Digital Integrated Electronics -, McGraw-Hill Book Company.
5. T.L. Floyd , Digital Fundamentals -, Pearson Education, 8/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)
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.

GROUP (C)

INTERNAL ELECTIVE

PAPER-2

Radiation Safety

Course Contents

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

BASICS OF ATOMIC AND NUCLEAR PHYSICS

Basic concept of atomic structure; X rayscharacteristic and production; concept of bremsstrahlung and auger electron-Thecomposition 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

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

RADIATION DETECTION AND MONITORING DEVICES

Radiation Quantities and Units: Basicidea of different units of activity, KERMA, exposure, absorbed dose, equivalent dose,effective dose, collective equivalent dose, Annual Limit of Intake (ALI) and derived AirConcentration (DAC) - Radiation detection: Basic concept and working principle ofgas detectors (Ionization Chambers, Proportional

Counter, Multi-Wire ProportionalCounters (MWPC) and Gieger Muller Counter), Scintillation Detectors (Inorganic andOrganic Scintillators), Solid States Detectors and Neutron Detectors, Thermo luminescent Dosimetr.

UNIT- IV

RADIATION SAFETY MANAGEMENT

Biological effects of ionizing radiations-Operationallimits and basics of radiation hazards evaluation and control: radiation protectionstandards-International Commission on Radiological Protection (ICRP) principles,justification, optimization, limitation, introduction of safety and risk management ofradiation. Nuclear waste and disposal management.Brief idea about Accelerator drivenSub-critical system (ADS) for waste management.

UNIT- IV

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,Sterization, Food preservation.

Text Books

Unit 1 to Unit 5

1. R. Murugeshan and KiruthigaSivaprasath, 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 ,JaypeeBrothers,Medical ,Publishers, 2009.

Reference Books

1. Dr. K. Thayalan, Basic Radiological Physics ,Jayapee 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=DvSNlmGu55c
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 qunatities 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.

GROUP (C)

INTERNAL ELECTIVE

PAPER-3

Astrophysics

Course Contents

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

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

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 -Interesteller space - Inter galactic space - Light Year - Astronomical Unit- Astronomical Map.Astronomical Systems -Astronomical co-ordinates - Celestial Sphere - Celestial Equators - Celestial Poles.

UNIT- III

STARS

Birth of Stars -Colour and Age- Life of Stars - Red giant stars - With dwarf star - Neutron Star -Black hole - Supernovae - Constellations - Zodiac - Asteroids - Meteors - Meteorites-Comets.

UNIT- IV

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

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. Theoritical 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.

CORE PRACTICAL

Semester: V & VI

PAPER - 3

Core Practical - 3 (General)

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 -Vibrating magnetic needle -Determination of B_H.
11. Potentiometer - EMF of a Thermocouple.
12. Potentiometer -Calibration of High range Voltmeter.
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 --High resistance by leakage.
18. BG - Internal resistance of a cell.
19. Hartley Oscillator- Using transistor.
20. Colpitt's oscillator-Using transistor.
21. RC Coupled Amplifier- Single stage.
22. FET -Characteristics.
23. UJT - Characteristics.
24. SCR- Characteristics
25. Clipping and Clamping circuits

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, Vellore - 632115

CORE PRACTICAL

Semester: V & VI

PAPER-4

Core Practical-4 (Electronics)

List of Experiments (Any 12 Experiments only)

1. Transistor - Phase shift oscillator.
2. Transistor - Wien bridge oscillator.
3. Emitter Follower.
4. FET-Amplifier.
5. UJT-Relaxation Oscillator.
6. Verification of De Morgan's Theorems.
7. K-Map reduction and logic circuit implementation.
8. Half adder and Full adder - using NAND gate.
9. Half subtractor and Full subtractor- using NAND gate.
10. RS, Clocked RS, and D Flip Flops using NAND gate.
11. Four bit ripple counter - 7473 / 7476.
12. Shift Register - Four bit left / right - 7473 / 7476.
13. D/A converter-4-bit binary weighted resistor method.
14. OP-AMP-Voltage follower, Adder, Subtractor, Averager (inverting mode).
15. OP-AMP- Differentiator and Integrator
16. OP-AMP- Inverting amplifier with frequency gain response.
17. OP-AMP-Astablemultivibrator.
18. Microprocessor 8085-ALP for Number conversion-8 bit -BCD to binary-Binary to BCD
19. Microprocessor 8085-ALP for 8 bit addition, Subtraction -using BCD & Hexadecimal.
20. Microprocessor 8085- ALP for Sum of N elements

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.

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 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. 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 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

THIRUVALLUVAR UNIVERSITY

MASTER OF SCIENCE

M.Sc. PHYSICS

(CBCS Pattern)

(With effect from 2020– 2021)

The Course of Study and the Scheme of Examination

Sl. No.	*Study Components*		*ins. hrs / week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
	Course Title					*CIA*	*Uni. Exam*	*Total*
SEMESTER I								
1.	Core-Theory	Paper-1	5	4	Mathematical Physics - I	25	75	100
2.	Core-Theory	Paper-2	5	4	Classical and Statistical Mechanics	25	75	100
3.	Core-Theory	Paper-3	5	4	Quantum Mechanics - I	25	75	100
	Core-Practical	Paper-1	4	0	General Practical	0	0	0
	Core-Practical	Paper-2	4	0	Electronics Practical	0	0	0
Internal Elective for same major students								
4.	**Core Elective**	**Paper-1**	4	3	(to choose one out of 3) A. Electronic Devices and Applications B.Fiber Optic Communication C. Electronics Communication Systems	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
5.	**Open Elective**	**Paper-1**	3	3	(to choose one out of 3) A.Energy Physics B.Basic Physics C. Communication Physics	25	75	100
			30	**18**		**125**	**375**	**500**
SEMESTER II						*CIA*	*Uni. Exam*	*Total*
6.	Core-Theory	Paper-4	5	4	Mathematical Physics - II	25	75	100
7.	Core-Theory	Paper-5	5	4	Electro Magnetic Theory	25	75	100
8.	Core-Theory	Paper-6	4	4	Quantum Mechanics - II	25	75	100
9.	Core-Practical	Paper-1	4	4	General Practical	25	75	100
10.	Core-Practical	Paper-2	4	4	Electronics Practical	25	75	100
Internal Elective for same major students								
11.	Core Elective	Paper-2	3	3	(to choose one out of 3) A. Nanoscience B.Electronics Instrumentation C. Non- linear optics	25	75	100

External Elective for other major students (Inter/multi disciplinary papers)								
12.	**Open Elective**	**Paper-2**	3	3	(to choose one out of 3) A. Spectroscopy and Lasers B. Physics for Competitive Exams C. Analog and Digital Electronics	25	75	100
13.	***Field Study**		-	2		100	-	100
14.	**Compulsory Paper**		2	2	**Human Rights & Duties**	25	75	100
			30	**30**		**300**	**600**	**900**
SEMESTER III						***CIA***	***Uni. Exam***	***Total***
15.	Core-Theory	Paper-7	5	5	Condensed Matter Physics	25	75	100
16.	Core-Theory	Paper-8	5	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	3	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 registred 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 energycalculations.
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.Ilangovan, 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
10. Delhi, 1999.
11. 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
1. https://www.youtube.com/watch?v=LcoUFX3_A1s
2. https://www.youtube.com/watch?v=-MTYPNfVw5Y
3. https://en.wikipedia.org/wiki/Brillouin_zone
4. http://yclept.ucdavis.edu/course/215b.W17/Kronig-Penney_Rapp-3.pdf
5. https://www.youtube.com/watch?v=6EdotZPaCIA
6. https://www.youtube.com/watch?v=IMbGqcb8aN4
7. https://en.wikipedia.org/wiki/Hund%27s_rules
8. https://en.wikipedia.org/wiki/Meissner_effect
9. https://www.youtube.com/watch?v=NVeAmKUbXvA

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 studyBand 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 quadropole 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 andquark 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

MICROPROCESSOR (8085) & MICROCONTROLLER (8051)

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 8051and 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 analogto digital converter (ADC) and Digital to analog converter (DAC)- Steppermotor 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 todescribe 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.ldeo.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. MATERIALS 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 – Binaryisomorphous systems – Interpretation of phase diagrams-Development ofmicrostructure in isomorphous alloys -mechanical properties ofisomorphous alloys- Binary eutectic systems – Development ofmicrostructure in eutectic alloys – Equilibrium diagrams having intermediatephases 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 plasticdeformation – 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-PhaseMatching-Third Harmonic Generation-Optical Mixing-Parametric Generationof 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 solarcells - 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. Iabch, 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=Yzfl3rtF0SM
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

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 andHydrogen 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 ptype semiconductors - Fermi level in intrinsic semiconductorElectrical 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. Ilangovan, 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=_AwjbHzwWLo
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 CO_2 and H_2O molecules-Dipole moment change in CO_2 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 MössbauerSpectroscopy

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 - Recoillness 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, Spectroscoy (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. httpshttps://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 H_2O and N_2O 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 CO_2 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 Resonsnce – 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 Wiely& 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, BotaRacon, 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 theraphy

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,
4. 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 Pyhon", Wiley
5. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication

E-Materials

1. https://www.tutorialspoint.com/matlab/index.htmww.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=rfscVS0vtbw
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 tolearn 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:
3. 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 – With 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 -Interesteller 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 and idea about weather forecasting

UNIT-1: Introduction to atmosphere

Elementary idea of atmosphere: physical structure andcomposition; compositional layering of the atmosphere; variation of pressure andtemperature with height; air temperature; requirements to measure air temperature;temperature sensors: types; atmospheric pressure: its measurement; cyclones andanticyclones: 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 historicalbackground; need of measuring weather; types of weather forecasting; weatherforecasting methods; criteria of choosing weather station; basics of choosing site andexposure; satellites observations in weather forecasting; weather maps; uncertainty andpredictability; probability forecasts.

Text Books

Unit 1 to Unit 5

1. Chandrasekar, Basics of AtomsphericScience,PHI Learning Pvt Ltd, New Delhi,2010
2. Howard J Critcchfield, 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 usingHe-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 acrystal
14. Analysis of FTIR spectrum – Vibrational assignments of a given sample
15. UV-Vis spectrometer - Analysis of UV- Vis spectrum - Determination ofabsorption 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

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE
B.Sc. CHEMISTRY DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
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	General Chemistry - I	25	75	100
	III	Core Practical	Practical-1	3	0	Volumetric Analysis	0	0	0
4.	III	Allied -1	Paper-1	4	3	(Choose any 1 out of 5) 1. Physics I 2. Botany I 3. Zoology I 4. Biochemistry I 5. Mathematics I*	25	75	100
	III	Allied- 1	Practical-1	3	0		0	0	0
5.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9.	III	Core Theory	Paper-2	5	4	General Chemistry - II	25	75	100
10.	III	Core Practical	Practical-1	3	2	Volumetric Analysis	25	75	100
11.	III	Allied-1	Paper-2	4	3	(Choose any 1 out of 5) 1. Physics II 2. Botany II 3. Zoology II 4. Biochemistry II 5. Mathematics II*	25	75	100
12.	III	Allied Practical - 1	Practical-1	2	2		25	75	100
13.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100
14.	IV	Value Education		2	2		25	75	100
15.	IV	Soft Skill		2	1		25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**

S.NO.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
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	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							**CIA**	**Uni. Exam**	**Total**
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**

S.NO.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
30.	III	Core Theory	Paper-5	6	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	6	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	6	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.	IV	Skill Based Subject	Paper-3	3	2	Applied Chemistry	25	75	100
				30	**19**		**150**	**450**	**600**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
35.	III	Core Theory	Paper-8	6	4	Inorganic Chemistry - II	25	75	100
36.	III	Core Theory	Paper-9	6	4	Organic Chemistry - II	25	75	100
37.	III	Core Theory	Paper-10	6	4	Physical Chemistry - II	25	75	100
38.		Compulsory Project		0	5		25	75	100
39.	III	Core Practical-3	Practical-3	0	2	Gravimetric Estimation	25	75	100
40.	III	Core Practical-4	Practical-4	0	2	Organic Analysis and Preparations	25	75	100
41.	III	Core Practical-5	Practical-5	3	3	Physical Chemistry Experiments	25	75	100
42.	III	Internal Elective	Paper-2	3	3	**Any one from** A. Analytical Chemistry-II B. Textile Chemistry C. Nano Chemistry	25	75	100

43.	III	Internal Elective	Paper-3	3	3	**Any one from** A. Pharmaceutical Chemistry B. Polymer Chemistry C. Green Chemistry	25	75	100
44.	III	Skill based Subject	Paper-4	3	2	Agriculture and Leather Chemistry	25	75	100
45.	IV	Extension Activities		0	1		100	0	100
		TOTAL		**30**	**33**		**350**	**750**	1100

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	10	(3-5)	42	100	1000
	Core practical	5	(2-3)	12	100	500
	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**

* **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 41.

THIRUVALLUVAR UNIVERSITY
B.Sc., CHEMISTRY SYLLABUS UNDER CBCS
(With effect from 2020- 2021)

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 SO_2. 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 - Preparaton and uses of $NaBiO_3$ - 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

(to choose one out of 5)

1. 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 forYoung'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 stimulatedemission – 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,Murugeshan, 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/elecmagnetism/growth-and-delay-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 organells - 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 Tobaco 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 knownledge about different kinds of animal species.

To study the systematic and fuctional 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 charters, **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. Ananthakrishnan. 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

OBJECTIVE:

To acquire knowledge on the structure and functions of biomolecules

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

CO1	Explain the structure, biological importance of carbohydrates, from monosaccharides to polysaccharides
CO2	Identify the structure and classification of amino acids,
CO3	Classify proteins and explain their properties
CO4	Define and classify lipids with examples, explain the properties of fats and describe the structure and biological functions of phospholipids, glycolipids and sterols
CO5	Illustrate the structure of nucleotides, distinguish DNA and RNA and describe the structure of DNA, types of RNA and their biological functions

UNIT-I: Carbohydrates

Definition and Classification of carbohydrate. Monosaccharides–Glucose, Fructose and Arabinose, Linear and ring forms (Haworth formula)for glucose and fructose. Anomer, epimer and enatiomers-Definition with examples. Disaccharides –Definition- Sucrose, maltose and Lactose occurrence, structure and functions. Polysaccharides –Homopolysaccharides -Starch -Structure and functions. Heteropolysacharides-Aminosugars and sugar acids.

UNIT-II: Amino acids

Definition and classification of amino acids. Reaction of amino acids with ninhydrin, Color reactions of amino acids (Xanthoproteic test, Morners test, Millons test, Sakaguchi test, Lead acetate test and Pauly's test), Amphoteric nature, isoelectric pH and Zwitter ion.

UNIT-III: Proteins

Proteins-Definition. Peptide bond formation. Classification of proteins based on solubility, shape and size. Denaturation. Structure of protein: primary, secondary, tertiary and quaternary structure.

UNIT-IV: Lipids

Definition, classification and functions of lipids. Occurrence, chemistry and biologicalfunctions 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: Nucleic acids

Nucleic acid- Composition of nucleic acid. Definition - nucleoside, nucleotide and polynucleotide. Double helical model of DNAand its biological functions. Chargaff's rule. RNA-Structure, types and functions of RNA: tRNA, mRNAand rRNA. Differences between DNA and RNA

REFERENCES

1. J. L. Jain, Nitin Jain, Sunjai Jai., Fundamentals of Biochemistry 7th editionS. Chand @ Co.Ltd .,2016
2. U. Satyanarayanan BiochemistryElseiver 2017
3. David.L.Nelson, Michael. M.Cox Lehninger principles of Biochemistry 7theditionFreeman. W.H. and Company2017
4. Victor Rodwell Harper's Illustrated Biochemistry McGrew. Hill 2018

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 - Elecrodiaysis - 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 CO_2 - 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 - NH_3, 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 electrodialysis 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) Illustratrate 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. Varashney - 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, Haemorrage, 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, Antipyreties, 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 therepheutic importances of Indian Medicinal plants
6) Describe the first Aid and Safety treatment of Shock, Haemorrage, 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

(to choose one out of 5)

1. 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 ofCNT's.

Text Books

Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, 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_lIkSB9s
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=mPxoJz6treE (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 - lightreaction - Calvin cycle Respiration - Glycolysis - Kreb'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, NewDelhi.
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. Gentics. 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

OBJECTIVE:

To acquire a wide knowledge on metabolism, disorders of metabolism and biological functions of vitamins and minerals

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

CO1	Illustrate the reactions of various metabolic pathways
CO2	Acquire knowledge on the various metabolic disorders
CO3	Classify enzymes and explain their functions
CO4	Define and classify vitamins with examples, explain the sources, RDA and functions of fat soluble and water soluble vitamins
CO5	Illustrate the sources, RDA and functions of minerals

UNIT-I: Metabolism

Metabolism-Catabolism and anabolism-Definition. Reactions of glucose oxidation- Glycolysis, TCA cycle and its energetics, HMP shunt and its significance. Amino acid- transamination and Deamination,reaction, Urea cycle- Formation of urea.

UNIT-II: Metabolic Disorders

Diabetes mellitus- definition. Types and symptoms. Glycogen storage diseases-Types, Renal Glycosuria-Definition and causes. In born errors of amino acid metabolism- Phenylketonuria, Alkaptonuria (Black urine syndrome) and albinism

UNIT-III: Enzymes

Enzymes-Definition, IUB system of classification with one example. Mechanism of enzyme action-Lock and key mechanism, Induced Fit theory. Michaleis-Menton equation. Coenzymes- Vitamins as coenzymes (Tabulation of Coenzymes with functions in metabolism)

UNIT-IV: Vitamins

Vitamins- fat soluble (Vitamin A, D, E and K) and water soluble vitamins (Vitamin B1, B2, B3 and B12),Vitamin C - sources, RDA, biological function and deficiency of Vitamins of the above mentioned vitamins

UNIT V-Minerals

Minerals- sources, RDA, biological functions and deficiency of Calcium, Iron, Phosporus, Sodium and potassium. Examples of minerals as cofactors in metabolism.

REFERENCES

1. J. L. Jain, Nitin Jain, Sunjai Jai., Fundamentals of Biochemistry 7th edition S. Chand @ Co.Ltd .,2016
2. U. Satyanarayanan BiochemistryElseiver 2017
3. David.L.Nelson, Michael. M.CoxLehninger principles of Biochemistry 7th editionFreeman. W.H. and Company2017
4. Victor RodwellHarper's Illustrated BiochemistryMcGrew. Hill 2018

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□) and □□□□□□□□

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 - Guass, 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

ALLIED PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

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

CO NUMBER	CO Statement
CO1	Quantify glucose in unknown solution by benedicts method
CO2	Quantify ascorbic acid in lemon by Dichlorophenol indo phenol dye method
CO3	Quantify glycine by Sorenson's formal titration method
CO4	Qualitatively analyze the carbohydrates and amino acids and report the type of carbohydrate based on specific tests
CO5	Differentiate the carbohydrates based microscopic examination of the crystal structure.

Volumetric Estimation

1. Estimation of Glucose by Benedict's method.
2. Estimation of Ascorbic acid by 2, 6 dichlorophenol indophenols dye method.
3. Estimation of Glycine by Sorenson's formal titration.

A) Qualitative analysis of Carbohydrates

1. Qualitative analysis of Glucose,
2. Qualitative analysis of Fructose,
3. Qualitative analysis of Sucrose
4. Qualitative analysis of Maltose,
5. Qualitative analysis of Starch

B) Qualitative analysis of Amino acids

1. Qualitative analysis of Arginine,
2. Qualitative analysis of Cysteine,
3. Qualitative analysis of Tryptophan
4. Qualitative analysis of Tyrosine
5. Qualitative analysis of Histidine

REFERENCES

1. J. Jayaraman,Laboratory Manual in Biochemistry New Age International Pvt Ltd Publishers 2011
2. S. K. SawhneyRandhir Singh Introductory Practical Biochemistry Alpha Science International, Ltd,2 edition, 2005.
3. Irwin H.Saegal Biochemical calculations Liss, Newyork 1991

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 Soyabeans.

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).

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.

UNIT - I

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, AX_3, AX_5 and AX_7 type of Compounds - Pseudohalogens and pseudohalides - Cyanogen and Thiocyanogen - Comparison of Pseudohalogens and Halogens - Basic Properties of Iodine - Evidences.

UNIT - II

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 Iomerism, Ligand Isomerism, Coordination Isomerism, Coordination position Isomerism and Polymerisation Isomerism - Geometrical and Optical Isomerism in 4- and 6- Coordinated Complexes.

UNIT - III

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

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

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.

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.

UNIT - I

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

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

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

Nitroalkanes - Preparation - Properties - Structure - Nitro-Acinitro Tautomerism - Uses of Nitroalkanes - Differences between Primary, Secondary and Tertiary Nitroalkanes. Diazomethane,Diazoaceticester,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

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.

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.

UNIT - I

SOLUTIONS

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

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,$FeCl_3$-H_2O,KI-H_2O systems. Freezing Mixtures.

UNIT - III

COLLIGATIVE PROPERTIES AND CHEMICAL EQUILIBRIUM

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 Kp,Kc and Kx 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

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 - Onsagar 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

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.

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.

UNIT - I

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 - Recrystalisation - Use of immiscible solvents - Soxhlet extraction - Crystallisation - Use of miscible solvents - Fractional Crystallisation and Sublimation.

UNIT - II

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

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

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

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 Winstor 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 Insternational 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.

INTERNAL ELECTIVE

PAPER - 1

B. BASICS OF COMPUTER PROGRAMMING IN C AND ITS APPLICATIONS IN CHEMISTRY

Objective:

- To introduce the basics of computers.
- To learn C language and its applications in solving problems in Chemistry.

UNIT - I

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

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

Control Structures - Conditional, Looping, Goto, Break, Switch and Continue Statements, Functions, Arrays And Pointers.

UNIT - IV

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

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-Lande 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.

UNIT - I

DISCONNECTION APPROACH

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

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

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

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

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, Plenium Press.
- Modern Synthetic Reactions. H. O. House and W. A. Benjamin,

SKILL BASED SUBJECT

PAPER - 3

APPLIED CHEMISTRY

Objective:

- To impart Knowledge about Petrochemicals, Paper Technology, Sugar Industry, Explosives, Photography and Diary 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.

UNIT - I

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

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

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

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

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.

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.

UNIT - I

NUCLEAR CHEMISTRY

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

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

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 $V_2 O_5$.

UNIT - IV

INNER TRANSITION ELEMENTS

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 - Positon of Actinides in the periodic table - Extraction of Thorium and Uranium

UNIT - V

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.

CORE PRACTICAL

PAPER - 3

GRAVIMETRIC ESTIMATION

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.

UNIT - I

MOLECULAR REARRANGEMENTS

Rearrangements - Classification - Anionotrpic, 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

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

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

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

ORGANOSULPHUR COMPOUNDS AND AROMATIC SULPHANIC ACIDS.

Thioalcohols-Structure-Nomenclature-methods of preparation-Physical and Chemical properties - Thioethers-Stucture-Nomenclature-Physical and Chemical properties - dimethyl sulphoxide - uses.Mustard gas-Preparation-Properties and uses - Aromatic sulphanic acid - stucture-Nomenclature-benzene sulphanic acid,benzene sulphanyl chloride, benzene disulphanic acids,Toluene sulphanic acids,Chloramine-T,Saccharin and sulphanilic acid-Chemical properties and uses.

CORE PRACTICAL

PAPER - 4

ORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS

Analysis of organic compounds containing one functional group and characterisation with a derivative.

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 - 5^{th} 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 raection.
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.

UNIT - I

ELECTROCHEMISTRY - III

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

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 (H_2-O_2 Cell).

UNIT - III

CHEMICAL KINETICS

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

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

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 - H_2-Cl_2 and H_2-Br_2 reactions - Photodimerisation of Anthracene.

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.

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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. Dnyder - 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

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.
10. Physical Chemistry - Walter J. Moore - Orient Longman - 1972.
11. Numerical Problems on Physical Chemistry, Gashal - Books and Allied (P) Ltd.,
12. Universal General Chemistry, C.N.R. Rao, Macmillan.
13. Group Theory and its Chemical Applications - P. K. Bhattacharya - Himalaya Publishing House.
14. Text book of Physical Chemistry - M. V. Sangaranarayanan, V. Mahadevan, Universities Press - 2011.
15. General and Physical Chemistry - Dr. A. Arunabhasan, Books of Allied (P) Ltd., - Ghosal - 2009.

CORE PRACTICAL

PAPER - 5

PHYSICAL CHEMISTRY EXPERIMENTS

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. $Na_2S_2O_3.5H_2O$, $CH_3COONa.3H_2O$, $SrCl_2.6H_2O$, $MnCl_2.4H_2O$

5. **Electrochemistry**

Conductivity

a) Determination of Cell Constant and Equivalent Conductivities ofthe 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.

UNIT - I

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 - Reqirement 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

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

NMR Spectroscopy - Principle of Nuclear Magnetic Resonance - Basic Instrumentation - Number of Signals - Chemical Shift - Shielding and Deshielding - Factors influencing Chemical Shift - Spin-Spin Coulpling and Coupling constants - TMS as NMR standard - Splitting of Signals - NMR Spectra of simple Organic Molecules - Applications in Structural Elucidation.

UNIT - IV

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

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 - CH_3, CD_3, 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 ($CaC_2O_4.H_2O$, $CuSO_4.5H_2O$) and DTA curves - Factors Affecting TGA and DTA Curves - Thermometric Titrations - Principle and Applications.

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 .

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 Moleculars Spectroscopy - 4th Edition, C. N. Banwell and E. M. McCash - Tata McGrow 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 Orgnic 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 McGrow Hill, New Delhi - 2006.
17. Elementary Organic Spectroscopy - Principles and Chemical Applications - Y. R. Sharma, S. Chand & Company Private Limited, V Revised Edition - 2013.

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.

UNIT - I

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

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

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

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

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.

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.

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.

INTERNAL ELECTIVE

PAPER - 2

C. NANO CHEMISTRY

Objectives:

- To introduce the Basics of Nanotechnology.
- To learn the Instrumental Techniques used in Characterisation of Nanomaterials.

UNIT - I

BASICS OF NANOCHEMISTRY

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

NANOPARTICLES

Introduction - Types of Nanoparticles - Preparation, Properties and Uses of Gold, Silicon, Silver, Zinc Oxide, Iron Oxide, Alumina and Titania Nanoparticles.

UNIT – III
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

Preparation, Properties and Applications of Carbon Nanotubes, Nanorods, Nanofibres and Nanoclays.

UNIT - V

INSTRUMENTAL TECHNIQUES

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).

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.

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.

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.

UNIT - I

Definition of the following terms - Drug, Pharmacophore, Pharmacology, Pharmacopoeia, Bacteria, Virus, Chemotherapy and Vaccine - Causes, Symptoms and Treatment for Jaundice, Cholera, Malaria and Filaria - First Aid for Accidents - Antidotes for Poisoning - Organic Pharmaceutical Aids - Their Role as Preservatives, Antioxidants, Colouring, Flavouring and Sweetening agents - Examples.

UNIT - II

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

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

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

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.

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.

UNIT - I

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

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

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

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

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 - Polmers 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, Jayader 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.

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.

UNIT - I

GREEN CHEMISTRY - INTRODUCTION

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, Hundsdiecker and Wittig reactions).

UNIT - II

GREEN SOLVENTS

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 CO_2 - Preparation, Properties and Applications (Decaffeination, Dry cleaning) - Environmental impact.

UNIT - III

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

Green Catalysis - Heterogeneous catalysis - Uses of Zeolites, Silica, Alumina, Clay supported catalysis - Biocatalysis - Enzymes and Microbes - Phase Transfer Catalysis (PTC) - Principles, Catalysts and Lipophility 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

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 Jercy, (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. Segreev, Elsevier, Science, New York, (2006)

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.

UNIT - I

SOIL CHEMISTRY

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

Fertilisers - Definition - Classification - Requirements of a Good fertiliser - Nitrogen fertiliser - Urea - Preparation and Uses - Potash fertiliser - KCl, K_2SO_4 and KNO_2 - Preparation and Uses - Phosphorus fertiliser - Phosphatic slag, Superphophate 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

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

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

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.

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.

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.

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) <u>Molecular weight</u>

Error upto 10 %: 45

20 %: 35

30 %: 25

> 30 %: 15

3) <u>Effect of electrolyte on CST</u>

Graph: 10

Error upto 10 %: 35

20 %: 25

30 %: 15

> 30: 10

4) <u>Transition temperature</u>

Graph: 10

Error upto 2^{o}C difference: 35

7^{o}C difference: 25

> 7^{o}C difference: 15

5) <u>Conductance</u>

<u>Equivalent conductance: 25 marks</u>		**<u>Cell constant : 20 marks</u>**	
Error upto 10 %	: 25	Error upto 10 %	: 20
Upto 15 %	: 15	Upto 15 %	: 15
>15 %	: 10	>15 %	: 10

6) <u>Conductometric titration</u>

Graph: 10

Upto 2 % : 35

2.1 to 3 % : 30

3.1 to 4 % : 25

4.1 to 5 % : 20

> 5% : 15

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THIRUVALLUVAR 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

S. No.	Study Components		Ins. Hrs/ week	Credit	Title of the Paper	Maximum Marks		
	Course Title							
SEMESTTER I						**CIA**	**Uni. Exam**	**Total**
1.	Core Theory	Paper-1	4	4	Organic Chemistry- I	25	75	100
2.	Core Theory	Paper-2	4	3	Inorganic Chemistry- I	25	75	100
3.	Core Theory	Paper-3	4	3	Physical Chemistry- I	25	75	100
	Core Practical	Paper-1	4	0	Organic Chemistry Practical- I	-	-	-
	Core Practical	Paper-2	4	0	Inorganic Chemistry Practical- I	-	-	-
	Core Practical	Paper-3	4	0	Physical Chemistry Practical- I	-	-	-
Internal Elective for same major students								
4.	**Core Elective**	Paper-1	3	3	(to choose 1 out of 3) A. Advanced Polymer Chemistry B. Heterocyclic Chemistry C. Materials Chemistry	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
5.	**Open Elective**	Paper-I	3	3	(to choose 1 out of 3) A. Chemistry in Agriculture B. Food Chemistry C. Industrial chemistry-I	25	75	100
			30	**16**		**125**	**375**	**500**
SEMESTER II						**CIA**	**Uni. Exam**	**Total**
6.	Core Theory	Paper-4	3	3	Organic Chemistry- II	25	75	100
7.	Core Theory	Paper-5	3	4	Inorganic Chemistry- II	25	75	100
8.	Core Theory	Paper-6	3	3	Physical Chemistry- II	25	75	100
9.	Core Practical	Paper-1	5	3	Organic Chemistry Practical- I	25	75	100
10.	Core Practical	Paper-2	5	3	Inorganic Chemistry Practical- I	25	75	100
11.	Core Practical	Paper-3	5	3	Physical Chemistry Practical- I	25	75	100
12.	Compulsory paper		2	2	Human Rights	25	75	100

Internal Elective for same major students								
13.	**Core Elective**	Paper-2	2	3	(to choose 1 out of 3) A. Green Chemistry B. Supramolecular and Nanochemistry C. Modern Separation Techniques	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
14.	**Open Elective**	Paper-II	2	3	(to choose 1 out of 3) A. Medicinal Chemistry B. Textile chemistry C. Diary Chemistry	25	75	100
15.	* Field Study		**-**	2		**-**	**-**	**100**
			30	**29**		**225**	**675**	**1000**
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 +25 viva)		100
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 registred 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.

SECOND YEAR
SEMESTER III
PAPER - 7
ORGANIC CHEMISTRY III

OBJECTIVE:

To understand the concepts of spectral techniques and to apply these techniques for the quantitative and structural analysis of organic compounds. To understand the concept of Photochemical and Pericyclic Reactions. To study the synthesis of heterocycles, vitamins and steroids.

OUTCOMES:

The student will be able to

- *Visualize the importance of UV-Visible and IR spectroscopy.*
- *Acquire knowledge of vibrational transition and identify various functional groups*
- *Apply the concept of Mass spectroscopy to different compounds*
- *Elucidate the structure of organic compounds using NMR*
- *Solve photochemical and pericyclic problems*
- *Illustrate the synthesis of heterocycles*

UNIT-I: UV AND IR SPECTROSCOPY AND THEIR APPLICATIONS

Ultraviolet-Visible spectroscopy: Types of electronic transitions - chromophores and auxochromes - factors influencing the positions and intensity of absorption bands - absorption spectra of dienes, polyenes and unsaturated carbonyl compounds - Woodward - Fieser rules and its applications.

Infra Red Spectroscopy: Vibrational frequencies and factors affecting them - identification of functional groups - intra and inter molecular hydrogen bonding – functional group region- finger print region.

UNIT-II: NMR SPECTRA AND ITS APPLICATIONS

Nuclear spin - magnetic moment of a nucleus - nuclear energy levels in the presence of magnetic field - basic principles of NMR experiments - CW and FT NMR - ^{1}H NMR - Chemical shift and coupling constant - factors influencing proton chemical shift and vicinal proton - proton coupling constant- ^{1}H NMR spectra of simple organic molecules such as CH3CH2Cl and CH3CHO. AX and AB spin system - nuclear overhauser effect-chemical exchange.

^{13}C NMR - proton decoupling and Off resonance decoupling spectra - factors affecting ^{13}C NMR chemical shift - ^{13}C NMR spectra of simple organic molecules.

UNIT-III: PHYSICAL METHODS OF STRUCTURAL DETERMINATION

Mass spectroscopy - Principles - measurement techniques - (EI, CI, FD, FAB, SIMS) - presentation of spectral data - molecular ions - isotope ions - fragment ions of odd and even electron types - factors affecting cleavage patterns - simple and multicentre fragmentation – Mc Lafferty rearrangement - Mass spectra of hydrocarbons, alcohols, phenols, aldehydes and ketones. ORD and its applications - Octant rule - Cotton effect - Axial halo ketone rule - Problem solving (for molecules with a maximum number of C10).

UNIT-IV: PHOTOCHEMISTRY AND PERICYCLIC REACTIONS

Photochemical excitation - fate of the excited molecules - Jablonskii diagram - study of photochemical reactions of ketone - photo reduction - photo cycloaddition - Paterno - Buchi reaction - di pi-methane rearrangement - Pericyclic analysis of electrocyclic - cyclo addition and sigmatropic reactions - correlation diagrams for butadiene - cyclobutene system - hexatriene to cyclohexadiene systems - structure of Bullvalene - fluxional molecule - Cope and Claisen rearrangement.

UNIT-V: HETEROCYCLES, VITAMINS AND STEROIDS

Synthesis of imidazole, oxazole, thiazole, flavones, isoflavones, anthocyanins, pyrimidines (cytocine, uaracil only) and purines (adenine, guanine only). Synthesis of Vitamin-A1 using Wittig method. Conversion of cholesterol to progesterone, estrone and testosterone.

RECOMMENDED BOOKS

1. Francis A. Carey and Richard J. Sundberg, Advanced organic chemistry, III Edition (1990). G.A Swan,Introduction to alkaloids
2. I.L. Finar, Organic chemistry, Vol. II, 5thedition ELBS publication.
3. J. Dyer, Application of absorption spectroscopy of organic compounds, Prentice and Hall of India, Pvt., New Delhi.
4. J. March, Advanced organic reaction mechanism and structure, Tata McGraw Hill.
5. Neil S. Issac, Physical organic chemistry, ELBS publication 1987.
6. O.P. Agarwal, Chemistry of organic Natural Products, Goel Publishing House, Meerut.
7. P.S. Kalsi, Spectroscopy of organic compounds,Wiley Eastern Ltd., Chennai.
8. R.M. Silverstein, G.d. Bassler and Monsu, Spectrometric identification of organic compounds, John Wiley and Sons, New York.
9. S.M. Mukherji and S.P. Singh,Organic Reaction Mechanism, MacMillan India Ltd., Chennai (1990).
10. Schliemann, Introduction to the spectroscopic methods for the identification organic compounds, 2 volumes, Pergamon Press.
11. W. Kemp, Spectroscopy, Macmillan Ltd.,
12. Y.R. Sharma,Structural identification of organic compounds, S. Chand & Co.

13. R.O.C. Norman, J.M. Coxon, Principle of Organic Synthesis, ELBS Publications,1994.
14. R. T. Morrison and R. N. Boyd, Organic chemistry, 6th edition, Prentice Hall of India Limited., New Delhi, 1992
15. Heterocyclic Chemistry, Vol. 1-3, R. R. Gupta, M. Kumar and V.Gupta, Spinger Verlag.
16. The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme.
17. Heterocyclic Chemistry, J. A. Joule, K. Mills and G. F. Smith, Chapman and Hall.
18. Heterocyclic Chemistry, T. L. Gilchrist, Longman Scientific Technical.
19.Charles H.Depey and Orville, Molecular Reaction and Photochemistry,L. Chapman, Prentice Hall of India Pvt., Ltd., New Delhi.

PAPER- 8
INORGANIC CHEMISTRY III

OBJECTIVE:

To study about the Coordination complexes, Substitution in Coordination complexes and Inorganic Photochemistry.

OUTCOMES:

The student will be able to

- *Explain about carbon donors*
- *Describe the structure and bonding of metallocenes (ferrocenes)*
- *Illustrate the different types of reaction of organo metallic compounds.*
- *Discuss the various catalysis processes in organo metallic chemistry.*
- *Explain the Electron transfer reactions of co-ordination compounds.*
- *Describe the various substitution reactions of coordination compounds.*
- *Analyse various types of photochemical reactions.*

UNIT-I: ORGANO METALLIC CHEMISTRY - I

Carbon donors: Alkyls and aryls metallation, bonding in carbonyls and nitrosyls, chain and cyclic donors, olefins, acetylene and allyl system. Synthesis, structure and bonding of metallocenes (ferrocene only).

Reactions: Association, substitution, addition and elimination reactions, ligand protonation, electrophilic and nucleophilic attack on ligands. Carbonylation, decorboxylation, oxidative addition and fluxionality.

UNIT-II: ORGANO METALLIC CHEMISTRY - II

Catalysis: Hydrogenation of olefins (Wilkinson's catalyst), hydroformylation of olefins using cobalt or rhodium catalysts (Oxo process), oxidation of olefins to aldehydes and ketones (Wacker process), polymerization (Zeigler - Natta Catalyst); cyclo oligomerisation of acetylene using nickel catalyst (Reppe's catalyst); polymer-bound catalysts.

UNIT-III: COORDINATION CHEMISTRY - IV

Electron transfer reactions, outer and inner sphere processes; atom transfer reaction, formation and rearrangement of precursor complexes, the bridging ligand, precursor and successor complexes. Marcus theory. Complementary, non-complementary and two electron transfer reactions.

UNIT-IV: COORDINATION CHEMISTRY - V

Substitution Reactions: Substitution in square planar complexes, reactivity of platinum complexes, influences of entering, leaving and other groups, the Trans effect.

UNIT-V: COORDINATION CHEMISTRY - VI

Substitution of octahedral complexes of cobalt and chromium, replacement of coordinated water, solvolytic (acids and bases) reaction applications in synthesis (platinum and cobalt complexes only).

Inorganic Photochemistry: Photo-substitution, Photoredox and isomerisation process, application of metal complexes in solar energy conversion.

Text books

1. R.C. Mehrothra, A. Singh, Organo Metallic Chemistry, Wiley Eastern Co., (1992).
2. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY (1967).
3. J. Huheey, Inorganic Chemistry, Harper and Collins, NY IV Edition, (1993).
4. K.F. Purcell and J.C. Kotz, Inorganic Chemistry, W. Saunders Co., (1977).
5. S. FA Kettle, Coordination Chemistry, ELBS, (1973).
6. F.A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, John Wiley and Sons, V Edition (1988).
7. D.F. Shrivers, Pw. Atkins and C.H. Langford, Inorganic Chemistry, OUP (1990).
8. Guillermo J. Ferraudi, Elements of inorganic photochemistry, Wiley (1988).
9. Arthur W. Adamson, Paul D. Fleischauer, Concepts of inorganic photochemistry, Wiley(1975).

Suggested References

1. G. Coates M.l. Green and K. Wade. Principles of Organometallic chemistry, Methven Co., London (1988).
2. P. Powell, Principles of Organometallic chemistry, Chappman and Hall. (1998).
3. G.S. Manku, Theoretical Principles of Inorganic Chemistry, McGraw-Hill Education, (1984).
4. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974).
5. R.B. Heslop and K. Jones, Inorganic Chemistry, Elsevier Scientific Publ., (1976).
6. F. Basolo and R.G. Pearson, Mechanism of Inorganic Reaction, Wiley NY (1967).
7. M.C. Day and J. Selbin, Theoretical Inorganic Chemistry, Van Nostrand Co., New York (1974).

8. B.E. Dogulas DH McDaniel's and Alexander, Concepts and Models of Inorganic Chemistry, Oxford IBH (1983).
9.WU. Mallik, G.D. Tuli, R.D. Madan, Selected topics in Inorganic Chemistry, S. Chand and Co., New Delhi (1992).

PAPER-9
PHYSICAL CHEMISTRY III

OBJECTIVES:

To study the electrochemical kinetics, over potential, corrosions and fuel cells. To know the solid state and its properties. To Study the principles and applications of spectroscopy. To study statistical thermodynamics,

OUTCOMES:

The student will be able to

- *Derive Butler-Volmer equation and explain Pourbaix and Evan's diagram of corrosion.*
- *Explain electrical and magnetic properties of solids.*
- *Describe the basic principles and applications of microwace, vibrational, Raman, NMR and electronic spectroscopy.*
- *Compare Maxwell-Boltzmann and Fermi-Dirac and Bose-Einstein statistics.*

UNIT-1: ELECTROCHEMISTRY- III

Mechanism of electrode reactions - polarization and over potential - the Butler-Volmer equation for one step and multistep electron transfer reactions - significance of electron exchange current density and symmetry factors - transfer coefficient and its significance - mechanism of the hydrogen and oxygen evolution reactions.

Corrosion and passivation of metals - Pourbaix diagram - Evan's diagram - fuel cells - electrodeposition - principle and applications.

UNIT-II: SOLID STATE

Classification of solids - Imperfection in solids - point, line and plane defect - Electrons and holes - Non-stoichiometry - Imperfection and physical properties of solids (brief study). **Electrical properties** - electrical conductivity - Hall effect - dielectric properties - piezo electricity, Ferro electricity and conductivity; **Optical properties** - Photo conductivity -luminescence - color center - lasers - refraction - birefringence;

Magnetic properties - diamagnetism - paramagnetism - ferro - antiferro and ferrimagnetisms. Calculation of magnetic moments. Mechanical and thermal properties.

UNIT-III: SPECTROSCOPY - I

Microwave spectroscopy – Rotational spectroscopy of rigid rotator - non rigid rotator - diatomic and polyatomic molecules.

Vibrational spectroscopy - Harmonic oscillator - anharmonicity - vibrational spectra of polyatomic molecules - vibrational frequencies - group frequencies - vibrational coupling- overtones - Fermi resonance.

Raman Spectroscopy- Raman effect, Stoke's and Anti-stoke's lines, rotational and vibrational Raman spectra.

Electronic spectroscopy - Progressions and sequences, selection rules, Franck - Condon principle, types of electronic transitions - solvent effects.

UNIT-IV: SPECTROSCOPY- II

Resonance spectroscopy - Zeeman effect - equation of motion of spin in magnetic fields - chemical shift - spin-spin coupling - NMR of simple AX and AMX type molecules - calculation of coupling constants - ^{13}C, ^{19}F, ^{31}P NMR spectra - applications - a brief discussion of Fourier Transformation Resonance Spectroscopy.

UNIT-V: STATISTICAL THERMODYNAMICS- I

Objectives of statistical thermodynamics - concept of thermodynamic and mathematical probabilities - permutations and combinations, distribution of distinguishable and non-distinguishable particles. Stirling approximation, Maxwell - Boltzmann distribution law - Fermi - Dirac and Bose - Einstein statistics - comparison with Maxwell -Boltzmann distribution law and their applications - radiation law - electron gas in metals.

Partition function - evolution of translational, vibrational and rotational partition functions for mono and diatomic ideal gases.

Text Books

S.Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi (1960).

D.R. Crow, Principles and Applications to Electrochemistry, Chapman and Hall (1991).

S. Glasstone, Introduction to Electrochemistry, Affiliated East West Press, New Delhi (1960).

P.H.Rieger, Electrochemistry, Chapman and Hall, New York (1994).

R.Crow, Principles and Applications to Electrochemistry, Chapman and Hall (1991).

Lesley E.Smart, Elaine A.Moore, Solid State Chemistry - An Introduction
Charles Kittel - Introduction to Solid State Physics
Anthony R. West - Solid State Chemistry and its Applications
C.N. Banwell and E.M. McCash, Fundamentals of Molecular spectroscopy, IV - Edition, Tata McGraw Hill (2005).
N. Sathyanarayana, Vibrational Spectroscopy, New Age International Publishers (2004).
Caringtion and Ad. Mclachlan, Introduction to Magnetic Resonance, Harper and Row, New York (1967).
M. C.Gupta, Statistical thermodynamics, Wiley Easter, New Delhi (1990).
R.Hasee, Thermodynamics Of Irreversible Process, Addition Wesley, Reading, Mass (1969).

Suggested References

J.O.M. Bokris and A. K. N. Reddy, Electrochemistry, Vol. 1 and 2, Plenum, New York (1977).
P. Dalahay, Electrode Kinetics and Structure of Double Layer, Inter Science, New York (1965).
J.Robbins, Ions in Solution-An Introduction to Electrochemistry, Clarendon Press, Oxford (1993).
H.Reiger, Electrochemistry, Chapman and Hall, New York (1994).
W.J. Moore, Physical Chemistry, Orient Longman, London (1972).
J.M. Murrell, S.F.A. Kettle and J.M. Tedder, The Chemical Bond, Wiley (1985).
R.C. Ropp, Solid State Chemistry
C N. Banwell, Fundamentals of Molecular Spectroscopy, Mc Graw Hill (1966).
Raymond Chang, Basic Principles of Spectroscopy, McGraw Hill Ltd., New York (1971).
G M. Barrow, Introduction to Molecular Spectroscopy, Mc Graw Hill, New York (1962).
W. Kemp, NMR in Chemistry, Mc Millan Ltd., (1986).
D. Mclauchlan, Magnetic Resonance, Oxford Chemistry Series, Oxford (1970).
P. Staughan and S. Walker, Spectroscopy, Vol. I, II & III, Chapman and Hall (1976).
J.K. Sanders and B.K. Hunter, Modern NMR Spectroscopy, A Guide for Chemists, Oxford University Press, Oxford (1987).
Jk.M. Sanders, E.C. Constable and B.K. Hunter, Modern NMR Spectroscopy - a Work Book of Chemical Problems, Oxford (1989).
Francis W Sears and Gerhard L Salinger, Thermodynamics, kinetic theory, and statistical thermodynamics.
P. Dalahay, Electrode Kinetics and Structure of Double Layer, Inter Science, New York (1965).

CORE ELECTIVE
PAPER-3
(to choose 1 out of 3)

A. Scientific Research Methodology

OBJECTIVES:

To study about the importance of research, literature survey, error analysis, statistical treatment. To study about the conventions of writing thesis.

OUTCOMES:

Understanding the importance of research and literature sources.
Knowledge on isolation and purification techniques.
Adequate knowledge on assessing the quality of analytical data.
Working knowledge on report writing.

UNIT-I: INTRODUCTION

Nature and importance of research - aims, objective, principles and problems - selection of research problem - survey of scientific literature - primary and secondary sources - citation index for scientific papers and journals - patents.

UNIT-II: CONDUCT OF RESEARCH WORK

Physical properties useful in analysis and methods of separation prior to analysis - Isolation techniques - extraction - Soxhlet extraction, crystallization, sublimation - methods for vacuum sublimation and distillation under reduced pressure.
Chemistry of working with hazardous materials - acid / base / water sensitive, corrosive, toxic, explosive and radioactive materials.

UNIT-III: EVALUATION OF ANALYTICAL DATA

Precision and accuracy - Reliability - determinate and random errors - distribution of random errors - normal distribution curve.

UNIT-IV: STATISTICAL TREATMENT OF ANALYTICAL DATA

Statistical treatment of finite samples - the students test and F test - criteria for rejection of an observation - the Q test, significant figures and computation rules - data plotting - least square analysis.

UNIT-V: THESIS AND ASSIGNMENT WRITING

Conventions of writing - the general format - page and chapter format - use of quotations and footnotes - preparation of tables and figures - referencing - appendices - revising editing and evaluating the final product - proof reading - meanings and examples of commonly used abbreviations.

REFERENCES

1. Douglas A. Skoog and Donald, M. West, Fundamental of analytical chemistry, Halt Saundersons International Edition.
2. J. Anderson, H.M. Durston and M.Poole, Thesis and assignment writing - Wiley Eastern Ltd., (1970).
3. J. March, Advanced organic chemistry - reactions, Mechanism & Structure. McGraw Hill Student Edition.
4.Vogel's Textbook of quantitative chemical analysis, ELBS edition.
5. Rajammal P. Devados, Research Methodolgy.

CORE ELECTIVE
PAPER-3
B. ADVANCED BIOINORGANIC CHEMISTRY

OBJECTIVES:

1. *To learn the importance of Bioinorganic Chemistry*
2. *To learn the role of metal ions in the biologically important complexes*
3. *To learn mechanism of photosynthesis*

OUTCOMES:

Understand the principles of bioinorganic chemistry.
Knowledge on metalloporphyrins and metalloenzymes.
Understand the role of metals in medicine.
Have knowledge on nitrogenfixation and photosynthesis.

UNIT - I: SCOPE OF BIOINORGANIC CHEMISTRY

Introduction: Trace elements, complex formation, hard and soft acids and bases (HSAB), inert and labile complexes. Amino acids and proteins - structure of proteins, peptide bond - enzymes - nucleic acid - carbohydrates - blood - plasma.

Concepts of essentiality - evolution of essential trace elements - future essential trace elements- role of minerals - working of essential trace elements - essential ultra trace elements - essential ultra trace nonmetals.

UNIT - II: METALLOPORPHYRINS

Respiratory proteins: Hemoglobin and Myoglobin - structure and functions - oxygenation reactions - structure and functions relationship - structural models for dioxygen binding - synthetic models for oxygen binding - models for Hemoproteins – Hemerythrin - Hemocyanin. Non-redox metalloenzymes: Peroxidase, Catalayse and Alcohol Dehydrogenase (Structure, mechanism of action and model compound)

UNIT - III: METALLOENZYMES

Copper enzymes: Superoxide dismutase, cytochrome oxidase and ceruplasmin - Molybdenum enzymes: Pyridoxyal oxidase and xanthine oxidase. Zinc enzymes:

Carbonic anhydrase and carboxy peptidase. Cobalt enzyme: Vitamin B_{12}. Biomineralization – Siderophores - Ferritin and Transferrin,

UNIT - IV: METALS IN MEDICINE

Metal deficiency and disease - toxicity of mercury, cadmium, lead, beryllium, selenium and arsenic - biological defence mechanism - meaning and example of chelation therapy - Metals used for diagnosis (Tc, Fe and Co) - Metals in medicine: platinum complexes as anticancer drugs, Pt-DNA binding, complexes of gold, copper, zinc, mercury, arsenic and antimony as drugs.

UNIT - V: NITROGEN FIXATION AND PHOTOSYNTHESIS

Nittogenase enzyme: Reactivity, reduction involving nitride / diazene intermediate, dinitrogen complexes and their reactivity in vitro nitrogen fixation. Photosynthesis: Structure of chlorophyll in green plants (Z- Scheme) - ATP synthesis - Role of manganese complex in oxygen evolution - dark reaction (Calvin cycle).

TEXT BOOKS

1. K. Hussain Reddy, Bioinorganic Chemistry, New Age international publishers (2007)
2. S. J. Lippard & J. M. Berg. Principles of Bioorganic Chemistry, Panima Publ. Corpn. (2005). 3. E. I. Ochiai. Bioinorganic Chemistry – An Introduction, Allyn and Bacon Inc. (1977).
4. M.N. Hughes, Inorganic Chemistry of Biological Processes, John Wiley &Sons, 2nd Edition, 1985
5. R.P. Hanzlik. Inorganic Aspects of Biological and Organic Chemistry, Academic Press (1976)

REFERENCE BOOKS

1. H. Kraatz & N. Metzler-Nolte (Eds.). Concepts and Models in Bioinorganic Chemistry, Wiley (2006).
2. I. Bertini, H. B. Gray, S. J. Dippard & J. S. Valentine, Bioinorganic Chemistry, Viva Books Pvt. Ltd. (2004).
3. A.W. Addison, W.R. Cullen, D. Dolphin & B.R. James (eds.). Biological Aspects of Inorganic Chemistry, John Wiley (1977).
4. R.J.P. Williams & J.R.R.F. Dasilva. New Trends in Bioinorganic Chemistry, Academic Press (1978).

5. A. E. Martel. Inorganic Chemistry in Biology and Medicine, ACS Symp. Series, ACS (1980).
6. S. J. Lippard. Progress in Inorganic Chemistry: Bioinorganic Chemistry, Vol. 38, John Wiley (1990).
7. N. Kaim & B. Schwederski. Bioinorganic Chemistry: Inorganic Elements in the Chenistry of Life, John Wiley (1994).
8. Advanced Inorganic Chemistry, F.A. Cotton and G. W. Wilkinson. John Wiley &Sons, 5th Ed. 1988.
9. Inorganic Chemistry, Principles of Structure and Reactivity, J. E. Huheey,E.A. Keiter 4th Ed. Harper Collins, 1993.
10. Bioinorganic chemistry, R. W. Hay, Halsted Press, 1984.
11. Principles of Bioinorganic Chemistry, S. J. Lippard and J.M. Berg, Panima Publishing Corporation, 2nd Ed., 1995.

CORE ELECTIVE

PAPER-3
C. ADVANCED ANALYTICAL TECHNIQUES

OBJECTIVES:

On the completion the course the students will have the knowledge of various instrumental techniques. The students should have learnt data analysis and electroanalytical techniques.

OUTCOMES:

Have knowledge on electro analytical techniques.

Understand the use of non-destructive method of chemical analysis.

Knowledge on basic and advanced microscopic techniques.

Adequate knowledge on thermal and radiochemical analytical methods.

UNIT-1: ELECTROANALYTICAL TECHNIQUES:

Voltametry - coulometry - amperometry – potentiometry – polarography - electrolytic conductivity - impedance spectroscopy.

UNIT-1I: CHEMICAL ANALYSIS:

Non-destructive techniques: Wavelength and energy dispersive X-ray fluorescence spectroscopy (WDS and EDS) - X-ray absorption spectroscopy (XANES and EXAFS) - secondary ion mass spectrometry (SIMS) - temperature programmed desorption (TPD) - thermal desorption spectroscopy (TDS).

Destructive techniques: Atomic absorption spectroscopy (AAS) - inductively coupled plasma-atomic emission spectroscopy (ICP-AES).

UNIT-1II: IMAGING AND DEPTH PROFILING:

Basic concepts in surface imaging - secondary electron microscopy (SEM) - secondary Auger microscopy (SAM) - scanning probe microscopy (SPM) - scanning tunneling microscopy (STM) - transmission electron microscopy (TEM) - surface imaging - depth profiling. Associated techniques of microscopy and spectroscopy.

UNIT- IV: THERMAL ANALYSIS:

Thermo gravimetric and differential thermal analysis - thermometric titrations - differential scanning colourimetry - basic instrumentation and applications.

UNIT–V: RADIOCHEMICAL METHODS

Hot atom chemistry – the Szilard – chalmers process, chemistry of recoil atoms, chemical effects on radioactive decay, solvated electron. Uses of radiations in the study of matter, neutron activation analysis, dilution analysis, dosimetry, synthesis of organic and inorganic compounds by irradiation. Radiometric analysis and radiography.

TEXT BOOKS:

1. R. Wiesendanger, *Scanning Probe Microscopy and Spectroscopy,* Cambridge University Press, 1994.
2. Frank A. Settle, Handbook of instrumental techniques for analytical chemistry, Prince Hall, New Jersey, 1997.
3. K. W. Kolasinski, Surface science: Foundations of catalysis and nanoscience, John Wiley and Sons, West Susses, 2002.
4. D. A. Skoog, D. M. West, F. J. Holler and S. R. Couch, Fundamentals of analytical chemistry. Brooks/ColeCengage learning, New Delhi, 2004.
5. P. Atkins and J. de Paula, Atkins' physical chemistry, 8th Ed., Oxford University Press, New Delhi, 2008.
6. T. Pradeep, Nano: The essentials, McGraw-Hill Education, New Delhi, 2010.
7. F. Scholz, Electroanalytical Methods, Springer, 2nd Ed., 2010.
8. Allen J. Bard and Larry R. Faulkner, Electrochemical Methods: Fundamentals and Applications, 2nd edition 2001, John Wiley & Sons
9. Allen J. Bard (Ed), Electroanalytical Chemistry, Vol.13, Plenum Press 1983
10. Joseph Wang, Analytical Electrochemistry, 3rd edition 2006, John Wiley & Sons
11. D.A .Skoog, 1985, Principles of Instrumental Methods of analysis, III Edition, Saunders College Publ.
12. Willard Merrit, Dean and Settle, 1986, Instrumental methods of analysis, VI Edition, CBS Publ.
13. D.A. Skoog and D.M. West, 1982, Fundamentals of Analytical Chemistry, IV Edition, old Reinhord & Winston, Publication

SUGGESTED REFERENCE BOOKS:

1. G.D.Christian & J.E.O. Reily, 1986, Instrumental Analysis, II Edition, Allegn Recon.
2. H.A. Strobel, 1976, Chemical Instrumentation, Addition- Wesely Publ Co.

3. Kolthoff and Elwing (All Series) - Treatise on Analytical Chemistry.
4. Willson Series - Comprehensive Analytical Chemistry.

5. Willard, Merit, Dean and Settle, Instrumental Methods of Analysis, CBS Publishers and Distributors, IV Edn. 1986
6. Schoog, Holler, Nieman, Principles of Instrumental Analysis**,** Thomson Asia Pte Ltd., Singapore, 2004.

OPEN ELECTIVE
PAPER-3
(To choose 1 out of 3)

A.INDUSTRIAL CHEMISTRY-II

OBJECTIVES:

To make the students learn about electrochemical industries
To understand the importance of agrochemical industries
To learn the importance of petroleum and fuel gases
To study about the paints and varnishes
To understand the importance of Cement, Ceramic and Glass

OUTCOMES:

The students will be able to
Identify the importance of electrochemical industries
Acquire knowledge of agrochemical industries
Appreciate the importance of petroleum and fuel gases
Acquire knowledge of paints and varnishes
Illustrate the importance of Cement, Ceramic and Glass

UNIT I Electrochemical Industries: Production of materials like chlorine, caustic soda ,sodium chlorate, perchlorates, Batteries – primary and secondary cells, solar cells, fuel cells.

UNIT II Agrochemical industries: Important categories of insecticides, fungicides, herbicides, rodenticide, Mode of action and synthesis of common pesticides like gammexane, DDT, aldrin, Parathion, Malathion, Baygon,

UNIT III Petroleum : Origin, refining, Cracking, reforming ,knocking and octane number, LPG, synthetic gas, synthetic petrol. **Fuel Gases:** Large scale production, storage, hazards and uses of coal gas, water gas, producer gas, and oil gas.

UNIT IV Paints & Varnishes: Primary constituents of paints, Dispersion medium (solvent), binder Pigments, formulation of paints and varnishes. Requirements of a good paint.
Cleansing Agents: Preparation of toilet and washing soaps, synthetic detergents-alkyl aryl sulphonates, ethanolamines, nonionic detergents, builders, additives, corrosion inhibitors. 124

UNIT V Cement : Manufacture – Wet Process and Dry process, types, analysis of major constituents, setting of cement, reinforced concrete. Cement industries in India. **Ceramics:** Important clays and feldspar, glazing and vitrification. **Glass:** Composition and manufacture of glass .Types of glasses- optical glass, coloured glasses and lead glass.

Reference : 1. B.N.Chakrabarty, Industrial Chemistry, Oxford & IBH Publishing Co, New Delhi, 1981.
2. B.K. Sharma, Industrial Chemistry, Goel Publishing House, Meerut.
3. P.P.Singh, T.M.Joesph, R.G.Dhavale, College Industrial
Chemistry, Himalaya Publishing House, Bombay, 4th Ed., 1983 125

OPEN ELECTIVE
PAPER-3

B. SCIENCE OF PHOTOGRAPHY

OBJECTIVES:

To make the student understand the principles of photography.

To make the student understand concepts of image formation.
To make the student understand the concept motion image and film.
To allow the student to have a deep knowledge of photography and photographic systems.

OUTCOMES:

The students will be able to

Learning the basic concepts of photography

Explaining the types and characterstics of Lens and filters

Acquiring the knowledge of functions of films and SD cards

Gaining the knowledge of aesthetic photography and lightings.

UNIT I: BASICS OF PHOTOGRAPHY

Photography- Definition and concept-Nature and Functions of Photography- Historical development of Photography- Camera-Introduction to camera- Human Eye and Camera - Concept of Visual Perception-Basics of Camera: Different types of Camera- Box - TLR- SLR and Digital; Parts and Functions of Camera- Aperture- Shutter- Lens and Film-Camera Accessories.

UNIT II: LENS

Lens- Definition and Concept- Nature and Characteristics of Lens- Types of Lens- Wide angle- Normal and Tele- Special Lens- Zoom- Fish eye and Macro Lens- Focus- Definition and Concept- Types of Focus- Split Image and Macro Image Focusing- Focal Length- Types of Focal Length- Short- Long and Variable Focal Length- Exposure- Depth of Field Aperture Priority and Shutter Priority- Filter- Definition and concept- Characteristics of Filters- Types of Filters- UV- Polarizing Filter- Grey Grad Color Balancing Filter- Neutral Density Filter and Soft Focus Filter.

UNIT III: PHOTOGRAPHIC FILM

Film- Definition and Concept- Function and Characteristics of Film- Cross Section of Film- Types of Film- Film Speed Definition- Functions of Film Speed- Types of Film Speed- Fast Speed and Slow Speed- Film Speed Numbers- ASA- ISO and DIN- Digital Storage- Digital Storage process- Types of Digital Storage- Compact Flash (CF)- Secure Digital Card(SD)- Mini SD Card- Micro SD and etc.- Film Developing Process- Developing- Fixing- Washing and Drying- Film Printing Process- Digital Printing Process.

UNIT IV: LIGHTING

Lighting- Definition and concept- Nature of Light- Characteristics of Light- Understanding Light- Indoor and Outdoor-Types of Light- Natural and Artificial- Three Point Lighting- Key- Fill and Back Light- Types of Lighting Equipments Pro-lit- Soft Box and etc- Different accessories of Lighting- Umbrella- andetc- Flash- Functions of Flash- Light MeterDefinition and concept- Functions of Light Meter.

UNIT V: AESTHETICS OF PHOTOGRAPHY

Aesthetics of Photography- Framing- Characteristics of Framing- Composition- Characteristics of Compositions- Types of Composition- Rule of Third- Frame within Frame and Etc.- Scope of Photography- Types of Photography- Photo Journalism-Ad Photography- Natural Photography- Wild life Photography- Fashion Photography and Industrial Photography.

TEXT BOOKS

1. James Curran, The Photography Handbook, 2nd Edition, Routledge, 2013.

2. Ben Long, Complete Digital Photography, 6th Edition, PTR, 2010.

REFERENCES

1. Linda Good, Teaching and Learning with Digital Photography, Sage Publications, 2009.

2. Ian Jeffrey, The Photography Book, Focal Press, 2nd Edition, 2000.

3. Michael Langford, Basic Photography, Focal Press, 6th Edition, 2000.

OPEN ELECTIVE
PAPER-3

C.ENERGY RESOURCES

OBJECTIVES:

To make the students to understand about energy resources
To understand the importance of solar energy
To learn the importance of energy from the ocean
To study about the wind energy and hydrogen energy
To understand the importance of energy management

OUTCOMES:

The students will be able to
Identify the importance of energy resources
Appreciate the importance of solar energy
Analyze the importance of energy from the ocean
Acquire knowledge of wind energy and hydrogen energy
Identify the importance of energy management

UNIT I: INTRODUCTION TO ENERGY SOURCES

Renewable and non-renewable energy sources, energy consumption as a measure of Nation's development - strategy for meeting the future energy requirements Global and National scenarios-Prospects of renewable energy sources.

UNIT II: SOLAR ENERGY

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles- attenuation and measurement of solar radiation-solar cooker, solar heating and cooling of buildings- photo voltaics - solar cells and its applications.

UNIT III: ENERGY FROM THE OCEAN

Ocean Thermal Electric Conversion (OTEC) systems like open cycle-closed cycle- Hybrid cycle- prospects of OTEC in India. Energy from tides- basic principle of tidal power- single basin and double basin tidal power plants- advantages- limitation and scope of tidal energy.

UNIT IV: WIND ENERGY AND HYDROGEN ENERGY

Principle of wind energy conversion-Basic components of wind energy conversion systems-wind mill components-various types and their constructional features Hydrogen Energy-Introduction-Hydrogen Production methods-Hydrogen storage-hydrogen transportation-utilization of hydrogen gas-hydrogen as alternative fuel for vehicles.

UNIT V: ENERGY MANAGEMENT

Energy economics-energy conservation-energy audit-general concept of total energy system-scope of alternative energy system in India.

TEXTBOOKS

1. Rai. G.D., Non-conventional energy sources, 4th Edition, Khanna Publishers, 2009.
2. Garg H.P. & Jai, Solar Energy: Fundamentals and Applications by Prakash, Tata McGraw Hill, 1977.
3. Singhal B.L., Alternative Energy Sources, 2nd Edition Tech Max Publication, 2007.

REFERENCES

1. Duffic.J.A and Beckman W.A ,Solar Engineering of Thermal Processes , 3rd Edition ,John Wiley & sons, New York, 1975.
2. Giri.N.K, Alternate energy sources and application, 2nd Edition, Khanna Publication, 2004.
3. Sukhatme S,P, Solar Energy: Principles of Thermal Collection and Storage, 3rd Edition ,Tata McGraw Hill, 2008.

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 – Sommlet- 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, VEdition 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 EditionMcGraw 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, Addision 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 hydrolysation)
2. Benzanilide from benzophenone (addition and Beckmann rearrangement)
3. m-Nitro benzoic acid from methyl benzoate (nitration and hydrolysation)
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 (Fridel Crafts reaction)
8. Acetyl salicylic acid from methyl salicylate (hydrolysis and acetylation)
9. 2- Phenyl indole from phenyl hydrazine (Fisher 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. Thiosulpate - 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 $Pb(NO_3)_2$ 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 fine the standard potentials for these electrodes and test the 12.
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 pKa 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 Illkovic 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 $AgNO_3$/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 $Ca(TiO_3)_2$ 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 $Zn + H_2SO_4$ gives $ZnSO_4 + H_2$ 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 CHMISTRY-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, Allegn 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. Aruldhas, 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, IVedition, John Wiley & Sons, Ltd., Chichester (2004).
9. M.C. Shrivers, 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, cephalosphorin, 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: Diazepham, Trimeprazine, Thiopental - Anti AIDS agents: Acylovir, 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-arrythmics, Anti-anginals, Vasodialators, Anti-hypertensives, Diuretics, Antihistamines) - Chemotherapeutic Agents (Antibiotics, Antivirals, Antifungals) - Drugs for metabolic and endocrine disorders (Anti-thyroid drugs, Anti-diabatic 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 - chloramphenical - 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, Lippincoh 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. Lednicer, 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 ,!992.

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 – O_2 and CO_2 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 INSTRUMETATION

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.

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THIRUVALLUVARUNIVERSITY

B.Sc. COMPUTER SCIENCE

CBCS PATTERN

(With effect from 2020-2021)

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
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	**(to choose any one)** 1. Mathematics I 2. 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					**CIA**	**Uni. Exam**	**Total**
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	**(to choose any one)** 1. Mathematics II 2. 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**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
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							**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-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**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
31.	III	Core Theory	Paper-5	6	4	Mobile Application Development	25	75	100
32.	III	Core Theory	Paper-6	6	4	Operating System	25	75	100
33.	III	Core Theory	Paper–7	4	3	Design and Analysis of Algorithms	25	75	100
34.	III	Core Practical	Practical-5	4	3	Mobile Applications Development-Lab	25	75	100
35.	III	Core Practical	Practical-6	4	3	Operating System-Lab	25	75	100
36.	III	Internal Elective	Paper-1	3	3	**(to choose any one)** 1. Data Mining 2. Information Security 3. Software Testing	25	75	100
37.	IV	Skill Based Subject	Paper-3	3	2	Software Engineering	25	75	100
				30	**22**		**175**	**525**	**700**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
38.	III	Core Theory	Paper-8	4	4	Open Source Software	25	75	100
39.	III	Core Theory	Paper-9	4	4	Python Programming	25	75	100
40.	III	Core Practical	Practical-7	4	3	Python Programming Lab	25	75	100
41.	III	Core Practical	Practical-8	4	2	Open Source Programming Lab	25	75	100
42.	III	Project		5	5	Project Work (Group/Individual Project)	25	75	100
43.	III	Internal Elective	Paper - 2	3	3	**(to choose any one)** 1. Big Data Analytics 2. Cryptography 3. Digital Image Processing	25	75	100
44.	III	Internal Elective	Paper - 3	3	3	**(to choose any one)** 1. Artificial Intelligence 2. System Software 3. Cloud Computing	25	75	100

45.	IV	Skill Based Subject	Paper - 4	3	2	Internet Of Things	25	75	100
46.	V	Extension Activities		0	1		100	0	100
		Sem. Total		**30**	**27**		**300**	**600**	**900**
					140				**4600**

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			100	100
	Electives	3	3	9	100	300
	Core	9	(3-5)	34	100	900
	Core practical	8	(2-3)	21	100	800
	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	**46**		**140**		**4600**

THIRUVALLUVARUNIVERSITY

B.Sc. COMPUTER SCIENCE

CBCS PATTERN

(With effect from 2020-2021)

SEMESTER III

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 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/OCP 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 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 -1

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 forYoung'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 stimulatedemission – 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,Murugeshan, 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/elecmagnetism/growth-and-delay-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 -1

STATISTICAL METHODS AND THEIR APPLICATIONS XI

Objective

To understand and computing statistical Methods by which to develop the programmingSkills.

UNIT-I

Introduction - scope and limitations of statistical methods - classification of data -Tabulation of data - Diagrammatic and Graphical representation of data - Graphical determination of Quartiles ,Deciles and Percentiles.

UNIT-II

Measures of location : Arithmetic mean, median, mode, geometric mean and Harmonicmean and their properties.

UNIT-III

Measures of dispersion : Range, Quartile deviation, mean deviation, Standard deviation,combined Standard deviation, and their relative measures.

UNIT-IV

Measures of Skewness Karl Pearson's, Bowley's, and kelly's and co-efficient ofSkewness and kurtosis based on moments.

UNIT-V

Correlation - Karl Pearson - Spearman's Rank correlation - concurrent deviation methods.
Regression Analysis: Simple Regression Equations.

Note : The proportion between theory and problems shall be 20:80

Books for Reference:

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
3. Elements of Statistics - Mode . E.B. - Prentice Hall

4. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons

SKILL BASED SUBJECT

PAPER-1

Digital Logic Design and Computer Organization

Objectives:

This course aims to provide the students with a detailed knowledge on digital logic, internals of the System logic circuits and to know the working principles of the computers.

UNIT-I BINARY NUMBER SYSTEM

Objective : To understand the basics of Number System

Number system and its conversions-. Digital Computers and Digital Systems - Binary Number System – Binary Addition – Binary Subtraction- Binary Multiplication and Division-Number Base Conversion: decimal, binary, octal, hexadecimal. The Basic Gates - Boolean Algebra - Universal Gates - Boolean Laws and Theorem.

UNIT-IISIMPLIFICATION

Objective: To understand the concept of Simplification of Boolean expressions using K-map and arithmetic circuits.

Sum of products - Product of Sums - K-map simplifications - Don't care conditions-QuineMcclausky tabulation method. Combinational Arithmetic Circuits: Adders-Subtractors-full adder-subtractor-BCD Adder.

UNIT-III COMBINATIONAL LOGIC CIRCUITS

Objective: To understand the concept of Combinational Logic Circuits

Multiplexers-De-Multiplexers- Decoders : -Encoders- Decoders-Sequential Logic Circuit: Flip-Flops -RS Flip flop- JK Flip flop- D Flip flop-T Flip flop and Master Slave. Counters-Synchronous and Asynchronous –Shift Registers and its types.

UNIT- IV BASIC STRUCTURE OF COMPUTERS

Objective: To understand the concept of **Basic Structure of Computers**

Basic Operational Concepts, Bus Structures - Central Processing Unit: General Register and stack Organization-Instruction Formats Addressing Modes-Data Transfer and manipulation.

UNIT V- INPUT OUTPUT AND MEMORY ORGANIZATION

Objective: To understand the basic concepts of Input Output and Memory Organization

Peripheral Devices- I/O Interface - Asynchronous Data Transfer- -Priority Interrupt – Direct Memory Access – I/O Processor.Memory Organization– Main Memory- Auxiliary Memory – Associative Cache and Virtual Memory.

TEXT BOOKS:

1. M. Morris Mano -Digital Logic and Computer Design- PHI.
2. M. Morris Mano, Computer System Architecture, Pearson Education.

REFERENCE BOOKS:

1 Thomas C. Bartee Digital Computer Fundamentals- McGraw HillPub.
2 Malvino& Leach- Digital Principles and Applications –McGraw HillPub.
3. S. Ramalatha - Digital Computer Fundamentals, MeenakshiAgency.
4. V. Carl Hamacher, Zvonko G. Vranesic, Safwat G. Zaky, Computer Organization, McGraw Hill HigherEducation.
5. John P. Hayes, Computer System Architecture, McGraw Hill HigherEducation

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.**ComputerFundamentals**.[FirstEdition,Revised].S.Chand &CompanyLtd, New Delhi. (**UNIT I**(**Introduction: Characteristics of Computers to Categories of Computer**))

REFERENCE BOOKS:

1. *ITL EducationsSolution Limited.* 2009. **Introduction toComputer Science**. [Fourth Impression].Pearson Education, New Delhi.
2. *Alexis Leon and Mathews Leon.* 1999. **Fundamentals of Information Technology.**[FirstEdition]. 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-4

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 sytems 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 QueriesModification 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 desigh, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. 2. NPTEL, Indexing and Searching TechniquesinDatabasesDr. ArnabBhattacharya,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 PRACTICAL - 4

RELATIONAL DATABASE MANAGEMENT SYSTEMS LABS

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.
- 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 - 2

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 ofCNT's.

Text Books
Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, 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_lIkSB9s
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=mPxoJz6treE (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 PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

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 -2
PAPER - 2

STATISTICAL METHODS AND THEIR APPLICATIONS XXIVI

Objective

To understand and computing statistical Methods by which to develop the programming Skills.

UNIT-I

Curve fitting by the methods of least squares -
$Y = a x + b$, $Y = a x^2 + b x + c$, $Y = a x^b$, $Y = a e^{bx}$ and $Y = ab^x$

UNIT-II

Sample Space - events - probability - Addition and Multiplication Theorem - conditional probability -Baye's Theorem. Mathematical expectation Addition and Multiplication theorem, Chebychev's Inequality.

UNIT-III

Standard distributions - Binomial, Poisson, Normal distribution and fitting of these distributions.

UNIT-IV

Test of Significance- small sample and large sample test based on mean, S.D. correlation and proportion - confidence interval.

UNIT-V

Analysis of variance - One and Two way classifications - Basic principle of design of Experiments - Randomisation, Replication and Local control - C.R.D., R.B.D. and L.S.D.

Books for Reference:

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor – Sultan Chand
3. Statistical Methods - Snedecor G.W. & Cochran W.G. oxford & +DII
4. Elements of Statistics - Mode . E.B. – Prentice Hall

ALLIED PRACTICAL

STATISTICAL METHODS AND THEIR APPLICATIONS - Practical

1. Formation of uni-variate and bi-variate frequency distribution
2. Diagrams and Graphs
3. Measures of Location
4. Measures of Dispersion
5. Skewness and Kurtosis
6. Correlation and Regression
7. Curve Fitting : $y = ax+b$, $y=ax^2+bx+c$, $y=ax^b$, $y=ae^{bx}$
8. Fitting of distributions - Binomial, Poisson, Normal
9. Test of significance small sample and large sample tests
10. Analysis of Variance: one way classification, Two way classification and Design of Experiments - C.R.D, R.B.D & L.S.D

BOOKS FOR REFERENCE:

1. Statistical Methods by S.P. Gupta, Sultan chand & Sons
2. Fundamental of Applied Statistics - S.C. Gupta & V.K. Kapoor

Note:

Use of Scientific Calculator shall be permitted for Practical Examination. Statistical Table may be provided to the students at the Examination Hall.

SKILL BASED SUBJECT
PAPER-2
WIRELESS DATA COMMUNICATION

Objectives:

- ✓ This course introduces the concepts and theories of networking
- ✓ To applies 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 GroupServices- 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 Stalling 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.

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 andWebDesign.** [Fourth reprint]. Tata McGraw-HillEducationPrivateLimited., New Delhi.

REFERENCE BOOKS:

1. *Deitel,H.M Dietel,P.J.andGoldbergA.B*.2008.**Internet&Worldwide Web- How toProgram.**[Third Edition].PHL,New Delhi.
2. *Comdex.*2000.**Teachyourselfcomputersandtheinternetvisually**.[First Edition]. IDGBookIndia (p)Ltd.
3. *Ramachandran,T.M.Nambissan*.2003.**AnOverviewofinternetandweb development**. [FirstEdition].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.

SEMESTER V

CORE PAPER - 5

MOBILE APPLICATIONS DEVELOPMENT

Objectives:

This course aims to provide the students with a detailed knowledge on Mobile Application Development and Deployment about Android programming from basics to building mobile applications for digital world.

UNIT I: INTRODUCTION TO ANDROID PLATFORM

Objective: To understand the basics of smart phones and android platforms**.**

Introduction to Mobile Application Development – Various platforms – Smart phones – 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 II: ANDROID UI DESIGN

Objective: To understand the basic concepts of user interface related to app development.

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 III: DATA PERSISTENCE

Objective: To understand the important of data persistence in mobile environment.

Different Data Persistence schemes: Shared preferences – File Handling – Managing data using SQLite database – Content providers: user content provider – Android in build content providers.

UNIT IV: ANDROID SERVICES & NETWORK ENVIRONMENT

Objective: To understand the various services and network facilities provided by android platform.

Services: Introduction to services – Local service – Remote service – Binding the service –Communication between service and activity – Intent Service – Multi–Threading: Handlers – AsyncTask– Android network programming: HttpUrlConnection– Connecting to REST–based – SOAP based Web services – Broad cast receivers: LocalBroadcastManager– Dynamic broadcast receiver – System Broadcast – Telephony Manager: Sending SMS and making calls.

UNIT V: ADVANCED APPLICATIONS

Objective: To understand the various apps deployed and developed on by mobile platform.

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.

TEXT BOOKS:

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.

REFERENCES:

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.

CORE PAPER - 6

OPERATING SYSTEM

Objectives:

Enable the student to get sufficient knowledge on concepts, functions and various system resources of operating systems.

UNIT I: OPERATING SYSTEM BASICS

Objective: To understand the structure and functions of operating systems.

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 II: CPU SCHEDULING ALGORITHM AND PREVENTION

Objective: To understand the principles of scheduler, scheduler algorithms and Deadlock.

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 III: STORAGE MANAGEMENT

Objective: To learn various memory management schemes.

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 IV: I/O SYSTEMS

Objective: To study I/O management, File system and Mass Storage Structure .

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 V: CASE STUDIES

Objective: To learn the basics of UNIX, LINUX systems and perform administrative tasks on LINUX servers.

UNIX System – A Case Study – LINUX System – Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security .

TEXT BOOKS:

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.

REFERENCES:

1. "Operating systems – Internals and Design Principles", W. Stallings, 6th Edition, Pearson.
2. "Modern Operating Systems", Andrew S.Tanenbaum, Second Edition, Addison WesleyPublishing Co., 2001.
3. "Fundamentals of Operating System", Prof. R. Sriddhar, Dynaram Publication, Bangalore Company.

CORE PAPER - 7

DESIGN AND ANALYSIS OF ALGORITHMS

Objectives:

The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm.

UNIT –I: ALGORITHM AND ANALYSIS

Objective: Understanding various algorithm design techniques.
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 – II: DIVIDE AND CONQUER

Objective: This technique is the basis of efficient algorithms for all kinds of problems**.**

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 – III: THE GREEDY METHOD

Objective: This is a simple approach which tries to find the best solution at every step.

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 – IV: DYNAMIC POGRAMMING, TRAVERSAL & SEARCHING

Objective: Providing a general insight into the dynamic programming approach.

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 – V: BACKTRACKING & BRANCH AND BOUND

Objective: Algorithm design paradigm for discrete and combinatorial optimization problems.

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.

TEXT BOOKS:

1. "Fundamentals of Computer Algorithms", Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Galgotia Publications, Second Edition 2015.
2. "Introduction to Algorithms", Coremen T.H., Leiserson C.E. and Rivest R.L., PHI Publications, Third Edition, 1998.

REFERENCES:

1. "Introduction to the Design and Analysis of Algorithms", AnanyLevitin, 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.

CORE PRACTICAL - 5

MOBILE APPLICATIONS DEVELOPMENT LAB

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 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.

CORE PRACTICAL - 6

OPERATING SYSTEM LAB

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 e 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 ELECTIVE
PAPER-1
(to choose one out of 3)
A. DATA MINING

Objectives:

To enable the students to understand the importance of Data Mining and its techniques with recent trends and tools.

UNIT I: DATA MINING BASICS

Objective: To understand about the basics of Data Mining and Data

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 II: DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING

Objective: To understand about the methods of Data Warehousing

Data Warehouse– Basic concepts–Data Warehouse Modeling: 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 III: PATTERNS AND CLASSIFICATION

Objective: To understand about the techniques of Data Mining

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 IV: CLUSTERING AND OUTLIER DETECTION

Objective: To understand about the importance of Cluster and outlier detection

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 V: RECENT TRENDS IN DATA MINING AND TOOLS

Objective: To improve the student's knowledge with recent trends and tools

Other Methodologies of Data Mining –Data Mining Applications–Data Mining Trends– Recent Data Mining Tools–Rapid miner–Orange–Weka–Knime–Sisense–Ssdt (SQL Server Data Tools)–Oracle–Rattle–Data melt–Apache Mahout.

TEXT BOOKS:

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

REFERENCES:

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.
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

INTERNAL ELECTIVE
PAPER-1
B. INFORMATION SECURITY

Objectives:

To enable the student to understand various methodologies available for securing information.

UNIT I: INFORMATION SECURITY BASICS

Objective: To understand the basic concepts of Information Security

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 II SECURITY INVESTIGATION

Objective: To understand the legal, ethical and professional issues in Information Security

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 III SECURITY ANALYSIS

Objective: To know about risk management

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 IV SECURITY MODELS

Objective: To understand the technological aspects of Information Security

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 V: CRYPTOGRAPHY AND ETHICAL HACKING

Objective: To understand the concepts of Cryptography and Hacking methods

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.

TEXT BOOKS:

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,MichaelG.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.

REFERENCES:

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, 2ndEdition , Pearson/PHI, 2002.

INTERNAL ELECTIVE
PAPER-1
C. SOFTWARE TESTING

Objectives:

To study the concepts of software engineering with the aim of acquiring skills to develop Software applications, following all standardized procedures and techniques.

UNIT I: INTRODUCTION TO SOFTWARE TESTING

Objective: To understand the concept of software testing, and software quality

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 II: SOFTWARE DEVELOPMENT MODEL AND TESTING

Objective: To learn to inspect and detect errors by going through each and every code segment

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 III: FUNCTIONAL AND STRUCTURAL TESTING

Objective: To gain knowledge of various functional and structural testing techniques

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 IV: TEST MANAGEMENT AND TOOLS

Objective: To understand basic concept of Software Management tools and object oriented testing

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 V: SOFTWARE QUALITY AND SOFTWARE QUALITY ASSURANCE

Objective: To understand basic concept of Software quality and software quality assurance

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

TEXT BOOKS:

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

REFERENCES:

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 Gopalaswamy Ramesh, Pearson Education, 2006.

SKILL BASED SUBJECT

PAPER-3

SOFTWARE ENGINEERING

Objectives:

This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of software development.

UNIT–I: INTRODUCTION TO EVOLVING SOFTWARE

Objective: Introduces the concepts and methods required for the construction of large software intensive systems.

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–II: REQUIREMENTS ENGINEERING

Objective: Gets the idea of choosing the Requirements in Software Engineering.

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–III: DATA ENGINEERING

Objective: Gives an understanding the concept of Data Engineering.

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–IV: TESTING STRATEGIES

Objective: To impart knowledge on Testing and Debugging.

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–V: PROJECT MANAGEMENT

Objective: To enable the students to learn the basic of Project Management & Scheduling.

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.

TEXT BOOKS:

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.

REFERENCES:

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.

SEMESTER VI

CORE PAPER - 8

OPEN SOURCE SOFTWARE

Objectives:

To study the concepts of open source techniques that can be effectively applied in practice about HTML5, JavaScript, PHP, and PERL.

UNIT I: INTRODUCTION TO HTML, CSS

Objective: To understand the concept of HTML, HTML5 and CSS.

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 II: LINUX

Objective: To learn to inspect and detect errors by going through each and every code segment.

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 III:JAVA SCRIPT AND MYSQL

Objective: To understand basic concept of Java Script and MySQL.

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 IV: PHP

Objective: To understand basic concept of PHP

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 – Cooking – Sessions – Database Access with PHO.

UNIT V: PERL

Objective: To understand basic concept of PERL

PERL : Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules– Working with Files – Data Manipulation.

TEXT BOOKS:

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

REFERENCES:

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

CORE PAPER - 9

PYTHON PROGRAMMING

UNIT I:

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 II:

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 III:

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 IV:

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 V:

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.

TEXT BOOKS:

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 BOOKS:

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.

CORE PRACTICAL - 7

PYTHON PROGRAMMING LAB

Write a Python program to find the area and perimeter of a circle.

1. Write a Python program to generate Fibonacci series.
2. Write a Python program to compute the GCD of two numbers.
3. Write a Python program to generate first n prime numbers.
4. Write a Python program to find the sum of squares of n natural numbers.
5. Write a Python program to find the sum of the elements in an array.
6. Write a Python program to find the largest element in the array.
7. Write a Python program to check if the given string is a palindrome or not.
8. Write a Python program to store strings in a list and print them.
9. Write a Python program to find the length of a list, reverse it, copy it and then clear it.

CORE PRACTICAL - 8

OPEN SOURCE SOFTWARE LAB

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets).
3. Write a shell program to find the factorial of an integer positive number.
4. Write a shell program to find the details of a user session.
5. Create a simple calculator in JavaScript.
6. Write 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 ELECTIVE

PAPER -2

(to choose one out of 3)

A. BIG DATA ANALYTICS

Objectives:

- To explore the fundamental concepts of big data analytics.
- To learn to analyze the big data using intelligent techniques and mining data stream.
- To understand the applications using Map Reduce Concepts.

UNIT–I: INTRODUCTION TO BIG DATA

Objective: To explore the fundamental concepts of big data analytics.

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–II: MINING DATA STREAMS

Objective:To learn to use various techniques for mining data stream.

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 III: BIG DATA FROM DIFFERENT PERSPECTIVES

Objective: To learn the Big data Business Perspective

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 –IV:HADOOP AND MAP REDUCE

Objective: To understand the applications using Map Reduce Concepts.

Hadoop: The Hadoop Distributed File System – Components of HadoopAnalysing the Data with Hadoop– 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 Job run–Failures–Job Scheduling–Shuffle and Sort – Task execution – Map Reduce Types and Formats– Map Reduce Features– Hadoop environment.

UNIT – V: FRAMEWORKS

Objective:To introduce programming tools HIVE in Hadoop echo system.

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 InfoSphereBigInsights and Streams.

TEXT BOOKS:

1. “Intelligent Data Analysis”, Michael Berthold, David J. Hand, Springer, 2007.
2. “Hadoop: The Definitive Guide “, Tom White Third Edition, Oreilly Media, 2012.

REFERENCES:

1. “Big Data and Analytics" SeemaAcharya, SubhasiniChellappan, Wiley 2015.
2. “Mining of Massive Datasets”,AnandRajaraman 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.

INTERNAL ELECTIVE

PAPER -2

B. CRYPTOGRAPHY

Objectives:

- Understand various Security practices and System security standards
- Understand different cryptographic operations
- Understand the various Authentication schemes to simulate different applications.

UNIT–I: COMPUTER AND NETWORK SECURITY

Objective: Understand OSI security architecture and classical encryption techniques**.**

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–II:SYMMETRIC CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of symmetric cryptographic algorithm**s.**

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–III: PUBLIC KEY CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of Public key cryptographic algorithms.

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 – Psedorandom Number Generation**.**

UNIT –IV:HASH FUNCTIONS AND DIGITAL SIGNATURES

Objective: To make use of application protocols to design and manage a secure system.

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 – V: SECURITY APPLICATIONS

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).

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TEXT BOOKS:

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.

REFERENCES:

1. "Modern Cryptography Theory and Practice", Wenbo Mao, Pearson Education, 2004.
2. "Cryptography and Network Security ",BehourzForouzan, DebdeepMukhopadyay,Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. "Quantum Cryptography and Secret–Key Distillation", Gilles van Assche, CambridgeUniversity Press, 2010.

INTERNAL ELECTIVE

PAPER -2

C. DIGITAL IMAGE PROCESSING

Objectives:

This course enables the student knowledge about various image processing concepts like enhancement, restoration, segmentation, compression and recognition.

UNIT I: FUNDAMENTALS

Objective: To know the basics of Digital image and techniques.

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 II: IMAGE ENHANCEMENT

Objective: To understand various Image enhancement ideas.

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 III: IMAGE RESTORATION AND SEGMENTATION

Objective: To understand Image restoration techniques.

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 IV: WAVELETS AND IMAGE COMPRESSION

Objective: To understand degrees of image resolution and compression methods.

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 V: IMAGE REPRESENTATION AND RECOGNITION

Objective: To understand concepts of image representation and recognition.

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.

TEXT BOOKS

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.

REFERENCES:

1. "Digital Image Processing", S. Sridhar, Oxford University Press; Second edition, 2016.
2. "Digital Image Processing", Gonzalez & woods, Pearson Education India, 2016.

INTERNAL ELECTIVE
PAPER -3
(to choose one out of 3)
A. ARTIFICIAL INTELLIGENCE

Objectives:

To induce the innovative ideas of students, related to Robotics, Artificial Intelligence and Machine Learning. This course enables the student's level to compete in the world of information and technology era.

UNIT I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE:

Objective: To know the basics of Artificial Intelligence.

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 II: AI – PROBLEM SOLVING METHODS:

Objective: To Understand the Methods and algorithms in AI.

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 III: AI – KNOWLEDGE REPRESENTATION:

Objective: To learn to represent knowledge in solving AI problems.

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 IV: STATISTICAL REASONING AND AGENTS:

Objective: To Understand Statistical logics and know about Software agents.

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 V: MACHINE LEARNING AND APPLICATIONS

Objective: To learn how Machine learning is related to AI.

Types of Machine Learning – Neural Networks – Deep Learning – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TEXT BOOKS:

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.

REFERENCES:

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

INTERNAL ELECTIVE
PAPER -3
B. SYSTEM SOFTWARE

Objectives:

To have an understanding the basic design of assemblers, loaders, linkers, macro processor.

UNIT I: INTRODUCTION TO SYSTEM SOFTWARE

Objective: To understand the basic concepts of system software

System software vs. Application software – Different types of system software – SIC& SIC/XE Architecture – traditional (CISC) machines – RISC machines.

UNIT II: ASSEMBLERS

Objective: Ability to trace the path of a source code to object code and to executable file

Basic assembler functions– Machine dependent and independent assembler features– Assembler design options–One pass assemblers–Multi pass assemblers– MASM assembler.

UNIT III: LOADERS AND LINKERS

Objective: To design and implementation of loaders and linkers

Basic loader functions–Simple bootstrap loaders – Machine dependent and independent loader features–Linkage editors– Dynamic linking.

UNIT IV: MACRO PROCESSOR

Objective: To understand the concepts of macro processor

Basic macro processor functions–Machine dependent and independent macro processor features–Macro processor design options.

UNIT V: COMPILERS

Objective: Ability to analyze the functions of compilers

Basic compiler functions–Machine dependent compiler features–Machine independent compiler features–Compiler design options the YACC compiler– Compiler.

TEXT BOOKS:

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.

REFERENCES:

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.

INTERNAL ELECTIVE
PAPER -3
C. CLOUD COMPUTING

Objectives:

To enable the students to learn the basic functions, principles and concepts of cloud computing Systems.

UNIT I: UNDERSTANDING CLOUD COMPUTING

Objective: To understand the concepts in Cloud Computing.

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 II: DEVELOPING CLOUD SERVICES

Objective: To understand the concepts of Cloud Computing Services.

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 III: PROGRAMMING MODELS FOR CLOUD COMPUTING

Objective: To enable the Students to learn Programming Models in Cloud Computing and its Environments.

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 – Sales force – VMware.

UNIT IV: SOFTWARE DEVELOPMENT IN CLOUD

Objective: The student should be made to learn the basics of Software Development in Cloud.

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 V: SECURITY IN CLOUD COMPUTING

Objective: At the end of the course, the student should be able to learn Security Aspects of Cloud Computing.

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.

TEXT BOOKS:

1. "Essentials of Cloud Computing "– K.CHANDRASEKARAN – CRC Press Taylor and Francis Group an Informal Business – 2015.

2. Cloud Computing – A Practical Approach for Learning and Implementation, A.Srinivasan and J.Suresh, Pearson India Publications, 2014

REFERENCES:

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.

SKILL BASED SUBJECT

PAPER-4

INTERNET OF THINGS

Objectives:

This course presents the Introduction to IoT, M2M,IoT Architecture, IoT Model And Views, IOT protocols and Real world design constraints enable the students to learn the concepts of IoT.

UNIT I: INTRODUCTION TO IoT

Objective: To understand the fundamentals of Internet of Things.

Introduction to Internet of Things –Definition and Characteristics of IoT– Physical Design– Logical Design–IoT Enabling Technologies –IoT Levels & Deployment Templates – Domain Specific IoTs – Home – City – Environment – Energy – Retail – Logistics – Agriculture – Industry – health and Lifestyle.

UNIT II: M2M and IoT ARCHITECTURE

Objective: To understand the M2M and IoT Architecture

IoT and M2M – Difference between IoT and M2M –SDN –IoT System Management with NETCONF–YANG–IoT Platforms Design Methodology – M2M high–level ETSI architecture – IETF architecture for IoT– OGC architecture –Service Oriented Architecture – IoT reference architecture

UNIT III: IoT MODEL AND VIEWS

Objective:To understand the IoT Model And Views

IoT reference model – Domain model – information model – functional model – communication model – Functional View – Information View – Deployment and operational View – other relevant architectural views – data representation and visualization.

UNIT IV: IoT PROTOCOLS

Objective: To learn about the basics of IOT protocols.

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 V: REAL–WORLD APPLICATIONS

Objectives: Analyze applications of IoT in real time scenario.

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 BOOKS:

1. “Interconnecting Smart Objects with IP: The Next Internet”, Jean–Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, 2010.

2. Internet of Things – A Hands–on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015.

3. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014.

REFERENCES:

1. “Internet of Things – A hands–on approach‖”, ArshdeepBahga, Vijay Madisetti, Universities Press, 2015

2. “Architecting the Internet of Things‖,”DieterUckelmann, Mark Harrison, Michahelles, Florian (Eds), Springer, 2011.

3. “The Internet of Things in the Cloud: A Middleware Perspective‖”, Honbo Zhou, CRC Press, 2012.

4. "From Machine–to–Machine to the Internet of Things – Introduction to a New Age of Intelligence", Jan Ho¨ ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand, David Boyle, Elsevier, 2014.

5. “The Internet of Things – Key applications and Protocols”, Olivier Hersent, David Boswarthick, Omar Elloumi ,Wiley, 2012.

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THIRUVALLUVAR UNIVERSITY

MASTER OF COMPUTER SCIENCE

(CBCS PATTERN)

(With effect from 2020 - 2021)

The course of Study and scheme of Examination

S.No	Study Components / Course Title		Ins. Hrs./ week	Credit	Title of the Paper	Maximum Marks		
						CIA	Uni. Exam	Total
SEMESTER 1								
1.	Core	Paper -1	5	3	Relational Database Management System	25	75	100
2.	Core	Paper -2	5	3	Enterprise Java Programming	25	75	100
3.	Core	Paper -3	5	3	Programming using C#.NET	25	75	100
4.	Practical	Paper -1	3	2	Practical 1:Relational Database Management System	25	75	100
5.	Practical	Paper -2	3	2	Practical 2: Enterprise Java Programming	25	75	100
6.	Practical	Paper -3	3	2	Practical 3: Programming using C#.NET	25	75	100
Internal Elective for same major students								
7.	Core Elective	Paper-1	3	3	**(to choose one out of 3)** A. Computer Organization B. Parallel Computing C. Embedded System	25	75	100
External Major for other major Students (Inter/multi-disciplinary papers)								
8.	Open Elective	Paper - 1	3	3	**(to choose one out of 3)** A. E-Commerce B. Introduction to Computer Applications C. Principles of Internet	25	75	100
			30	**21**				**800**
SEMESTER II						**CIA**	**Uni. Exam**	**Total**
9.	Core	Paper -4	5	3	Advanced Enterprise Java Programming	25	75	100
10.	Core	Paper -5	4	3	Design and Analysis of Algorithm	25	75	100
11.	Core	Paper -6	4	3	Web Application using C#.NET	25	75	100
12.	Practical	Paper -4	3	2	Practical 4: Advanced Enterprises Java Programming	25	75	100
13.	Practical	Paper -5	3	2	Practical 5: Design and Analysis of Algorithm	25	75	100
14.	Practical	Paper -6	3	2	Practical 6: Web Application using c#.NET	25	75	100
Internal Elective for same major students (Choose any one)								
15.	Core Elective	Paper -2	3	3	**(To choose one out of 3)** A. Human Computer Interaction B. Social Information N/W C. Cloud Computing	25	75	100
External Major for other major Students (Inter/multi-disciplinary papers)								
16.	Open Elective	Paper – 2	3	3	**(To choose one out of 3)** A. Principles of Web Design B. Open Source Applications C. Problem Solving Techniques	25	75	100

17.	*Field Study		-	2		100	-	100
18.	Compulsory Paper		2	2	Human Rights	25	75	100
			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: Distributed Operating System	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 registred 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
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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. MichealDroettboom, “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.

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www.w3schools.com/xml/
https://www.tutorialspoint.com/xml/
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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 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

www.learnpython.org/
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. Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, Internet of Things, Wiley, India, 2019.

REFERENCES

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on Approach)", 1st Edition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

WEB REFERENCES

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 tocompare and contrast symmetric and asymmetric encryption systems.

CO4 - Students are able toidentify the web systems vulnerable to attack.

CO5 - Students are able touse 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 identifysituations 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 involvedin a given computational problem.
- To approachthe programming tasks using techniques learned and writepseudo-code.
- To choosethe right data representation formats based on the requirements of the problem.
- To usethe comparisons and limitations of the various programming constructs and choosethe 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.

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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

www.learnpython.org/
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 InformationApplication 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 Learming: 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.

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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 tolearn the risk management activities and the resource allocation for the projects.
CO3 - Students are able toapply the software estimation and recent quality standards for evaluation of the software Projects.
CO4 - Students are able toacquire knowledge and skills needed for the construction of highly reliable software project.
CO5 - Students are able to 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.

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1. Futrell, "Quality software Project management", Pearson Education India.
2. Royce, "Software Project Management", Pearson Education India.

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https://www.lynda.com/Project-Management-training-tutorials/39-0.html
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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 ANALYTSIS

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 analtics 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 Cassendra
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 Soumendra 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 toapply these techniques in applications which involve perception, reasoning and learning.
CO3 - Students are able toexplain 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 toacquire the knowledge of real world Knowledge representation.
CO5 - Students are able toanalyze and design a real world problem for implementation and understand the dynamic behavior of a system.
CO6 - Students are able touse different machine learning techniques to design AI machine and enveloping applications for real world problems

UNIT – I: INTRODUCTION

AI Problems - Al 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.

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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 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 Ne xt Threat to National Security & What to Do About It", Ecco, 2010. 3. Dan Shoemaker, "Cyber security The Essential Body of Knowledge", Cengage Learning, 2011.

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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

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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 researchproposal/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.

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THIRUVALLUVARUNIVERSITY

BACHELOR OF COMPUTER APPLICATIONS DEGREE COURSE

CBCS PATTERN

(With effect from 2020-2021)

S. No.	Part	Study Components Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
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					**CIA**	**Uni. Exam**	**Total**
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
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
		Sem. Total		**30**	**21**		**175**	**525**	**700**

SEMESTER VI							CIA	Uni. Exam	Total
37.	III	Core Theory	Paper-12	4	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.	IV	Skill Based Subject IV	Paper-4	3	2	Object Oriented analysis and design	25	75	100
45.	V	Extension Activities		0	1		100	0	100
		Sem. Total		30	**26**		**300**	**600**	**900**
					140				**4500**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	2	4	16	100	400
Part II	Communicative English & English	2	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	13	(3-5)	50	100	1300
	Core practical	8	(2-3)	20	100	800
	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	**45**		**140**		**4500**

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 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/OCP 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 typesand 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 Liner Programming.
- ✓ To understand the concepts ofTransportation, 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,KrishnaPrakashanMedia(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 edition2004, 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.
- 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.**ComputerFundamentals**.[FirstEdition,Revised].S.Chand &CompanyLtd, New Delhi. (**UNIT I**(**Introduction: Characteristics of Computers to Categories of Computer**))

REFERENCE BOOKS:

1. *ITL EducationsSolution Limited.* 2009. **Introduction toComputer Science**. [Fourth Impression].Pearson Education, New Delhi.
2. *Alexis Leon and Mathews Leon.* 1999. **Fundamentals of Information Technology.**[FirstEdition]. 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 sytems 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 protocolDeadlock 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 desigh, Dr P Sreenivasa Kumar Professor CS&E, Department, IIT, Madras
2. 2. NPTEL, Indexing and Searching TechniquesinDatabasesDr. ArnabBhattacharya,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 Elecrical 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 GroupServices- 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 Stalling 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.

- 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

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 RASPERRY 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 Madisetti, —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 Rasperry 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 andWebDesign.** [Fourth reprint]. Tata McGraw-HillEducationPrivateLimited., New Delhi.

REFERENCE BOOKS:

1. *Deitel,H.M Dietel,P.J.andGoldbergA.B*.2008.**Internet&Worldwide Web- How toProgram.**[Third Edition].PHL,New Delhi.
2. *Comdex.*2000.**Teachyourselfcomputersandtheinternetvisually**.[First Edition]. IDGBookIndia (p)Ltd.
3. *Ramachandran,T.M.Nambissan*.2003.**AnOverviewofinternetandweb development**. [FirstEdition].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.

SEMESTER V

CORE PAPER - 9

MOBILE APPLICATIONS DEVELOPMENT

Objectives:

To provide the students with a detailed knowledge on Mobile Application Development and Deployment about Android programming from basics to buildingmobile applications for digital world.

UNIT I: INTRODUCTION TO ANDROIDPLATFORM

Objective: To understand the basics of smart phones and android platforms**.**

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 simpleapplication.

UNIT II: ANDROID UI DESIGN

Objective: To understand the basic concepts of user interface related to app development.

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 III: DATA PERSISTENCE

Objective: To understand the important of data persistence in mobile environment.

Different Data Persistence schemes: Shared preferences–FileHandling–Managing data using SQLite database –Content providers: user content provider– Android in build content providers.

UNIT IV: ANDROID SERVICES & NETWORK ENVIRONMENT

Objective: To understand the various services and network facilities provided by android platform.

Services: Introduction to services – Local service – Remote service – Binding the service –Communication between service and activity –Intent Service – Multi–Threading: Handlers – AsyncTask– Android network programming:HttpUrlConnection– Connecting to REST–based –SOAP based Web services –Broad cast receivers:LocalBroadcastManager–Dynamic broadcast receiver – System Broadcast –Telephony Manager:Sending SMS and making calls.

UNIT V: ADVANCED APPLICATIONS

Objective: To understand the various apps deployed and developed on by mobile platform.

Location based services: Google maps V2 services usingGoogle 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 processof uploading Apps to Google play.

TEXT BOOKS:

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.

REFERENCES:

1. "Professional Android™ Sensor Programming",Greg Milette,Adam Stroud, John Wiley and Sons, Inc2012.

2. "Android 6 for Programmers, App Driven approach", Paul Deital, Harvey Deital, Alexander Wald, Prentice Hall, 2015.

CORE PAPER - 10

OPERATING SYSTEM

Objectives: Enable the student to get sufficient knowledge on concepts, functions and various system resources of operating systems.

UNIT I: OPERATING SYSTEM BASICS

Objective: To understand the structure and functions of operating systems.

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 II: CPU SCHEDULING ALGORITHM AND PREVENTION

Objective: To understand the principles of scheduler, scheduler algorithms and Deadlock.

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 III: STORAGE MANAGEMENT

Objective: To learn various memory management schemes.

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 IV: I/O SYSTEMS

Objective: To study I/O management, File system and Mass Storage Structure.

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 V: CASE STUDIES

Objective: To learn the basics of UNIX, LINUX systems and perform administrative tasks on LINUX servers.

UNIX System – A Case Study – LINUX System – Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security .

TEXT BOOKS:

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.

REFERENCES:

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. Sriddhar, Dynaram Publication, Bangalore Company.

CORE PAPER - 11

DESIGN AND ANALYSIS OF ALGORITHMS

Objectives: To build a solid foundation of the most important fundamental subject in computer science. Creative thinking is essential to algorithm design and mathematical Acumen and programming skills.

UNIT – I: ALGORITHM AND ANALYSIS

Objective: Understanding various algorithm design techniques.
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 – II: DIVIDE AND CONQUER

Objective: This technique is the basis of efficient algorithms for all kinds of problems**.**

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 – III: THE GREEDY METHOD

Objective: This is a simple approach which tries to find the best solution at every step.

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 – IV: DYNAMIC POGRAMMING, TRAVERSAL & SEARCHING

Objective: Providing a general insight into the dynamic programming approach.
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 – V: BACKTRACKING & BRANCH AND BOUND

Objective: Algorithm design paradigm for discrete and combinatorial optimization problems.

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.

TEXT BOOKS:

1. "Fundamentals of Computer Algorithms", Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Galgotia Publications, Second Edition 2015.
2. "Introduction to Algorithms", Coremen T.H., Leiserson C.E. and Rivest R.L., PHI Publications, Third Edition, 1998.

REFERENCES:

1. "Introduction to the Design and Analysis of Algorithms", AnanyLevitin, 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.

CORE PRACTICAL (Practical - 5)

MOBILE APPLICATIONS DEVELOPMENT LAB

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Intent and Acitivity.
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 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.

CORE PRACTICAL (Practical - 6)

OPERATING SYSTEM LAB

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 e 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 ELECTIVE

PAPER - 1

(to choose one out of 3)

A. DATA MINING

Objectives: To enable the students to understand the importance of Data Mining and its techniques with recent trends and tools.

UNIT I: DATA MINING BASICS

Objective: To understand about the basics of Data Mining and Data

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 II: DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING

Objective: To understand about the methods of Data Warehousing

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 III: PATTERNS AND CLASSIFICATION

Objective: To understand about the techniques of Data Mining

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 IV: CLUSTERING AND OUTLIER DETECTION

Objective: To understand about the importance of Cluster and outlier detection

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 V: RECENT TRENDS IN DATA MINING AND TOOLS

Objective: To improve the student's knowledge with recent trends and tools

Other Methodologies of Data Mining – Data Mining Applications – Data Mining Trends – Recent Data Mining Tools – Rapidminer – Orange – Weka–Knime–Sisense –Ssdt (SQL Server Data Tools) – Oracle – Rattle – Data melt – Apache Mahout.

TEXT BOOKS:

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

REFERENCES:

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.

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

INTERNAL ELECTIVE

PAPER - 1

B. INFORMATION SECURITY

Objectives: To enable the student to understand various methodologies available for securing information.

UNIT I: INFORMATION SECURITY BASICS

Objective: To understand the basic concepts of Information Security

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 II SECURITY INVESTIGATION

Objective: To understand the legal, ethical and professional issues in Information Security

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 III SECURITY ANALYSIS

Objective: To know about risk management

Risk Management – Introduction – An Overview of Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a Risk Control Strategy –Quantitativeversus Qualitative Risk Control Practices – Risk Management Discussion Points

UNIT IV SECURITY MODELS

Objective: To understand the technological aspects of Information Security

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 V: CRYPTOGRAPHY AND ETHICAL HACKING

Objective: To understand the concepts of Cryptography and Hacking methods

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.

TEXT BOOKS:

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,MichaelG.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.

REFERENCES:

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, 2ndEdition , Pearson/PHI, 2002.

INTERNAL ELECTIVE

PAPER - 1

C. SOFTWARE TESTING

Objectives:

To study the concepts of software engineering with the aim of acquiring skills to develop Software applications, following all standardized procedures and techniques.

UNIT I: INTRODUCTION TO SOFTWARE TESTING

Objective: To understand the concept of software testing, and software quality

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 II: SOFTWARE DEVELOPMENT MODEL AND TESTING

Objective: To learn to inspect and detect errors by going through each and every code segment

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 III: FUNCTIONAL AND STRUCTURAL TESTING

Objective: To gain knowledge of various functional and structural testing techniques

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 IV: TEST MANAGEMENT AND TOOLS

Objective: To understand basic concept of Software Management tools and object oriented testing

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 V: SOFTWARE QUALITY AND SOFTWARE QUALITY ASSURANCE

Objective: To understand basic concept of Software quality and software quality assurance

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

TEXT BOOKS:

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

REFERENCES:

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 Gopalaswamy Ramesh, Pearson Education, 2006.

SKILL BASED SUBJECT
PAPER-3

SOFTWARE ENGINEERING

Objectives:

This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of software development.

UNIT–I: INTRODUCTION TO EVOLVING SOFTWARE

Objective: Introduces the concepts and methods required for the construction of large software intensive systems.

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–II: REQUIREMENTS ENGINEERING

Objective: Gets the idea of choosing the Requirements in Software Engineering.

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–III: DATA ENGINEERING

Objective: Gives an understanding the concept of Data Engineering.

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–IV: TESTING STRATEGIES

Objective: To impart knowledge on Testing and Debugging.

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–V: PROJECT MANAGEMENT

Objective: To enable the students to learn the basic of Project Management & Scheduling.

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.

TEXT BOOKS:

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.

REFERENCES:

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.

SEMESTER VI

CORE PAPER - 12

OPEN SOURCE SOFTWARE

Objectives:

To study the concepts of open source techniques that can be effectively applied in practice about HTML5, JavaScript, PHP, and PERL.

UNIT I: INTRODUCTION TO HTML, CSS

Objective: To understand the concept of HTML, HTML5 and CSS.

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 II: LINUX

Objective: To learn to inspect and detect errors by going through each and every code segment.

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 III:JAVA SCRIPT AND MYSQL

Objective: To understand basic concept of Java Script and MySQL.

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 IV: PHP

Objective: To understand basic concept of PHP

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 – Cooking – Sessions – Database Access with PHO.

UNIT V: PERL

Objective: To understand basic concept of PERL

PERL : Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules– Working with Files – Data Manipulation.

TEXT BOOKS:

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

REFERENCES:

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

CORE PAPER - 13

PYTHON PROGRAMMING

UNIT I:

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 II:

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 III:

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 IV:

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 V:

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.

TEXT BOOKS:

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 BOOKS:

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.

CORE PRACTICAL (PRACTICAL-7)

PYTHON PROGRAMMING LAB

1. Write a Python program to find the area and perimeter of a circle.
2. Write a Python program to generate Fibonacci series.
3. Write a Python program to compute the GCD of two numbers.
4. Write a Python program to generate first n prime numbers.
5. Write a Python program to find the sum of squares of n natural numbers.
6. Write a Python program to find the sum of the elements in an array.
7. Write a Python program to find the largest element in the array.
8. Write a Python program to check if the given string is a palindrome or not.
9. Write a Python program to store strings in a list and print them.
10. Write a Python program to find the length of a list, reverse it, copy it and then clear it.

OPEN SOURCE SOFTWARE LAB

CORE PRACTICAL (Practical– 8)

1. Create a web page with Frames and Tables.
2. Create a web page incorporating CSS (Cascading Style Sheets).
3. Write a shell program to find the factorial of an integer positive number.
4. Write a shell program to find the details of a user session.
5. Create a simple calculator in JavaScript.
6. Write 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 ELECTIVE - 2

PAPER-2

(to choose one out of 3)

A. BIG DATA ANALYTICS

Objectives:

- To explore the fundamental concepts of big data analytics.
- To learn to analyze the big data using intelligent techniques and mining data stream.
- To understand the applications using Map Reduce Concepts.

UNIT–I: INTRODUCTION TO BIG DATA

Objective: To explore the fundamental concepts of big data analytics.

Introduction to big data: Introduction to Big Data Platform – Challenges ofConventional 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 Processesand Tools – Analysis vs. Reporting.

UNIT–II: MINING DATA STREAMS

Objective:To learn to use various techniques for mining data stream.

Mining data streams: Introduction To Streams Concepts – Stream Data Model andArchitecture – Stream Computing – Sampling Data in a Stream – Filtering Streams –Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness ina Window – Decaying Window – Real time Analytics Platform(RTAP) Applications – CaseStudies – Real Time Sentiment Analysis– Stock Market Predictions.

UNIT III: BIG DATA FROM DIFFERENT PERSPECTIVES

Objective: To learn the Big data Business Perspective

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 –IV:HADOOP AND MAP REDUCE

Objective:To understand the applications using Map Reduce Concepts.

Hadoop: The Hadoop Distributed File System – Components ofHadoopAnalysing the Data with Hadoop– Scaling Out–Hadoop Streaming– Design ofHDFS–Java interfaces to HDFS Basics– Developing a Map Reduce Application–How MapReduce Works–Anatomy of a Map Reduce Job run–Failures–Job Scheduling–Shuffle andSort – Task execution – Map Reduce Types and Formats– Map Reduce Features–Hadoop environment.

UNIT – V:FRAMEWORKS

Objective:To introduce programming tools HIVE in Hadoop echo system.

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operatorsin Pig – Hive services – HiveQL – Querying Data in Hive – fundamentals of HBase andZooKeeper– IBM InfoSphereBigInsights and Streams.

TEXT BOOKS:

1. “Intelligent Data Analysis”, Michael Berthold, David J. Hand, Springer, 2007.
2. “Hadoop: The Definitive Guide “, Tom White Third Edition, Oreilly Media, 2012.

REFERENCES:

1. “Big Data and Analytics" SeemaAcharya, SubhasiniChellappan, Wiley 2015.
2. “Mining of Massive Datasets”,AnandRajaraman 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.

INTERNAL ELECTIVE

PAPER-2

B. CRYPTOGRAPHY

Objectives:

- Understand various Security practices and System security standards
- Understand different cryptographic operations
- Understand the various Authentication schemes to simulate different applications.

UNIT – I: COMPUTER AND NETWORK SECURITY

Objective: Understand OSI security architecture and classical encryption techniques**.**

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 – II:SYMMETRIC CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of symmetric cryptographic algorithm**s.**

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 – III:PUBLIC KEY CRYPTOGRAPHY

Objective: Understand the different cryptographic operations of Public key cryptographic algorithms.

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 – Psedorandom Number Generation**.**

UNIT –IV:HASH FUNCTIONS AND DIGITAL SIGNATURES

Objective: To make use of application protocols to design and manage a secure system.

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 –V: SECURITY APPLICATIONS

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).

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TEXT BOOKS:

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.

REFERENCES:

1. “Modern Cryptography Theory and Practice”, Wenbo Mao, Pearson Education, 2004.
2. “Cryptography and Network Security “,BehourzForouzan, DebdeepMukhopadyay,Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. “Quantum Cryptography and Secret–Key Distillation”, Gilles van Assche, Cambridge
University Press, 2010.

INTERNAL ELECTIVE

PAPER-2

C. DIGITAL IMAGE PROCESSING

Objectives:

This course enables the student knowledge about various image processing concepts like enhancement, restoration, segmentation, compression and recognition.

UNIT – I: FUNDAMENTALS

Objective: To know the basics of Digital image and techniques.

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 – II: IMAGE ENHANCEMENT

Objective: To understand various Image enhancement ideas.

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 – III: IMAGE RESTORATION AND SEGMENTATION

Objective: To understand Image restoration techniques.

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 – IV: WAVELETS AND IMAGE COMPRESSION

Objective: To understand degrees of image resolution and compression methods.

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 – V: IMAGE REPRESENTATION AND RECOGNITION

Objective: To understand concepts of image representation and recognition.

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.

TEXT BOOKS

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.

REFERENCES:

1. “Digital Image Processing”, S. Sridhar, Oxford University Press; Second edition, 2016.
2. “Digital Image Processing”, Gonzalez &woods, Pearson Education India, 2016.

INTERNAL ELECTIVE

PAPER - 3

(to choose one out of 3)

A. ARTIFICIAL INTELLIGENCE

Objectives:

To induce the innovative ideas of students, related to Robotics, Artificial Intelligence and Machine Learning. This course enables the student's level to compete in the world of information and technology era.

UNIT I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE:

Objective: To know the basics of Artificial Intelligence.

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 II: AI – PROBLEM SOLVING METHODS:

Objective: To Understand the Methods and algorithms in AI.

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 III: AI – KNOWLEDGE REPRESENTATION:

Objective: To learn to represent knowledge in solving AI problems.

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 IV: STATISTICAL REASONING AND AGENTS:

Objective: To Understand Statistical logics and know about Software agents.

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 V: MACHINE LEARNING AND APPLICATIONS

Objective: To learn how Machine learning is related to AI.

Types of Machine Learning – Neural Networks – Deep Learning – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TEXT BOOKS:

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.

REFERENCES:

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

INTERNAL ELECTIVE
PAPER - 3
B. SYSTEM SOFTWARE

Objectives:

To have an understanding the basic design of assemblers, loaders, linkers, macro processor.

UNIT I: INTRODUCTION TO SYSTEM SOFTWARE

Objective: To understand the basic concepts of system software

System software vs. Application software – Different types of system software – SIC& SIC/XE Architecture – traditional (CISC) machines – RISC machines.

UNIT II: ASSEMBLERS

Objective: Ability to trace the path of a source code to object code and to executable file.

Basic assembler functions– Machine dependent and independent assembler features– Assembler design options–One pass assemblers–Multi pass assemblers– MASM assembler.

UNIT III: LOADERS AND LINKERS

Objective: To design and implementation of loaders and linkers

Basic loader functions–Simple bootstrap loaders – Machine dependent and independent loader features–Linkage editors– Dynamic linking.

UNIT IV: MACRO PROCESSOR

Objective: To understand the concepts of macro processor

Basic macro processor functions–Machine dependent and independent macro processor features–Macro processor design options.

UNIT V: COMPILERS

Objective: Ability to analyze the functions of compilers

Basic compiler functions–Machine dependent compiler features–Machine independent compiler features–Compiler design options the YACC compiler– Compiler.

TEXT BOOKS:

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.

REFERENCES:

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.

INTERNAL ELECTIVE
PAPER - 3
C. MOBILE COMPUTING

Objectives:

- To understand the challenges of wireless communication and the solutions that is in use.
- To study about various types of wireless data networks, wireless protocols and wireless voice networks.
- To design and implement mobile applications.

UNIT I: WIRELESS COMMUNICATION FUNDAMENTALS

Objective: To understand basic concepts of mobile computing.

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 II: MEDIUM ACCESS CONTROL AND TELECOMMUNICATION SYSTEM

Objective: To learn the basics of mobile telecommunication system.

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.

UNIT III: WIRELESS NETWORKS

Objective: To comprehend wireless LAN and cellular systems.

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 IV: MOBILE NETWORK LAYER

Objective: To understand protocols at network and transport layer.

Mobile IP–Goals– Assumption–Entities and Terminology– IP Packet delivery – Agent

advertisement and discovery–Registration–Tunneling and encapsulation–Optimizations–Dynamic Host Configuration Protocol (DHCP) –Routing –DSDV–DSR – Alternative Metrics.

UNIT V: WIRELESS APPLICATION PROTOCOL

Objective: To learn development of applications in mobile computing platform.

Introduction–Protocol Architecture–Wireless Markup Language(WML)–WML Script– Applications–Wireless Telephony Application (WTA) – Wireless Telephony Application Architecture.

TEXT BOOKS:

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.

REFERENCES:

1. "Principles of Wireless Networks", KavehPahalavan, PrasanthKrishnamoorthy, PHI/Pearson Education, 2003.

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.

SKILL BASED SUBJECT

PAPER - 4

OBJECT ORIENTED ANALYSIS AND DESIGN

Objectives: The student should be made to learn the basics of OO analysis and design skills.

UNIT I UML DIAGRAMS

Objective: Learn the UML analysis and design diagrams.

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 II OBJECT MODEL AND DESIGN PATTERNS

Objective: Apply appropriate object model and design patterns.

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 – behavioral – Strategy – observer.

UNIT III APPLYING DESIGN PATTERNS

Objective: Create object code from design Patterns

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 Modeling Language – Package Diagrams – Component Diagrams – Deployment Diagrams – Activity Diagrams – Logical architecture refinement – UML class diagrams – UML interaction diagrams – Applying GoF design patterns.

UNIT IV CLASSIFICATION, CODING AND TESTING

Objective: Learn to map design to code, Compare and contrast various testing techniques.

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 V CASE STUDY

Objective: At the end of the course, the student should be able to: Design and implement projects using OO concepts.

Case study – the Next Gen POS system, Inception –Use case Modeling – 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.

TEXT BOOKS:

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 D esign 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.

REFERENCES: Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc–Graw Hill Education, 2010.

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.

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF ARTS

B.Com.

DEGREE COURSE

CBCS PATTERN

(With effect from 2020 -2021)

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	5	3	Financial Accounting -I	25	75	100
4.	III	Core Theory	Paper-2	5	3	Business Organization	25	75	100
5.	III	ALLIED -1	Paper-1	6	3	**(to choose 1 out of 3)** 1. Indian Economy I 2. Elements of Insurance 3. Consumerism	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
				36	**22**		**175**	**525**	**700**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10.	III	Core Theory	Paper-3	5	3	Financial Accounting –II	25	75	100
11.	III	Core Theory	Paper-4	5	3	Office management	25	75	100
12.	III	ALLIED-1	Paper-2	6	5	**(to choose 1 out of 3)** 1. Indian Economy II 2. Merchant banking 3. Business Mathematics	25	75	100
13.	III	PE	Paper-2	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
				36	**25**		**200**	**600**	**800**

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.	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 Economicsl	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 AccountingII	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**
30.	III	Core Theory	Paper-13	6	4	Cost accounting I	25	75	100
31.	III	Core Theory	Paper-14	5	4	Practical Auditing	25	75	100
32.	III	Core Theory	Paper-15	6	5	Management Accounting	25	75	100
33.	III	Core Theory	Paper-16	6	4	Income Tax Law and Practice I	25	75	100
34.	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

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
35.	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**
36.	III	Core Theory	Paper-17	5	4	Cost accounting II	25	75	100
37.	III	Core Theory	Paper-18	5	4	Income Tax law and practice II	25	75	100
38.	III	Core Theory	Paper-19	4	4	Financial management	25	75	100
39.	III	Compulsory Project	Paper-20	5	5	Individual / Group Project	25	75	100
40.	III	Elective	Paper-2	4	3	(To choose one out of 3) 1. Innovation management 2. Logistics management 3. Service Marketing	25	75	100
41.	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
42.	IV	Skill based Subject	Paper-4	3	2	Human resources management	25	75	100
43.	V	Extension Activities		-	1		100	-	100
				30	**26**		**275**	**525**	**800**
TOTAL					**140**				**4300**

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	Communicative English	2	4	8	100	200
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	19	(3-5)	70	100	1900
	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**

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
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 › bcomiiisem197

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 if 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 Conttract-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=HIuiDzdIInM-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 measures Central Tendency and their application in business.
3. To measure the degree and direction of relationship between the variables inbusiness.
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 Bowlay'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'sPaasche, DorbishBowley'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 3rd 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.southaampton.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 theirapplication 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 aboutIndex 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.economicsdiscussion.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 APPLICATION IN BUSINESS

Course Objectives

1.Indentify 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 itssubsidiary 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
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
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.economicsdiscussion.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,NewDelhi,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

SEMESTER V
CORE PAPER - 13
COST ACCOUNTING- I

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.
6. To be able to solve simple cases.

UNIT-I

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

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

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

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

Overheads

Classification of Overhead Costs - Departmentalization of Overheads - Allocation Absorption and Appointment 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 andProblems.

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. Iyangar	Cost Accounting	Sultan Chand & Sons, New Delhi.

Reference Books:

S.No	Authors	Title	Publishers
1.	A. Murthy and S. Gurusamy,	Cost Accounting	Vijay Nicole Imprints Private Ltd., Chennai.
2.	Tulsian	Cost Accounting	Tata McGraw Hills.
3.	S.N.Maheswari	Principles of Cost Accounting	Sultan Chand & sons, New Delhi

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.

Course Out Comes

Units	CO Statement	
Unit- I	After studied unit-1, the student will be able to	To taught the Nature and Scope of Cost Accounting, and Computation of Cost Sheet and Tenders.
Unit- II	After studied unit-2, the student will be able to	To learn the preparation of Material Purchase and Control.
Unit - III	After studied unit-3, the student will be able to	To impart knowledge about Methods of pricing of Material Issues.
Unit- IV	After studied unit-4, the student will be able to	To study about preparation of Labour Cost Control.
Unit-V	After studied unit-5, the student will be able to	To gain knowledge about Distribution of Overheads.

CORE PAPER - 14

PRACTICAL AUDITING

Course Objectives

1. Understand 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.

UNIT-I

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

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

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

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

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

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.

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 basic concepts of auditing.
Unit - II	After studied unit-2, the student will be able to	The students will be able to the meaning and importance of internal audit, internal check and control.
Unit - III	After studied unit-3, the student will be able to	The students will be able to understand the verification of vouchers and vouching.
Unit - IV	After studied unit-4, the student will be able to	The students will be able to study the auditors appointment, removal, qualification and disqualification.
Unit - V	After studied unit-5, the student will be able to	The students will be able to identify the auditors reports and its kinds.

CORE PAPER - 15

MANAGEMENT ACCOUNTING

Course Objective

To introduce students to the various tools and techniques of management Accounting.

- To enlighten students on Financial Statement Analysis with the emphasis on the preparation of fund flow and cash flow statement.
- Is to impart knowledge of financial statements and their analysis and interpretations.
- To emphasize on application of theoretical knowledge and help managers in decision making.
- To familiarize the students with managerial financial decisions which are taking place in organizations.
- To appreciate the importance of financial information for decision making process.

UNIT-I

Management Accounting: Definition - objectives - Functions - Advantages and limitations - Financial Statement Analysis - Comparative and Common size statements - Trend Analysis.

UNIT-II

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

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

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

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 andProblems.

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.

Reference Books:

S.No	Authors	Title	Publishers
1.	A. Murthy & S. Gurusamy,	Management Accounting	Vijay Nicole Imprints Private Ltd., Chennai.
2.	S.P.Gupta	Management Accounting	Sultan Chand & Sons, New Delhi.

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

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To learn the preparation of Financial Statement Analysis.
Unit - II	After studied unit-2, the student will be able to	To gain effective knowledge about Ratio Analysis
Unit - III	After studied unit-3, the student will be able to	To impart knowledge about Fund Flow and Cash Flow Analysis.
Unit - IV	After studied unit-4, the student will be able to	To study about Marginal Costing techniques.
Unit - V	After studied unit-5, the student will be able to	To know about the preparation of Budget and Budgetary Control

CORE PAPER - XVI

INCOME TAX LAW AND PRACTICE I

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
6. To ensure Price Stability

UNIT - I

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

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

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

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

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 andProblems.

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. &HariprasadReddy, Y	Income Tax Theory, Law& Practice	Margham Publications, Chennai.

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

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

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To understand the basic level of Income tax Act.
Unit - II	After studied unit-2, the student will be able to	To know the tax calculation on house property income
Unit - III	After studied unit-3, the student will be able to	To achieve knowledge on tax calculation of salaried people.
Unit - IV	After studied unit-4, the student will be able to	To obtain knowledge on income tax of business/ professional income.
Unit -V	After studied unit-5, the student will be able to	To understand the administrative set up of income tax department and their powers

INTERNAL ELECTIVE

(to choose one out of 3)
PAPER - 1

A. ENTREPRENEURIAL DEVELOPMENT

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.

UNIT- I

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

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
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

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 Entrepreneurs0- DIC- Industrial Estates

UNIT- V
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

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.

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understand the basic concepts and theories of entrepreneurship.
Unit - II	After studied unit-2, the student will be able to	Exemplify knowledge on course contents, curriculum and constraints of EDP.
Unit - III	After studied unit-3, the student will be able to	Conceive business ideas and convert them into business projects.
Unit- IV	After studied unit-4, the student will be able to	Become familiar with institutions support various forms of assistances and subsidies.
Unit - V	After studied unit-5, the student will be able to	Learn the MSMEs schemes provided to budding entrepreneurs .

INTERNAL ELECTIVE

PAPER - 1

B. BUSINESS ENVIRONMENT

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.
6. To acquire the knowledge Technological environment Indian Business

UNIT-I

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

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

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

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

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 Enironment	Margham Publication
4.	Sheik Saleem	Business Environment	Pearson Education.
5.	Dr.N.Premavathy	Business Environment	Sri Vishnu 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.Dhanabhakyam 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.

Course Out Comes

Units		CO Statement
Unit - I	After studied unit-1, the student will be able to	The students will be able to know the concept of external, micro macro of business environment.
Unit - II	After studied unit-2, the student will be able to	The students will be able to study the economic policies and conditions in India.
Unit - III	After studied unit-3, the student will be able to	The students will be able to understand the concept of natural and technological environment.
Unit - IV	After studied unit-4, the student will be able to	The students will be able to acquire the knowledge of social environment and consumer protection.
Unit - V	After studied unit-5, the student will be able to	The students will be able to study the concept of globalization of Indian business.

INTERNAL ELECTIVE

PAPER - 1

C. MANAGEMENT INFORMATION SYSTEM

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

UNIT - I

Definition- Management Information System - MIS Support for Planning, Organizing and Controlling - Structure of MIS- Information for Decision Making

UNIT - II

Concept of System - Characteristics of System - System Classification - Categories of Information System - Strategic Information System and Competitive advantage.

UNIT - III

System Analysis and Design -SDLC- Role of System - Analyst- Functional Information System - Personnel ,Production, Material, Marketing.

UNIT - IV

Computer and Information Processing - Classification of Computer - Input Devices- Storage Devices - Batch and Online Processing- Hardware - Software - Database Management Systems.

UNIT -V

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.	Jawadekar W.S	Management Information System	Tata McGraw Hill Publishing Company Ltd., 2002.

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Mudrick& Ross	Management Information System	Prentice- Hall of India
2.	Sadagopan	Management Information System	Prentice Hall of India
3.	Murthy CSV	Management Inforation System	Himalaya Publishing House

E-MATERIALS:

www.dbtra.com
www. itword.com
www. icisa. cag. gov. in

Course Out Comes

Units	CO Statement	
Unit- I	After studied unit-1, the student will be able to	Understand the fundamental principles of MIS
Unit - II	After studied unit-2, the student will be able to	Basic knowledge about Concepts and Technologies used in MIS
Unit - III	After studied unit-3, the student will be able to	Acquired knowledge on process of developing and implementing information system
Unit - IV	After studied unit-4, the student will be able to	Impart knowledge on Information Processing
Unit - V	After studied unit-5, the student will be able to	Enhanced knowledge on DBMS.

SKILL BASED SUBJECT
PAPER - 3
PRINCIPLES OF MARKETING

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.

UNIT - I

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

PRODUCT

Meaning- Features-Classification of products- Product Mix- Product Innovation-New Product Development-Product Life Cycle- Branding- Meaning- Advantages and Limitations. Packaging - Meaning - Kinds - Labeling - Meaning-Advantages and Limitation.

UNIT - III

PRICING

Price - Meaning - Pricing- Importance - Objectives- Factors affecting pricing decisions Pricing Policies- Procedure for price determination- Kinds of Pricing.

UNIT- IV

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

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.

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.

E-Material

1.Online Study Material for Commerce courses - LPU Distance

Course OutComes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Know the basic principles and practices of marketing.
Unit - II	After studied unit-2, the student will be able to	Be aware of the importance of products, standards of branding, packing and quality management.
Unit - III	After studied unit-3, the student will be able to	Understand the pricing mechanism of marketing.
Unit - IV	After studied unit-4, the student will be able to	Know the basic aspects of the channels of distribution and buyers' behaviours.
Unit - V	After studied unit-5, the student will be able to	Articulate sales Promotional techniques used in modern marketing.

SEMESTER VI
CORE PAPER - 17
COST ACCOUNTING II

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.

UNIT-I

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

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

Operating Costing (Transport Costing): Cost Unit - Cost Classification - Operating Cost sheet.

UNIT-IV

Standard Costing - Variance Analysis - Material -Labour- Overheads - Fixed - Variable -Sales Variance.

UNIT-V

Reconciliation of Cost and Financial Accounts.

Note: Questions in Sec. A, B & C shall be in the proportion of 20:80 between Theory andProblems.

Text Books:

S.no	Authors	Title	Publishers
1	S.P.Jain and Narang	Cost Accounting	Kalyani Publishers, New Delhi
2.	S.N.Maheswari	Principles of Cost Accounting	Sultan Chand & sons, New Delhi
3.	S.P. Iyangar	Cost Accounting	Sultan Chand & Sons, New Delhi.

Reference Books:

S.No	Authors	Title	Publishers
1.	A. Murthy and S. Gurusamy,	Cost Accounting	Vijay Nicole Imprints Private Ltd., Chennai
2.	Tulsian	Cost Accounting	Tata McGraw Hills.

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.

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To taught the Computation of Job, Batch, Contract Costing
Unit - II	After studied unit-2, the student will be able to	To learn the preparation of Process Costing.
Unit - III	After studied unit-3, the student will be able to	To impart knowledge about calculation of Operating Costing
Unit - IV	After studied unit-4, the student will be able to	To study about preparation of Standard Costing.
Unit - V	After studied unit-5, the student will be able to	To gain knowledge about Reconciliation of Cost and Financial Accounts.

CORE PAPER - 18
INCOME TAX LAW AND PRACTICE II

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
6. To ensure Price Stability

UNIT- I

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

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

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

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

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 andProblems.

Text Books

S.no	Authors	Title	Publishers
1	Gaur &Narang	Income Tax Law & Practice	Kalyani Publishers
2.	Reddy,T.S. &HariprasadReddy ,Y	Income Tax Theory, Law&Practice	Margham Publications, Chennai.
3	Dr. A. Murthy	Income Tax Law & Practice	Vijay Nicole Imprints Pvt.Ltd. Chennai

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

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

Course OutComes

Units		**CO Statement**
Unit - I	After studied unit-1, the student will be able to	To know the calculation of taxes for gain on capital asset.
Unit - II	After studied unit-2, the student will be able to	To know the tax on other source and its calculation.
Unit - III	After studied unit-3, the student will be able to	To know the adjustment of carry forward Income/Expenditure.
Unit - IV	After studied unit-4, the student will be able to	To Expertise in preparation of total income of individual/ firm etc.
Unit - V	After studied unit-5, the student will be able to	To gain knowledge on filing of income tax returns.

CORE PAPER - 19

FINANCIAL MANAGEMENT

Course Objectives

- To provide expert knowledge on setting financial objectives & goals.
- To manage Financial Resource, financial risk management and through understanding of investment portfolios and financial instruments.
- To Maximize the Cost of Capital by Developing a Sound and Economical combinations of Corporate Securities
- Proper Estimation and Requirement for Expansion and Growth
- To Ensure adequate Return on Investment
- To Maintain Proper Cash Flow Creating Reserves and Goodwill

UNIT- I

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

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

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

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

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

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

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 businessline

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To understand the basic Principles and practices of Financial management.
Unit- II	After studied unit-2, the student will be able to	Determining the amount of Capital, Organization and Structure. Reduce cost of Capital and Operating Risks
Unit - III	After studied unit-3, the student will be able to	To have the knowledge and practice of arriving financial Decision makings
Unit - IV	After studied unit-4, the student will be able to	To acquire practical knowledge on Calculation of working capital
Unit - V	After studied unit-5, the student will be able to	To gain knowledge on leverage and portfolio management

INTERNAL ELECTIVE
Paper - 2
(to choose one out of 3)
A. INNOVATION MANAGEMENT

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.

UNIT- I

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

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 behavior 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

INNOVATION THEORIES

Major contemporary theories: Disruptive-Networked-Open; Alternative theories: Evolutionary-Uncontested- Adaptive - Green Initiatives.

UNIT- IV

INNOVATION PROCESS

New Product Development-Criticality of the Value Proposition, Differentiation - Paths to Market-Systems of Ideation, Experimentation and Prototyping - Innovation Labs.

UNIT- V

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.	J. Christopher Westland	Global innovation Management, A strategic Approach	Palgrave Macmillan
3.	J. Christopher Westland	Global Innovation Management	Macmillan International Higher Education

Reference Books

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Moore, G.A	Dealing with Darwin: How Great Companies Innovate at Every Phase of theirEvolution, 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.

E-Material

1. www.eui.upm.es › ModuloIIPDF Basic Concepts of Innovation and Innovation Management
2. 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? YouTube app · The Audiopedia

Course Outcomes:

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Perceive the basics of innovation
Unit - II	After studied unit-2, the student will be able to	Appreciate the value of creativity
Unit - III	After studied unit-3, the student will be able to	Gain exposure to various theories of innovation
Unit - IV	After studied unit-4, the student will be able to	Apprehend the innovation process.
Unit - V	After studied unit-5, the student will be able to	Inculcate the Shade of innovation for the success of business

INTERNAL ELECTIVE
Paper - 2
B. LOGISTIC MANAGEMENT

Course Objectives

- To enable students understand the importance and dynamics of a firm's physical distribution function and management of its supply chain.
- To understand how warehouse functions in logistics fits into logistics & supply chain management.

UNIT- I

Logistics - meaning - definition- scope- importance - function- objectives- of logistics management- customer service and logistics.

UNIT- II

Supply chain intermediaries - Meaning, Importance, Objectives, Functions- Types of Intermediaries- Selection of Channel Member- Motivation, Training and Evaluation of Channel Members.

UNIT- III

Supply Chain Management- Meaning, Definition, Function, Need- Marketing Forces affecting Supply Chain Activities- Supply Chain Activities in India.

UNIT- IV

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

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	Printice Hall of India, New Delhi
2.	Sunil chopra	Supply chain management strategic planning and operation	Pearson Education
3	Nanthakumar .B	Logistics and supply chain management	Vijay Nicoles Imprint Pvt. Ltd

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	Vinod V. Sople	Logistics Management	Pearson Education
2.	Satis c, Ailawadi, Rakesh Singh	Logistics Management	Prentice Hall of India New Delhi
3.	Taylor	supply chain manager's guide	Person Education
4.	RonaLH.Ballou	Business Logistics /supply chain management	Pearson education prentice hall, New Delhi

Course Outcomes:

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To understand the basic concepts of logistic management
Unit - II	After studied unit-2, the student will be able to	To explore the supply chain intermediaries
Unit - III	After studied unit-3, the student will be able to	To explore the supply chain strategies
Unit - IV	After studied unit-4, the student will be able to	To identify the warehousing strategies in logistic management
Unit - V	After studied unit-5, the student will be able to	To perceive the legal frame work of logistic management.

INTERNAL ELECTIVE
PAPER - 2
C. SERVICE MARKETING

Objectives

a) To enable students to acquire knowledge of service marketing
b) To understand the concepts relating to service quality, pricing and demand for services
c) To impart knowledge about insurance services in service marketing
d) To develop practical knowledge about service marketing.
e) To create new ideas in service marketing.

UNIT - I

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

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

Strategic Marketing Management for Services - Matching Demand and Supply through Capacity Planning and Segmentation - Internal Marketing of a Service - External versusInternal Orientation of Service Strategy.

UNIT - IV

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

Marketing of Services with special reference to Health Services - HospitalityServices 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

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	RamneetKaur, Parampalsingh	Services Marketing	Kalyani Publications
2.	S.M. Jha	Services Marketing	Himalaya Publications
3.	Dr. B. BaLy	Services Marketing	S. Chand and Co. Publications
4.	VasanthiVenugopal& Raghu V.N	Services Marketing	Himalaya Publications

Course Outcomes:

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understand the concepts and evolution of service marketing.
Unit - II	After studied unit-2, the student will be able to	Explore the 4 Ps of service marketing.
Unit - III	After studied unit-3, the student will be able to	To Perceive the strategies in service marketing.
Unit - IV	After studied unit-4, the student will be able to	To explore the quality issues of service marketing.
Unit - V	After studied unit-5, the student will be able to	To understand the different services organizations.

E- Material

1. http://www.sasurieengg.com/e-course-material/MBA/II-Year Sem3/BA7013%20SERVICE_MARKETING.pdf

2. http://www.pondiuni.edu.in/storage/dde/downloads/markiv_sm.pdf

INTERNAL ELECTIVE
PAPER - 3
(to choose one out of 3)

A. CUSTOMS AND GOODS AND SERVICE TAX

Objectives

To enable the students to understand basic concepts of goods and service tax.

To analyze the assessment returns and refund of goods and service tax

UNIT - I

CUSTOMS ANDEXCISE 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

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

GOODS AND SERVICE TAXREGISTRATION

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

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

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).

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	T S Reddy and Hari Prasad Reddy	Business Taxation	Margham Publication.
2.	Dr. Vinod and K. SinghaniaMonicSinghania	Students Guide To goods and service Tax	Taxmann Publications, New Delhi.
3.	Datey, V.S.	Indirect Tax Law and practice	Taxmann Publications Pvt. Ltd., Delhi,

Course OutComes

Units	CO Statement	
Unit- I	After studied unit-1, the student will be able to	Understand the basics of Customs and Excise duty.
Unit- II	After studied unit-2, the student will be able to	Know the fundamental concepts of Goods and Service Tax (GST).
Unit - III	After studied unit-3, the student will be able to	Understand the Goods and Service Tax Registration.
Unit- IV	After studied unit-4, the student will be able to	Analyze the procedures of Levy and Collection of GST.
Unit - V	After studied unit-5, the student will be able to	Understand the Assessment Returns and Refund of Goods and Service Tax.

INTERNAL ELECTIVE
PAPER - 3
B. INVESTMENT MANAGEMENT

Objectives

1. To enable the students toapply various tools and techniques of Investment and risk management.
2. To provide knowledge on various investment avenues that benefitsthe individual and nation.

UNIT- I

INTRODUCTION TO INVESTMENT

Investment Meaning- Investment Vs. Speculation- Investment Vs Gambling- Important factors favorable for investment program- stages in investment - investors classification

UNIT - II

SECURITY INVESTMENT

Meaning- Bonds- Preference Shares- Equity shares- Derivatives- Options- Swaps- Futures- Mutual funds

UNIT - III

NON SECURITY INVESTMENT

Meaning- Government Securities- Life Insurance- UTI- Commercial banks- Provident fund- Post office schemes- National Savings Schemes- Fixed Deposit Schemes.

UNIT - IV

RISK AND RETURN

Meaning- Historical and Expected return- Types of risk- Measurement of risk

UNIT - V

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.

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS

1.	Natarajan L	Investment Management Security Analysis and Portfolio Management	Margham Publication, Chennai.
2.	Avadhani VA	Investment and Securities Market in India	Himalaya Publishing House, Mumbai.
3.	Bhalla VK	Investment Management, Security Analysis and Portfolio Management	S.Chand and Company Ltd, New Delhi

E-Material

1. www.universityofcalicut.info › ...PDF Investment Management - University of Calicut
2. www.pondiuni.edu.in › ddePDFSecurtiy Analysis and Portfolio Management
3. https://www.cfainstitute.org › ...PDF the future of investment management - CFA Institute

Course OutComes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understanding the Fundamentals of Investment
Unit - II	After studied unit-2, the student will be able to	Knowledge pertaining to Security Investment.
Unit - III	After studied unit-3, the student will be able to	Knowledge about Non Security Investment.
Unit - IV	After studied unit-4, the student will be able to	Scientific reasoning about Risk and Return.
Unit - V	After studied unit-5, the student will be able to	Reflective thinking through Fundamental and Technical Analysis.

INTERNAL ELECTIVE
PAPER - 3
C. FINANCIAL SERVICES

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.

UNIT-I

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

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

Factoring - Types and feature of factoring agreement - Factoring Vs Bills discounting - Services of factor - Consumer Finance and credit card services - forfeiting.

UNIT-IV

Venture capital - meaning and characteristics - criteria for assistance - schemes and guidelines - infrastructure financing - assessment of risk - legal aspects.

UNIT-V

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

Reference Books:

S.No	Authors	Title	Publishers
1.	Dr. N. Premavathy	Financial Services and Stock Exchange	Sri Vishnu Publications, Chennai.
2.	Dr.S.Gurusamy	Financial Services and Systems	Vijay Nicholes Imprint Pvt. Ltd., Chennai

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"

Course Out Comes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	To gain knowledge about Financial Services, Capital and Money Markets
Unit - II	After studied unit-2, the student will be able to	To gain effective knowledge about leasing.
Unit - III	After studied unit-3, the student will be able to	To impart knowledge about Factoring.
Unit - IV	After studied unit-4, the student will be able to	To know about Venture capital.
Unit - V	After studied unit-5, the student will be able to	To learn about Mutual funds.

SKILL BASED SUBJECT

PAPER - 4

HUMAN RESOURCES MANAGEMENT

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.

UNIT - I

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

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

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 - V

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 MNCs.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, 5th edition (2013).
2.	L.M. Prasad	Human Resource Management (Text & Cases)	Sultan Chand and sons, New Delhi, 3rd edition (2014).

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS
1.	K. A. Aswathappa	Human Resource Management	Himalaya Publishing House, 8th edition.
2.	C. B. Mamoria	Personnel Management	Himalaya Publishing House Pvt., Ltd, 13th edition (2019).
3.	P. C. Tripathi	Personnel Management and industrial relations	Sultan Chand and sons, New Delhi, 21st edition (2013).
4.	P.SubbaRao	Personnel and Human Resource Management	Himalaya Publishing House.

E-Material

1.Online Study Material for Commerce courses - LPU Distance

Course OutComes

Units	CO Statement	
Unit - I	After studied unit-1, the student will be able to	Understanding the basics of Human Resource Management.
Unit - II	After studied unit-2, the student will be able to	Ability to plan Human resource.
Unit - III	After studied unit-3, the student will be able to	Knowledge about leadership qualities through Recruitment and Selection.
Unit - IV	After studied unit-4, the student will be able to	Comprehension about Training and Development.
Unit - V	After studied unit-5, the student will be able to	Awareness about Performance and Potential Appraisal.

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THIRUVALLUVAR UNIVERSITY

MASTER OF COMMERCE

SYLLABUS

UNDER CBCS

(With effect from 2020-2021)

The Course of Study and the Scheme of Examination

Sl. No.	*Study Components*		*ins. hrs / week*	*Credit*	*Title of the Paper*	*Maximum Marks*		
	Course Title					*CIA*	*Uni. Exam*	*Total*
SEMESTER I								
1.	Core	Paper- 1	6	4	Advanced Financial Management	25	75	100
2.		Paper- 2	6	4	Accounting for Managerial Decision	25	75	100
3.		Paper- 3	6	4	Marketing Management	25	75	100
4.		Paper- 4	6	4	Advanced Business Statistics	25	75	100
Internal Elective for same major students								
5.	Core Elective	Paper-1	3	3	(To choose one out of 3) A. Business Environment B. Computer Application in Business C. Managerial Economics	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
6.	Open Elective	Paper-1	3	3	(To choose one out of 3) A. Principles of Marketing B. Elements of Insurance C. Corporate Social Responsibility	25	75	100
			30	**22**		**150**	**450**	**600**
SEMESTER II						*CIA*	*Uni. Exam*	*Total*
7.	Core	Paper- 5	6	4	Corporate Laws	25	75	100
8.		Paper- 6	6	4	Human Resource Management	25	75	100
9.		Paper- 7	6	4	Advanced Corporate Accounting	25	75	100
Internal Elective for same major students								
10.	Core Elective	Paper-2	5	3	(To choose one out of 3) A. Export and Import Management B. Global Marketing C. E-Commerce	25	75	100
External Elective for other major students (Inter/multi disciplinary papers)								
11.	Open Elective	Paper-2	5	3	(To choose one out of 3) A. Principles of Management B. Elements of Accounting C. Elements of Business Law	25	75	100
12.	*Field Study		-	2		100	-	100

13.	Compulsory Paper		2	2	Human Rights	25	75	100
			30	**22**		**250**	**450**	**700**
SEMESTER III						*CIA*	*Uni. Exam*	*Total*
14.	Core	Paper- 8	5	4	Goods & Services 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	5	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 registred 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

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 Autority.

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 organistional 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 organistional 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 organistional 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. Agricutural 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. senecahs.org
4. Principles of Agribusiness Management, epdf – 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 Weihrich, ‘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:

1. After studied Unit-1, the student will be able to understand the concept of Small Business and MSME.
2. After studied Unit-2, the student will be able to know how to start a Small Industry step by step.
3. After studied Unit-3, the student will be able to understand the Type of the Organizations.
4. After studied Unit-4, the student will be aware of the Sources of Finance for Small Business.
5. After studied Unit-5, the student will be able to know Incentives and Subsidies given the Government.

OPEN 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 Pubications, 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.
2. T.S. Reddy and Y. Hari Prasad Reddy, Income Tax Law & Practice, Margham Publications, Chennai.

3. Girish Ahuja & Ravi Gupta, Practical Approach to Income Tax, Wolters Kluwer India Pvt. Ltd., Mohali, Chandigarh.
4. Anita Raman, Income Tax Theory, Law & Practice, Mc Graw Hill, New Delhi.

Reference Books:

1. Vinod K Singhania and Monica Singhania, Students' Guide to Income Tax including GST, Taxmann, New Delhi.
2. H.C. Mehrothra, Income Tax including Tax Planning & Management, Sahithya Bhavan, Agra.
3. R N Lakhotia and Subhash Lakhotia, How to Save Income Tax through Tax Planning, Vision Books, New Delhi.
4. Master Guide to Income Tax Rules, Taxmann, New Delhi.
5. Income Computation & Disclosure Standards, Taxmann, New Delhi.

Course Outcomes:

1.The Students we able to Contrast The Different Basic Concepts In Income Tax
2. The Students we able to understand and Compute Salary Income And Income From House Property
3. The Students we able to understand and Construct The Statements For Business. Income, Professional Income And Capital Gains
4. The Students we able to understand and Compute Income From Other Sources And Total Income Of Individuals
5. The Students we able to understand and Trace Assessment Procedure and Familiarizing Tax Planning

PAPER - 13

INVESTMENT & PORTFOLIO MANAGEMENT

Course Objectives

1. To infuse basic knowledge in proposed investors as to select the better investment proposal.
2. To create awareness among the investors about unscrupulous trade practices happening in the security market thereby protecting their interests.
3. To Impart the students about basic Fundamental Analysis, Economic Analysis and Technical Analysis.
4. To facilitate the students about Valuation of Securities, ABM,YBM,FVM.
5. To Let students to know about Efficient Market Hypothesis, Random Walk Theory, Markowitz Theory.

Unit - 1

Properties of financial assets - Financial Markets - Investments - Types - Characteristics - Objectives - Types of Investors - Investment Vs. Gambling, Speculation, Speculation Vs. Gambling.

Unit - 2

Nature and Scope of Security Analysis - Concept of Risk and Return - Sources of Risk - Types of Risk - Risk Aversion and Risk Premium - Measurement of Risk: Standard Deviation as a measure of Risk, β as a measure of Risk) - Measurement of Return from Historical data.

Unit - 3

Fundamental Analysis - Economic Analysis, Industry Analysis and Company Analysis - Technical Analysis - Trend Indications - Indices and Moving applied in Technical Analysis.

Unit - 4

Valuation of Securities - Equity Shares: Assets Backing Method, Yield Basis Method, Fair Value Method, Return on Capital Employed and Price Earning Method. Preference Shares: Dividend Discount Model, Yield on Preference Shares. Debentures and Bonds: Market Discount Rate, Spot and Forward rate, Binominal Interest Rate Free, Maturity Pricing.

Unit - 5

Efficient Market Hypothesis - Random Walk Theory - Markowitz Theory - Sharpe's Optimisation Solution - Down Theory - CAPM model - SML, CML.

Note: Only theory Questions

Text Book

1. Dr. Bhalla V.K. Investment Managemet, S. Chand and Company, New Delhi.
2. Rustagi R.P. Investment Analysis and Portfolio Management, Sultan Chand & Sons, New Delhi.

References

1. Dr. Ranganatham m & Madhumathi R. Investment Analysis 7 Portfolio Management. Pearson Education, New Delhi.
2. Fisher & Jordan, Security Analysis and Portfolio Management, Prentice Hall of India, New Delhi.
3. Sharpe, William and Gordon, Investment - Prentice hall of India, New Delhi.

Course Outcomes

1. Making the students being well aware of types of financial markets
2. Testing the knowledge of students about measurement of risk and return.
3. Asses the performance of students in relation to Fundamental Analysis, Economic Analysis, Industry Analysis and Company Analysis.
4. Evaluate student's knowledge on valuation of equity shares, preference shares, debentures and bonds
5. Getting the students to familiarize Efficient Market Hypothesis

PAPER - 14

PROJECT DEVELOPMENT

Course Objective:

1. To study Project development cycle, Project Appraisal, Project Financing and Selection and Risk Management.

2. To Enhance the knowledge about the types of Appraisals.

3. To facilitate the students to the understanding Project cost and Social cost.

4. To enable the students Learn Selection of Project and Programming.

5. To Impart Knowledge on Project control and budgetary control.

UNIT-I: PROJECT

Meaning and overview – Project Development Cycle – Capital Expenditure Decisions – Importance and Difficulties.

UNIT-II: PROJECT APPRAISAL

Aspects of Appraisal – Market Appraisal – Technical Appraisal – Financial Appraisal – Economic Appraisal, Project formulation, and Feasibility Report.

UNIT-III: PROJECT COST AND MEANS OF FINANCE

Project cost – Social Cost and Social Benefit. Terms Loans – Loans from Development banks – Assistance from Indian Finance Corporations and International Finance Corporations. External commercial borrowing.

UNIT-IV: PROJECT SELECTION

Selection of a suitable project – Programming – Scheduling and Controlling Mechanism.

UNIT-V: PROJECT CONTROL

Time and cost control – Budgetary control – corrective and preventive actions. Risk Management function.

TEXT BOOKS:

1. Prasanna Chandra, Projects – Preparation Appraisal, Budgeting and Implementation, 3rd ed. Tata McGraw- Hill Publishing Company Limited, New Delhi.
2. Dr. Gupta, C.B. & Dr. Srinivasan, N.P. Entrepreneurial Development, Sultan Chand & sons, New Delhi.

REFERENCE BOOKS

1. Bryce, M.D. Industrial Development: A Guide for Accelerating Economic Growth, McGraw- Hill, 1960 New York.
2. Varma, M.L. Foreign Trade Management in India, Vikas Publishing House, 1993, New Delhi.
3. Jeevanandam, C. Foreign Exchange, Sultan Chand & sons, 1994, New Delhi.

Course Out Comes

1. The students will be able to understand the Project and its development:

2. The students will be able to understand the Capital expenditure decisions of projects.

3. The students will be able to understand the Economic Viability of the project.

4. The students will be able to understand the Sources of Project Finance.

5. The students will be able to understand the Project schedule and control mechanism.

CORE ELECTIVE

PAPER - 4

(to choose one out of 3)

A. FINANCIAL SERVICES

Course Objectives

1. To enhance the understanding of the Financial Institutions and Financial Services Sector.
2. To extend the knowledge of Legal aspects of Factoring and Venture Capital.
3. To facilitate the students to have the deep understanding of Capital Market and stock market in India
4. To bring about the awareness of SEBI Guidelines.
5. To let students to know about Credit rating agencies

Unit – I

Financial Services – meaning – Financial Services and economic environment - Legal and Regulatory Framework – Financial Institutions and other participants in the Financial Services Sector.

Unit – II

Factoring – Types and Features of Factoring agreement - Legal aspects of Factoring – Factoring in India – Steps involved in Future – Venture Capital – meaning and characteristics – Criteria for assistance – Schemes and guidelines.

Unit – III

Financial market - meaning – Features – Capital Market – primary market – secondary market – present position of stock market in India – money market – characteristics of Development money market – Importance – Problems faced by Indian money market – Difference between capital market and money market.

Unit – IV

Mutual Funds – SEBI Guidelines – Features and types – management – structure and performance evaluation – Growth and recent trends.

Unit – V

Investor Services – Credit rating agencies – CRISIL, CARE, ICRA – Services – Criteria for rating – symbols

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 Insititutions, Deep and Deep Publishers, 2000.

Reference Books:

1. Dr. V. Balu, Merchant Banking & Finance Services, Sri Venkateswara Publication, Chennai
2. Dr. N. Permavathy, 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, achieve the target of students having better understanding of Financial Services in India.
2. After studied Unit-2, the student will be able to know the Collect the data from the students pertaining to venture capital
3. After studied Unit-3, Let the students know about Capital Market, Money Market Strategies and present position of stock market in India,.
4. After studied Unit-4, the student will be able to have the awareness of SEBI Guidelines and Structure and performance evaluation
5. After studied Unit-5, the student will be able to know about Investor Services & Credit rating agencies.

CORE ELECTIVE

PAPER - 4

B. INFORMATION TECHNOLOGY IN BUSINESS

Course Objectives

1. To Develop skills to practice information systems in Business.
2. To bring understanding about the Accounting and Financial Information Systems
3. To facilitate the students to know about – preparing to online business
4. To provide the students information about Security Issues in E-Commerce
5. To extend the knowledge of Growth of internet

UNIT-I : INFORMATION TECHNOLOGY

Meaning - Definition - Types of Information System - Changing decision making scenario; Quality of information - Role of Information Technology in information generation and value addition**.**

UNIT-II APPLICATION OF IT IN BUSINESS:

Accounting and Financial Information Systems- Manual System Vs Computer based Accounting System. Marketing Information Systems - Components. Operational and Production Systems – Material Resource Planning. Human Resource Information Systems – Advantages**.**

UNIT-III: ELECTRONIC BUSINESS

Computers - Internet business - Definition - Online Business - E.Business Categories – preparing to online business - Ethics of information technology. E. Business Applications - Business to Business (B2B) - Business to Customers (B2C) - Electronic Shopping.

UNIT-IV - SECURIY ISSUES IN E-COMMERC

Security Issues in E-Commerce: Risks of e-commerce –Types and sources of threats, Protecting electronic commerce assets and intellectual property; Risk management approach to e-commerce security.

UNIT-V: INTERNET

Meaning of Internet; Growth of internet, Owner of Internet, Anatomy of Internet, Net Etiquette ; World Wide Web; Internet Protocols, Usage of Internet to society, Search Engines . Features of Industry 4.O.

Text Books:

1. Deepak Bharihoka, Fundaments of Information Technology, Excel Book, New Delhi
2. Leon a. and Leon M., (2002) Fundamental of Information Technology, Vikas Software Manuals.

Reference Books:

1. Comer, Douglas E. (2007), the Internet Book, New Delhi : PHI Learning Private Limited).
2. Morley, Deborah and Charles S. parker (2007) Fundamentals of Computers (New Delhi: Learning India Pvt. Ltd.)
3. Laudon, Kenneth C. and Jane P. Laudon, (2003), Management Information Systems(New Delhi: Prentice Hall of India

Course Outcomes

1. After Studied Unit-1, Students will be able to develop skills to practice information systems in Business.
2. After Studied Unit-2, Students will be able understand the Accounting and Financial Information Systems.
3. After studied unit-3, Students will be able to develop to skill by preparing to online business
4. After Studied Unit-4, Students will be able to know the Security Issues in E-Commerce and Risk management approach to e-commerce security.
5. After Studied Unit-5, the student will be able to understand the relevant information technology, growth of internet and Usage of Internet to society

CORE ELECTIVE

PAPER - 4

C. ENTREPRENEURIAL DEVELOPMENT

Course Objectives

1. To enhance the deep understanding of the Entrepreneur and Entrepreneurship Qualities.
2. To extend the knowledge of devaluations of Joint Rights, liabilities and Discharge of contract.
3. To facilitate the students to have the understanding about Indemnity and Guarantee
4. To enable the students to know about Bailment and pledge
5. . To let students to know about Contract of Agency and Termination agency.

UNIT I

Concept of Entrepreneur and Entrepreneurship – Major Entrepreneurial Competencies – Qualities of Successful Entrepreneur – Types of Entrepreneur – Knowledge and Skills Required for an Entrepreneur.

UNIT II:

Entrepreneurial Environment – Economic and Non-Economic Factors – Entrepreneurial Motivation – Need for EDPS.

UNIT III

Sources of Business / Product ideas – Market Research – Pre-feasibility study - Criteria for Selection of a project – Project Report Preparation and Evaluation Criteria.

UNIT IV

Institutional Finance – Term Lending Institutions – Commercial Banks – State Finance Corporations – Small Industries Development Bank of India (SIDBI) – Small Industries Service Institute (SISI) – District Industries Centre (DIC) – SIDCO – SIPCOT and ITCOT – Microfinance and Self Help Groups.

UNIT V

Launching and Development of Small Business – Institutional Support to Small Business – Growth Strategies – Product Launching – Monitoring and Evaluation of Small Business – Industrial Sickness – Causes and Consequences – Prevent in Sickness.

Text Book:

1. Dr. Jayshree Suresh, Entrepreneurial Development, MArgham Publications, Chennai.
2. Dr. S.S. Khanka, Entrepreneurial Development S. Chand & Co., New Delhi

Reference 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 Identify the essential elements of contract and rules as to offer.
3. After studied Unit-3, the student will be able to have to 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.

OPEN ELECTIVE

PAPER - 4

(to choose one out of 3)

A. OFFICE MANAGEMENT

Course Objectives

1. To impart knowledge in office management and its functions and make them to apply in the practical manner in the company
2. To understand how to organize their office and maintain filing system
3. To inspire the students to apply the knowledge gained in Office forms
4. To provide the students the avenues of studies in Office Machines and equipments
5. To teach the recent developments in the various areas of Measurement of Office Work.

Unit I - Office Management Introduction

Office and office Management –meaning of office, function of office, primary and administrative functions, importance of office. Relation of office with other departments of business Organization. Concept of paperless office, virtual office, back and front office, open and private office. Definition and elements of office management, duties of an Office Manager.

Unit II - Filing System

Filing and Indexing –Meaning and importance of filing, essential of good filing system. Centralized and decentralized filing system. Meaning, need and types of indexing used in the business organization.

Unit III - Office Forms

Office forms–Meaning and types of forms used in business organization, advantages, forms controls, objectives, form designing, principles of forms designing and specimens of forms used in office. Office Record Management –Meaning, importance of record keeping management, principles of record management and types of records kept in a business organization.

Unit IV - Office Machines and Equipments

Office Machines and equipments –Importance, objectives of office machines. Office Safety and Security –Meaning, importance of office Safety, safety hazards and steps to improve office safety. Security hazards and steps to improve office security.

Unit V - Measurement of Office Work:

Measurement of Office Work –Importance, purpose, difficulty in measuring office work. Different ways of measurement, setting of work standards, benefits of work standards. Techniques of setting standards. Office Manuals –Meaning, need, types of office manuals and steps in preparing of office manuals

Text Books:

1. S.P.Arrora -Office organization and management- Vikas publishing housenov,2009
2. Chopra-Office management-Vikas publishing house 2nd revised edition,2015

Reference Books:

1. M.E. Thukaram Rao-Office management and organization-atlantic publishers and distributers,2000
2. Ranjan Nangia -Office management- - Neha Publisherscrescent publishing corporation,2012

Course Outcomes

1. After Studied Unit-1, Students will be able to support management in office administration.
2. After Studied Unit-2, Students will be able to prepare business documents
3. After studied unit-3, Students will be able to manage records and files. Students will also able to demonstrate business communication skills
4. After Studied Unit-4, Students will be able to utilize appropriate office technology. Students will also able to execute the duties of an office administrator.
5. After Studied Unit-5, the student will be able to know about to role of management in the workplace, levels and functions of management

OPEN ELECTIVE

PAPER - 4

B. BUSINESS ORGANISATION

Course Objectives

1. To make students to understand the concept of business and Business ethics
2. To expand the awareness of forms of business organization
3. To facilitate the students to the understanding on size of industry
4. To bring the subject knowledge about functions of Stock Exchanges
5. To let students to be acquainted with on the subject of Trade Association & Chamber of commerce.

Unit –I

Business- meaning and types – profession – importance of business Organization- Social Responsibilities of Business- Business Ethics.

Unit –II

Forms of Business organization- sole trader- partnership- joint Hindu family- joint stock companies – co-operative societies – public utilities and public enterprises.

Unit –III

Location of industry – factors influencing location – size of industry- optimum firm- advantages of large- scale operation – limitation of small scale operation.

Unit- IV

Stock Exchange – Function – Types- working- Regulation of Stock Exchanges in India.

Unit – V

Trade association- Chamber of commerce- Functions- objectives – Working in India.

Text Books:

1. Y.K. Bhushan, Business organization, Sultan Chand, New Delhi.
2. Business organization & Management, R.N. Gupta, S. Chand & Co. New Delhi.
3. Dr. K. Sundar, Business Organization, Vijay Nicholes Imprint Pvt. Ltd., Chennai.

Reference Books:

1. Prakash & jagedesh, Business organization & Management.
2. Reddy & Gulshar, Principles of Business Organization & Management.
3. Vasudevan & Radhasivam, Business Organization.

Course Outcomes:

1. After studied Unit-1, the student will be able to know about Basics of Business Organization
2. After studied Unit-2, the student will be able to aware about different forms of business organization
3. After studied Unit-3, the student will be able to gain knowledge on Industry location & operations
4. After studied Unit-4, the student will be able to Facilitate to get exposure on Functioning of Stock Exchange.
5. After studied Unit-5, the student will be able to get full information on Trade Association & Chamber of commerce.

OPEN ELECTIVE

PAPER - 4

C. PRINCIPLES OF AUDITING

Course Objective:

1. To Facilitates the Students to know about Auditing and their nature.
2. To Impart the knowledge on Auditing programme Audit file and Audit note book.
3. To Enable the Students to know about Internal Check and Internal Audit.
4. To Make Aware the Students about Verification and Valuation of assets and liabilities.
5. To Learn Students about Qualification and Disqualification of Auditors, Rights, Powers,Liabilties.

UNIT-I

Meaning and Definition of Auditing – Nature and Scope of Auditing –Auditing and Investigation – Objectives of Auditing – Limitations of Audit – Advantages of Audit – Classification of Audit.

UNIT-II

Meaning and Definition of Audit Programme – Advantages and Disadvantages – Audit File, Audit Note Book, Audit Working Papers – Purposes and Importance of Working Papers –

UNIT-III

Internal Check – Meaning, object of Internal Check – Features of Good Internal Check System – Auditors duty with regards to Internal Check System – Internal Check and Internal Audit.

UNIT-IV

Verification and Valuation of assets and liabilities – Meaning and objects of verification – Vouching and verification – Verification and Valuation of different kinds of Assets and Liabilities.

UNIT-V

Qualification and Disqualification of Auditors – Status of Auditors – Rights – Powers – Duties and Liability of Auditors.

Text Books:

1. B.N. Tandon, Sultan Chand – A handbook of practical auditing
2. B.N. Tandon, Sudharsanam, Sundharabahu – S Chand – Practical auditing.
3. Sundar. K and Pari. K, Vijay Nicole Imprints Private Ltd., Chennai.

Reference Books:

1. Sharma, SahityaBhavan, Agra – Auditing
2. Dr.N.Premavathy, Practical Auditing, Sri Vishnu Publications, Chennai.
3. Dr.N.Premavathy, Practical Auditing (in Tamil), Sri Vishnu Publications, Chennai.

Course Outcomes

1. The Students will able to understand the concept of Auditing and Classification.

2. The Students will able to Gain the knowledge about Audit Programme and importance.

3. The Students will able to Get awareness the Students about Internal check and Audit.

4. The Students will able to understand the Valuation of assets and liabilities.

5. The Students will know about the qualification and disqualification of Auditors

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THIRUVALLUVAR UNIVERSITY

BACHELOR OF BUSINESS ADMINISTRATION

DEGREE COURSE

CBCS PATTERN

(With effect from 2020 - 2021)

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	5	3	Principles of Management	25	75	100
4.	III	Core Theory	Paper-2	5	3	Business Mathematics & Statistics I	25	75	100
5.	III	ALLIED -1	Paper-1	6	3	(**to choose any 1 out of 3)** A. Business Organization B. Principles of Insurance C. Business Ethics	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
				36	**22**		**175**	**525**	**700**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	4	4	**Communicative English I**	25	75	100
10.	III	Core Theory	Paper-3	5	3	Business Environment	25	75	100
11.	III	Core Theory	Paper-4	5	3	Business Mathematics & Statistics II	25	75	100
12.	III	ALLIED-1	Paper-2	6	5	(**to choose any 1 out of 3)** A. Customer Relationship Management B. Principles of Banking System C. Fundamentals of Computer	25	75	100
13.	III	PE	Paper-2	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
				36	**25**		**200**	**600**	**800**

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 VI							**CIA**	**Uni. Exam**	**Total**
36.	III	Core Theory	Paper-17	6	5	Strategic Management	25	75	100
37.	III	Core Theory	Paper-18	6	5	International Business	25	75	100
38.	III	Core	Paper-19	5	5	Individual Project *Viva-Voce ** Project Report	25*	75**	100
39.	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
40.	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
41.	IV	Skill based Subject	Paper-4	3	2	Creativity and Innovation Management	25	75	100
42.	V	Extension Activities		0	1	Extension Activities	100	0	100
		Total		**30**	**24**		**150**	**450**	**700**
					140				**4200**

Part	**Subject**	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total Marks**
Part I	Languages	2	4	8	100	200
Part II	Communicative English	2	4	8	100	200
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	18	(3-5)	70	100	1800
	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	**2**		**140**		**4200**

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 if 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 analyses 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 - Manag1erial 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 uunderstands 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 Pubications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Unit 2

Services Marketing - Dr. L. Natarajan, Margham Pubications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Unit 3

Services Marketing - Dr. L. Natarajan, Margham Pubications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Unit 4

Services Marketing - Dr. L. Natarajan, Margham Pubications.
Services Marketing & Management - Balaji. B - S.Chand.
Valerie Zeithaml - Service Marketing - Tata McGraw-Hill Pub.

Unit 5

Services Marketing - Dr. L. Natarajan, Margham Pubications.
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 Publicaitons, 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.Dougles 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 understands 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

Couse 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 learns 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 aacquire 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 - Prinicples 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
- 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 Pubictions
J. Jayasankar - Organizational behavior, Margham Pubications
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 Pubictions
J. Jayasankar - Organizational behavior, Margham Pubications
S.S. Khanka - Organizational Behavior. S.Chand

Unit 4
Dr. C.D. Balaji - Organisational Behaviour - Margham Pubictions
J. Jayasankar - Organizational behavior, Margham Pubications
Dr.P.K.Ghosh, Partho Ghosh - Organisation Behaviour - Laxmi publications Pvt. Ltd.

Unit 5
Dr. C.D. Balaji - Organisational Behaviour - Margham Pubictions
J. Jayasankar - Organizational behavior, Margham Pubications
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 wiser 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 - Marhgam 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.lpude.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 it tools.

After studied Unit - 2, Describe the fundamental concepts of ration 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-Retaail-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.

ALLIED - 2

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 - Sills, 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 marking 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 - V

CORE PAPER - 13

MARKETING MANAGEMENT

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 port folio 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.

UNIT - I

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

Buyer Behavior - Buying motives - Buyer Behavior Model - Factors influencing buyer behavior. Market segmentation - Need and basis of Segmentation - Marketing strategy - Targeting - Positioning.

UNIT - III

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

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

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

Unit 1

J. Jayasankar - Marketing - Margham Publications
Essentials of Marketing - Sundar K, Vijay Nicole Imprints Pvt. Ltd.

Unit 2

J. Jayasankar - Marketing - Margham Publications
Essentials of Marketing - Sundar K, Vijay Nicole Imprints Pvt. Ltd.

Unit 3

Rajan Nair - Marketing - Sultan & Chand, New Delhi.
J. Jayasankar - Marketing - Margham Publications

Unit 4

Ramaswamy and Namakumari - Marketing Management, Laxmi Publications Pvt. Ltd
J. Jayasankar - Marketing - Margham Publications

Unit 5

Adrian Palmer - Introduction to Marketing theory and practice- Oxford University Press-Indian edition.
J. Jayasankar - Marketing - Margham Publications

Reference Items: 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 Pub

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

Course outcome

1. After studied unit-1, the student will be able to identify the primary marketing activities of an oganisation.
2. After studied unit-2, the student will be able to use marketing information and research to develop marketing strategies for targeting customers.
3. After studied unit-3, the student will be able to create and analyse product positioning, brand building process, with appropriate product port folio structure which contributes to the success of products or services.
4. After studied 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 studied unit-5, the student will be able to use the appropriate promotional tools for the promotion of products/ services.

CORE PAPER - 14

BUSINESS LAW

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.

UNIT - I

Formation and essential elements of contract - Types of contract and agreements - rules as to offer, acceptance and consideration - capacity to contract - lawful object and face consent.

UNIT - II

Performance of contract - Discharge of contract - Breach of contract and remedies - Quasi contract.

UNIT - III

Guarantee - features and distinctions - Bailment and pledge - features difference - Rights and duties of bailer and Bailee.

UNIT - IV

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

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

Unit 1
Dr. J. Jayasankar - Business Law- Margham Publications
N.D. Kapoor- Business law- Sultan & Sons
Balachandran V and Thothadri S -Business Law - Vijay Nicole Imprints (P) Ltd

Unit 2
Dr. J. Jayasankar - Business Law- Margham Publications
N.D. Kapoor- Business law- Sultan & Sons
Balachandran V and Thothadri S -Business Law - Vijay Nicole Imprints (P) Ltd

Unit 3
Dr. J. Jayasankar - Business Law- Margham Publications
N.D. Kapoor- Business law- Sultan & Sons
Balachandran V and Thothadri S -Business Law - Vijay Nicole Imprints (P) Ltd

Unit 4
Dr. J. Jayasankar - Business Law- Margham Publications
N.D. Kapoor- Business law- Sultan & Sons
Balachandran V and Thothadri S -Business Law - Vijay Nicole Imprints (P) Ltd

Unit 5
Dr. J. Jayasankar - Business Law- Margham Publications
N.D. Kapoor- Business Law- Sultan & Sons
Balachandran V and Thothadri S -Business Law - Vijay Nicole Imprints (P) Ltd

Reference Items: Books and Journal

1. M.C. Dhandapani - Business Law
2. M.C. Shukla - Business Law
3. R.S.N. Pillai & Bagavathi- Business Law
4. P.C. Tulsion - Business Law

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/

Course Outcome

After studied unit-1, the student will be able to understand the fundamental legal principles in developing various contracts.
After studied unit-2, the student will be able to understand the commercial laws in the business world.
After studied unit-3, the student will be able to identify the common forms of business associations and elements of Corporate Governance.
After studied unit-4, the student will be able to understand the legality and statute of frauds in contracts.
After studied unit-5, the student will be able to develop insights regarding the laws and transactions related to sales of goods.

CORE PAPER - 15

RESEARCH METHODOLOGY

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.

UNIT - I

Definition of research - meaning - objectives - types of research - research process - qualities of a researcher - criteria of good research - problems encountered in research

UNIT- II

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

Sampling techniques - types of sampling - merits and demerits

UNIT - IV

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

Measurement and scaling techniques

TEXTBOOK

Unit 1

C. R. Kothari Research Methodology Methods and Technique 3rd Edition New age International Publishers 2014

P.Ravilochannan Research Methods - Margham Publications

Prof. Deepak Chawla- Research Methodology 2nd Edition, Vikas Publishing House

Unit 2
C. R. Kothari Research Methodology Methods and Technique 3rd Edition New age International Publishers 2014
P.Ravilochannan Research Methods - Margham Publications
Prof. Deepak Chawla - Research Methodology 2nd Edition Vikas Publishing House.

Unit 3
C. R. Kothari Research Methodology Methods and Technique 3rd Edition New age International Publishers 2014
P.Ravilochannan Research Methods - Margham Publications
Prof. Deepak Chawla- Research Methodology 2nd Edition, Vikas Publishing House

Unit 4
C. R. Kothari Research Methodology Methods and Technique 3rd Edition New age International Publishers 2014
P.Ravilochannan Research Methods - Margham Publications
Prof. Deepak Chawla- Research Methodology 2nd Edition, Vikas Publishing House

Unit 5
C. R. Kothari Research Methodology Methods and Technique 3rd Edition New age International Publishers 2014
P.Ravilochannan Research Methods - Margham Publications
Prof. Deepak Chawla - Research Methodology 2nd Edition Vikas Publishing House

Reference Items: 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

E-Materials

- https://www.researchgate.net/publication/319207471_HANDBOOK_OF_RESEARCH_METHODOLOGY
- 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

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 indentify 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.

COREPAPER - 16

COMPUTER APPLICATION IN BUSINESS

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.

UNIT - I

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 softwares, Tally, SPSS - Emergence of computers and evolution of computers.

UNIT - II

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 a document - Format options.

UNIT - III

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

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 power point.

UNIT - V

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

Unit 1

Leon & Leon - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd

Dr.P. Rizwan Ahmed - Computer Application in Business with Tally -Margham Publications

Mohan Kumar - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd.

Ananthi Sheshasayee - Computer Application in Business - Margham Publications.

Unit 2

Leon & Leon - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd

Dr.P. Rizwan Ahmed - Computer Application in Business with Tally -Margham Publications

Mohan Kumar - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd.

Ananthi Sheshasayee - Computer Application in Business - Margham Publications.

Unit 3

Leon & Leon - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd

Dr.P. Rizwan Ahmed - Computer Application in Business with Tally -Margham Publications

Mohan Kumar - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd.

Ananthi Sheshasayee - Computer Application in Business - Margham Publications.

Unit 4

Leon & Leon - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd

Dr.P. Rizwan Ahmed - Computer Application in Business with Tally -Margham Publications

Mohan Kumar - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd.

Ananthi Sheshasayee - Computer Application in Business - Margham Publications.

Unit 5

Leon & Leon - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd

Dr.P. Rizwan Ahmed - Computer Application in Business with Tally -Margham Publications

Mohan Kumar - Computer Application in Business - Vijay Nicole Imprints Pvt. Ltd.

Ananthi Sheshasayee - Computer Application in Business - Margham Publications.

Reference Items:Books and Journal

1. Introduction to Information Technology, ITL ESL, Pearson Education
2. Business Application Software by AitJohri, Himalaya Publication House, First Edition 2016
3. Simple Tally 9 , BPB Publications , Asok K. Nadhani, copy right 2007
4. Introduction to Information Technology, ITL Education Solutions Limited, Research And development Wing,2016,Pearson Education
5. Gary Shelly, Thomas J. Cashman, Misty Vermaat , Microsoft Office 2007: Introductory Concepts and Techniques, ,2007,Thomson Learning publishers

E-Materials

1. https://www.spss-tutorials.com/spss-what-is-it/
2. https://stats.idre.ucla.edu/**spss**/
3. https://study.com/articles/Business_Computer_Applications_Courses_and_Training_Programs.html
4. https://tallysolutions.com/
5. https://www.udemy.com/course/the-**fundamentals**-of-**business-intelligence**/

Course Outcomes

1. After studied unit-1, the student will know about the emergence of computers and various software solution used for business
2. After studied unit-2, the student will be learn to use MS word and its functions
3. After studied unit-3, the students will learn the application of Excel in problem solving and decision
4. After studied unit-4, the student will be familiar with uses of PPT and also learn to design presentations
5. After studied unit-5, the student will know about the emerging trends of computer applications in business

INTERNAL ELECTIVE

PAPER - 1

(to choose one out of 3)

A. INDUSTRIAL RELATIONS AND LABOUR LAWS

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.

UNIT - I

Industrial Relations - Meaning And Definition - Role - Importance - Trade Unions - Importance of Trade Union- Industrial disputes - types - and their Resolutions.

UNIT - II

Participative Management - Structure - Scope - Collective Bargaining - Works Committee - Joint Management Councils - Pre-Requisite for successful participation - Role of Government in Collective Bargaining.

UNIT - III

Industrial unrest - employee dissatisfaction - Grievances - Disciplinary Action - Domestic Enquiry - Strikes - lockout - Prevention of Strikes - Lockouts.

UNIT - IV

Factories Act: Meaning, Definition - importance of factories act -need -provision relating to Welfare - Safety - Health Measures.

UNIT - V

Workmen's Compensation Act - meaning and definition and International Labor Organization- importance of ILO- - Role and Function of ILO

TEXT BOOKS

Unit 1

Sreenivasan M.R - Industrial Relations & Labor legislations

Aswathappa K - Human Resource and Personnel Management

Subba Rao P - Human Resource Management and Industrial Relations

Monoppa - Industrial Relations

Unit 2
Sreenivasan M.R - Industrial Relations & Labor legislations
Aswathappa K - Human Resource and Personnel Management
Subba Rao P - Human Resource Management and Industrial Relations
Monoppa - Industrial Relations

Unit 3
Sreenivasan M.R - Industrial Relations & Labor legislations
Aswathappa K - Human Resource and Personnel Management
Subba Rao P - Human Resource Management and Industrial Relations
Monoppa - Industrial Relations

Unit 4
Sreenivasan M.R - Industrial Relations & Labor legislations
Aswathappa K - Human Resource and Personnel Management
Subba Rao P - Human Resource Management and Industrial Relations
Monoppa - Industrial Relations

Unit 5
Sreenivasan M.R - Industrial Relations & Labor legislations
Aswathappa K - Human Resource and Personnel Management
Subba Rao P - Human Resource Management and Industrial Relations
Monoppa - Industrial Relations

Reference Items: Books and Journal

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

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

Course Outcomes

After studied Unit-1 student will be able to understand the importance of industrial relation and know the role of trade union and know the industrial disputes and their resolutions.

After studied 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.

After studied 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.

After studied Unit-4 the student is able to understand the Indian factories act and provisions regarding welfare, safety and health of workers.

After studied Unit-5 the students is able to understand the concepts of workmen's compensation act and provisions and also know the international labour organisation role and its various functions.

INTERNAL ELECTIVE

PAPER - 1

B. REWARD MANAGEMENT

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.

UNIT - I

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

Wage determination - factors influencing wage fixation, job evaluation - methods - job pricing - wage and salary surveys - rationalizing and developing wage structures.

UNIT - III

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

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

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

Unit 1
Narain, Laxmi: 'Managerial Compensation & Motivation in Public Enterprises, (Oxford Pub. House).
Sibson: 'Wages & Salaries', (American Management Association).
Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall,

William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill.
Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed

Unit 2
Narain, Laxmi: 'Managerial Compensation & Motivation in Public Enterprises, (Oxford Pub. House).
Sibson: 'Wages & Salaries', (American Management Association).
Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall,
William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill.
Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed

Unit 3
Narain, Laxmi: 'Managerial Compensation & Motivation in Public Enterprises, (Oxford Pub. House).
Sibson: 'Wages & Salaries', (American Management Association).
Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall,
William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill.
Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed

Unit 4
Narain, Laxmi: 'Managerial Compensation & Motivation in Public Enterprises, (Oxford Pub. House).
Sibson: 'Wages & Salaries', (American Management Association).
Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall,
William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill.
Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed

Unit 5
Narain, Laxmi: 'Managerial Compensation & Motivation in Public Enterprises, (Oxford Pub. House).
Sibson: 'Wages & Salaries', (American Management Association).
Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall,
William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill.
Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed

Reference Items: Books and Journal

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
   Michael Armstrong, Helen Murlis, The Art of HRD - Reward Management, Crest Publishing
3. Michael Armstrong, Employee Reward, (University Press)

P.Zingheim, The New Pay, Linking Employee & Organization Performance, Schuster, (Jossey-Bass)

4. Sara Rynes, Compensation in Organization, Gerhart (Jossey BASS)

5. 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.docsity.com/en/lecture-notes/management/compensation-management/
- https://www.coursehero.com/file/14598021/HND-BM-HRM-7/

Course Outcome

After studied Unit-1 student is able to understand the importance of employee compensation and equity. Tom knows the wages policy and its structure and different levels of wages an major decisions.

After studied 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.

After studied 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.

After studied 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.

After studied Unit-5 the student is able to understand meaning of reward and statutory provision. To know the pay commissions and machinery resolving disputes between Domestic and international companies and rewarding women.

INTERNAL ELECTIVE

PAPER - 1

C. CHANGE MANAGEMENT

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.

UNIT - I

INTRODUCTION

Concept of organizational change - forces - micro and macro perspective - the process - Requisite for successful change - dimensions of planned change.

UNIT- II

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

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

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UNIT- IV

ORGANIZATIONAL CULTURE AND CHANGE

Creating and sustaining culture - Creating a culture for change - stimulating a culture of innovation.

UNIT - V

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

Unit 1
K. Sundar - Essentials of Human Resource Management, Vijay Nicole Imprints
Tripathy P.C -.Organization Change - Sultan Chand, 2010.

Unit 2
K. Sundar - Essentials of Human Resource Management, Vijay Nicole Imprints
Tripathy P.C -.Organization Change - Sultan Chand, 2010.

Unit 3
K. Sundar - Essentials of Human Resource Management, Vijay Nicole Imprints
Tripathy P.C -.Organization Change - Sultan Chand, 2010.

Unit 4
K. Sundar - Essentials of Human Resource Management, Vijay Nicole Imprints
Tripathy P.C -.Organization Change - Sultan Chand, 2010.

Unit 5
K. Sundar - Essentials of Human Resource Management, Vijay Nicole Imprints
Tripathy P.C -.Organization Change - Sultan Chand, 2010.

Reference Items: Books and Journal

1. Kavita Singh, Organisation Change and Development -Excel Books, 2010.
2. Kondalkar V. G,Organisation Effectiveness and Change Management- PHI Learning, 2009.

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

Course Outcome

1. After studied unit-1, the student will be able to provide an over view of the change process.
2. After studied unit-2, the student will be able to review the spectrum of reactions to change.
3. After studied unit-3, the student will be able to offer techniques for preparing for change.
4. After studied unit-4, the student will be able to create and stimulate the culture for change.
5. After studied unit-5, the student will be able to give suggestion for managing uncertainty.

SKILL BASED SUBJECT

PAPER - 3

E - BUSINESS

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.

UNIT - I

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

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

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

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

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

Unit 1

Dr. P.RizwanAhmed , E-Business & E-Commerce, Margham Publications

Dr.K.Abirami Devi and Dr. M. Algammai , E-Commerce -Margham Publications

Unit 2

Dr. P.RizwanAhmed , E-Business & E-Commerce, Margham Publications

Dr.K.Abirami Devi and Dr. M. Algammai , E-Commerce -Margham Publications

Unit 3

Dr. P.RizwanAhmed , E-Business & E-Commerce, Margham Publications

Dr.K.Abirami Devi and Dr. M. Algammai , E-Commerce -Margham Publications

Srinivasa Vallabhan SV, E-Commerce,Vijay Nicole Imprints Pvt. Ltd.

Unit 4

Dr. P.RizwanAhmed , E-Business & E-Commerce, Margham Publications

Dr.K.Abirami Devi and Dr. M. Algammai , E-Commerce -Margham Publications

Mamta Bhusry , E-Commerce, Laxmi Publications Pvt. Ltd.

Unit 5

Dr. P.RizwanAhmed , E-Business & E-Commerce, Margham Publications

Dr.K.Abirami Devi and Dr. M. Algammai , E-Commerce -Margham Publications

U.S.Pandey, Rahul Srivastava, Saurabh Shukla, E-Commerce and its applications, S.Chand, New Delhi.

Reference Items:Books and Journal

1. Pete Loshin, John Vacca - Electronic Commerce -Laxmi Publicacations
2. R.Kolkota and A.B.Whinston: Frontiers of Electronic Commerce, New Delhi, Addision 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, A Managerial Perspective, Pearson Education Asia, 2001.

E-Content:

1. https://smude.edu.in/smude/programs/bba/e-commerce.html
2. https://csistudyabroadmaterials.files.wordpress.com/2015/10/e-business-syllabus.pdf
3. https://www.indiastudycenter.com/Other/Syllabus/...E-Business/default.asp
4. https://targetstudy.com/courses/diploma-in-e-business.html
5. https://www.toppr.com/guides/business-studies/...of-business/e-business/

Course out Comes

1. After studied unit-1, the student will be able to define appreciate the difference between traditional and electronic business
2. After studied unit-2, the student will know basic infrastructure required to build an E-Business and secure it
3. After studied unit-3, the student will be equipped with using electronic as a tool to perform business effectively
4. After studied 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 studied unit-5, the student will be able to use various electronic governance media and tools.

SEMESTER VI
CORE PAPER - 17

STRATEGIC MANAGEMENT

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 - line and staff function and the management of change.
5. To learn the implementation of strategy, elements of strategy, importance of leadership and organizational climate, planning and control of implementation.

UNIT - I

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

Corporate strategy - nature and scope - characteristic of corporate strategy - process of strategic planning - formulation of strategy - project life cycle - Portfolio analysis - SWOT.

UNIT - III

Generic strategic alternatives - Michael Porter's generic strategies - Grand strategies/ Directional Strategy - horizontal, vertical diversification - active and passive alternatives.

UNIT - IV

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

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

Unit 1
Dr. C.B. Mamoria & Dr. Satish Mamoria, Business planning and policy (1987) Himalaya publishing house, Mumbai.
Dr. S.Sankaran -Strategic Management,Margham Publications
S.C. Bhattacharya - Strategic Management Concepts & cases - S.Chand & Co

Unit 2
Dr. C.B. Mamoria & Dr. Satish Mamoria, Business planning and policy (1987) Himalaya publishing house, Mumbai.
Dr. S.Sankaran -Strategic Management,Margham Publications
S.C. Bhattacharya - Strategic Management Concepts & cases - S.Chand & Co

Unit 3
Dr. C.B. Mamoria & Dr. Satish Mamoria, Business planning and policy (1987) Himalaya publishing house, Mumbai.
Dr. S.Sankaran -Strategic Management,Margham Publications
S.C. Bhattacharya - Strategic Management Concepts & cases - S.Chand & Co

Unit 4
Dr. C.B. Mamoria & Dr. Satish Mamoria, Business planning and policy (1987) Himalaya publishing house, Mumbai.
Dr. S.Sankaran -Strategic Management,Margham Publications
S.C. Bhattacharya - Strategic Management Concepts & cases - S.Chand & Co

Unit 5
Dr. C.B. Mamoria & Dr. Satish Mamoria, Business planning and policy (1987) Himalaya publishing house, Mumbai.
Dr. S.Sankaran -Strategic Management,Margham Publications
S.C. Bhattacharya - Strategic Management Concepts & cases - S.Chand & Co

Reference Items: Books and Journal

1. Kazmi - Business policy & Strategic Management - Tata McGraw-Hill pub.
2. Azhar kazmi, Business Policy.

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/

Course Outcome

1. After studying unit-1, student will be able to learn the business system, balancing business objectives with mission and vision. Appreciate strategic analysis of corporate goals and its capabilities.

2. After studying 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 studying unit-3, student will be able to learn generic strategic alternatives - horizontal and vertical diversification.
4. After studying 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 studying 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.

CORE PAPER - 18

INTERNATIONAL BUSINESS

Course Objectives

1. To enable the students to understand the meaning and importance of globalisation 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.

UNIT - I

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

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

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

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 BRICS Trade.

UNIT - V

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

Unit 1

K. Aswathappa, *International Business*, Tata Mc-Graw Hill, 2012

Francis Cherunilam, *International Business Environment*, Himalaya Publishing House Pvt. Ltd., 2015

Unit 2

K. Aswathappa, *International Business*, Tata Mc-Graw Hill, 2012

Francis Cherunilam, *International Business Environment*, Himalaya Publishing House Pvt. Ltd., 2015

Unit 3

Sanjay Misra, P.K. Yadav, *International Business : Text & Cases,* PHI Learning, New Delhi, 2009

Francis Cherunilam, *International Business : Text & Cases*, PHI Learning, New Delhi, 2010

Unit 4

Sanjay Misra, P.K. Yadav, *International Business : Text & Cases,* PHI Learning, New Delhi, 2009

Francis Cherunilam, *International Business : Text & Cases*, PHI Learning, New Delhi, 2010

Unit 5

John Daniels, *International Business : Environments & Operations*, Pearson Education, 2009

Francis Cherunilam, *International Business Environment*, Himalaya Publishing House Pvt. Ltd., 2015

Reference Items: Books and Journal

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.

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

Course Outcome

1. After studied unit-1, the student will be able to define and explain the importance of globalization and international business
2. After studied unit-2, the student will be known the options used and various modes of entering global markets.
3. After studied unit-3, the student will understand how governments use trade policies to restrict movement of goods abroad
4. After studied unit-4, the student will be familiar with how various regional co operational organization work and their functions.
5. After studied unit-5, the student will be able make decisions of setting up MNCs and know how to invest abroad to establish MNC

CORE PAPER - 19

INDIVIDUAL PROJECT

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 ROJECT 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.

INTERNAL ELECTIVE

PAPER - 2

(to choose one out of 3)

A. FINANCIAL MANAGEMENT

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.

UNIT - I

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

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

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

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

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

Unit 1

Dr. A. Murthy, Financial Management -Margham Publications

Maheshwari S.N.,Financial Management, Sultan & Sons Publications

S.N. Maheshwari , Elements of Financial Management - Sultan Chand & Sons.

Unit 2

Dr. A. Murthy, Financial Management -Margham Publications

S.N. Maheshwari , Elements of Financial Management - Sultan Chand & Sons.

J. Srinivasan, Sridhar & Ramalingam - Financial Management - Vijay Nicole Imprints

Unit 3

Dr. A. Murthy, Financial Management -Margham Publications

J. Srinivasan, Sridhar & Ramalingam - Financial Management - Vijay Nicole Imprints

R.K. Sharma, Shashi and K.Gupta , Fiancial Management -, Kalyani publication

Unit 4

Dr. A. Murthy, Financial Management -Margham Publications

S.N. Maheshwari , Elements of Financial Management - Sultan Chand & Sons.

J. Srinivasan, Sridhar & Ramalingam - Financial Management - Vijay Nicole Imprints

R.K. Sharma, Shashi and K.Gupta , Fiancial Management -, Kalyani publication

Unit 5

Dr. A. Murthy, Financial Management -Margham Publications

R.K. Sharma, Shashi and K.Gupta , Fiancial Management -, Kalyani publication

Prasanna Chandra, Fundamentals of Financial Management - Tata McGraw Hills Publishing Company Limited.

Reference Items: Books and Journal

1. Periasamy - Financial Management, Vijay Nicole Imprints
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 Company Limited.
4. P.V. Kulkarni Financial Management - Himalaya Publishing House

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/

Course Outcome

1. After studied unit-1, the student will be able to calculate time value for money
2. After studied unit-2, the student will be able to explain Capital structure decision and suggest the best mix of capital structure using theories
3. After studied unit-3, the student will calculate cost of capital how it is affected
4. After studied unit-4, the student will be familiar with capital budgeting and develop a basic budget format.
5. After studied unit-5, the student will know how to make funds available for routine operations.

INTERNAL ELECTIVE

PAPER - 2

B. FINANCIAL SERVICES

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.

UNIT - I

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

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

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

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

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

Unit 1
Dr.S. Gurusamy - Financial Services - Vijay Nicole Imprints Private Ltd
B. Santhanam - Financial Services , Margham Publications

Unit 2
Dr.S. Gurusamy - Financial Services - Vijay Nicole Imprints Private Ltd
B. Santhanam - Financial Services , Margham Publications
M.Y. Khan -Indian Financial System - Tata Mc Graw Hill

Unit 3
B. Santhanam - Financial Services , Margham Publications
M.Y. Khan -Indian Financial System - Tata Mc Graw Hill
H. R. Machiraju - Indian Financial System -Vikas Publishing House

Unit 4
B. Santhanam - Financial Services , Margham Publications
M.Y. Khan -Indian Financial System - Tata Mc Graw Hill
H. R. Machiraju - Indian Financial System -Vikas Publishing House

Unit 5
B. Santhanam - Financial Services , Margham Publications
H. R. Machiraju - Indian Financial System -Vikas Publishing House

Reference Items: Books and Journal

1. Dr. N. Premavathy - Financial Services and Stock Exchange -Sri Vishnu Publications
2. E. Gordon and E.Nataraj - Financial Markets & Services

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/

Course Outcome

1. After studied 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 studied unit-2, the student will be able to explain how merchant banking works and how securitization is done
3. After studied unit-3, the student will gain understanding on hire purchasing and leasing finance
4. After studied unit-4, the student will be familiar with Factoring and RBI regulates them.
5. After studied unit-5, the student will gain skills on venture capital process.

INTERNAL ELECTIVE

PAPER - 2

C. INVESTMENT MANAGEMENT

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

UNIT - I

Investment - Meaning - Objectives - Investment Vs. Speculation - Investment Process - Investment information - Management of Investment.

UNIT - II

Investment Alternatives - Meaning - variable Income Securities - Fixed Income Securities - Tax Sheltered Saving Schemes -Mutual Funds -Real Assets - Modern Investment -Arts and Techniques.

UNIT - III

Risks and Returns - Meaning - Systematic Risks - Unsystematic Risks - Risk Measurement - Capital Returns and Revenue Returns -Computation of Expected Risks and Returns.

UNIT - IV

Investment Valuation - Time Value for Money - Bond Valuation - Yield to Maturity - Equity Valuation - capital asset pricing model.

UNIT - V

Investment Analysis - Fundamental Analysis -Economic Analysis - Industry Analysis - Company Analysis - Financial Analysis.

TEXT BOOKS

Unit 1

Dr. L. Natarajan - Investment Management - Margham Publications
V.K.Bhalla, Investment Management
Gurusamy S, Security Analysis and Portfolio Management, Vijay Nicole Imprints.

Unit 2

Dr. L. Natarajan - Investment Management - Margham Publications
V.K.Bhalla, Investment Management
Gurusamy S, Security Analysis and Portfolio Management, Vijay Nicole Imprints.

Unit 3

Dr. L. Natarajan - Investment Management - Margham Publications
V.K.Bhalla, Investment Management
Gurusamy S, Security Analysis and Portfolio Management, Vijay Nicole Imprints.

Unit 4

Dr. L. Natarajan - Investment Management - Margham Publications
V.K.Bhalla, Investment Management
Gurusamy S, Security Analysis and Portfolio Management, Vijay Nicole Imprints.

Unit 5

Dr. L. Natarajan - Investment Management - Margham Publications
V.K.Bhalla, Investment Management
Gurusamy S, Security Analysis and Portfolio Management, Vijay Nicole Imprints.

Reference Items: Books and Journal

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

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

Course Outcome

1. After studied unit-1, the student will be able to understand the various alternatives available for investment
2. After studied unit-2, the student will be able to measure risk and return.
3. After studied unit-3, the student will be able to find the relationship between risk and return.
4. After studied unit-4, the student will be able to value the equity and bonds
5. After studied unit-5, the student will be able to gain knowledge of the various strategies followed by investment practitioners.

INTERNAL ELECTIVE

PAPER - 3

(to choose one out of 3)

A. MARKETING RESEARCH

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

UNIT - I

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 - II

Marketing Research Process - steps- Problem Definition - Research Purpose - Research Objective - Research Design - data collection methods - research instruments - data analysis - report preparation

UNIT - III

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 - IV

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 - V

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 BOOKS

Unit - 1

1. Dr.P. Ravilochanan - Marketing Research - Margham Publications
2. Sharma D.D - Marketing Research - Marketing Research - Sultan Chand and sons

Unit - 2

1. Dr.P. Ravilochanan - Marketing Research - Margham Publications
2. Sharma D.D - Marketing Research - Marketing Research - Sultan Chand and sons

Unit - 3

1.S.L. Gupta - Marketing Research
2.Sharma D.D - Marketing Research - Marketing Research - Sultan Chand and sons

Unit - 4

1. Dr.P. Ravilochanan - Marketing Research - Margham Publications

Unit - 5

Sharma D.D - Marketing Research - Marketing Research - Sultan Chand and sons

Reference Items: Books and Journal

1. Tull and Hawkings - Marketing Research.
2. Boyd and Westfall- Marketing Research.
3. Aaker - Marketing Research.
4. David. J.Luck, Ronald S. Rubin, Marketing Research . Prentice Hall of India. New Delhi.

E- Materials

- 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
- http://164.100.133.129:81/econtent/Uploads/Marketing_Research.pdf

Course Outcome

1. After studied unit-1, the student will be able to 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.

INTERNAL ELECTIVE

PAPER - 3

B. RURAL MARKETING MANAGEMENT

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.

UNIT - I

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

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

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

Channel of Distribution - Evolution of Rural Distribution System - Behaviour of Channels - Prevalent Ideal Rural Distribution Model

UNIT - V

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

Unit - 1

P. Kashyap & S.Raul, The Rural Marketing

C.S.G.K.M.L Ramakrishnan,Rural Marketing - Text and Cases

Unit - 2
P. Kashyap & S.Raul, The Rural Marketing
Sukhpal Sing, Rural Marketing

Unit - 3
P. Kashyap & S.Raul, The Rural Marketing
C.S.G.K.M.L Ramakrishnan,Rural Marketing -Text and Cases

Unit - 4
P. Kashyap & S.Raul, The Rural Marketing
C.S.G.K.M.L Ramakrishnan,Rural Marketing -Text and Cases

Unit - 5
P. Kashyap & S.Raul, The Rural Marketing
C.S.G.K.M.L Ramakrishnan,Rural Marketing -Text and Cases

Reference Items: Books and Journal
1.M. Kamath & R. Ramakrishnamurthy - A Text Book on Rural Marketing
2.Shipra Chawla , A Text of Rural Marketing.

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

Course Outcome
1. After studied 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 studied unit-2, the student will be able to aware of categorizing the rural products and branding the products in rural areas.
3. After studied unit-3, the student will be able to make sound marketing decisions n pricing strategies in rural market.
4. After studied 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 studied unit-5, the student will be able to identify the appropriate promotion mix for rural market.

INTERNAL ELECTIVE

PAPER - 3

C. ADVERTISING AND SALES MANAGEMENT

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.

UNIT - I

Definition - concept and functions of advertising - types of advertising - evolution and steps in development of advertising - social, economic and legal implications of advertising.

UNIT - II

Advertising design - types of advertising appeals - structure of advertisement copy - message strategies - advertising effectiveness - AIDA Model.

UNIT - III

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 - IV

Sales management - definition - objectives - functions of sales men - qualities and skills of salesmen - personal selling - management of sales territories and Quotas.

UNIT - V

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. Sales and Advertisement Management - S. Raj Kumar, V. Rajagopalan- S. Chand and Co
2. Advertising and Sales Management - G.R. Basotia, N.K.Sharma, Mangal Deep Jaipur
3. Advertising- Chunawallah K.C Sethia, Himalaya Publishing House, New Delhi
4. Modern Marketing- (Principles and Practices) R.S.N.Pillai and Bagavathi, S.Chand & Co, New Delhi.
5. Advertising and sales promotion S.H. H. Kazmi and Sathish K. Batra, Excel Book India.

Reference Items: Books and Journal

1. Geroge Belch, Michael Belch, and KeyoorPurani, Advertising & Promotion - an Integrated Marketing Communications Perspective, Tata Mcgraw Hill,
2. Kruti Shah & Alan DSouza, Advertising and Promotions: An IMC Perspective, Tata Mcgraw Hill,
1. Advertising Management, Dr. Varma & Aggarwal, King Books
2. Principles of Marketing, Kotler & Armstrong, Prentice-Hall of India
3. Advertising: An Introduction Text, S. A. Chunawalla, Himalayan Publishing House
4. Advertising Principles and Practice, Wells Burnett Moriarty, PHI
5. Foundations of Advertising, S.A. Chunawalla, KC Sethia , Himalayan Publishing House

E-Materials

- http://www.pondiuni.edu.in/storage/dde/downloads/markiv_asp.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

Course Outcome

1. After studied unit-1, the student will be able to set up advertising objectives and know the legal implications of advertising.
2. After studied unit-2, the student will be able to design copy of advertisement.
3. After studied unit-3, the student will be able to select the appropriate media for promotion.
4. After studied unit-4, the student will be able to know the functions of salesmen.
5. After studied unit-5, the student will be able to discover and demonstrate various sales promotion technique and their advantages. The student will also be able to demonstrate the key principles and tools of integrated market communication.

SKILL BASED SUBJECT

PAPER - 4

CREATIVITY AND INNOVATION MANAGEMENT

Course Objectives

1. To learn What is Creativity - Individual and Group Creativity - Convergent Thinking - Divergent Thinking and Generation of Creative Ideas?
2. To learn various Thinking Hats Methods - Redefinition Techniques - Random Stimulus - Generation of Creative Ideas in Groups - Brainstorming - Reverse Brainstorming - Synaptic - Morphological Method.
3. To enable practice 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.
4. To understand creative problem-solving techniques: Innovation - Suspended judgment - Analogies - Lateral Thinking - What is a Problem - Defined Problems.
5. To learn the differences between various 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

UNIT - I

What is Creativity - Individual and Group Creativity - Convergent Thinking - Divergent Thinking and Generation of Creative Ideas?

UNIT - II

Thinking Hats Methods - Redefinition Techniques - Random Stimulus - Generation of Creative Ideas in Groups - Brainstorming - Reverse Brainstorming - Synaptic - Morphological Method.

UNIT - III

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

Innovation - Suspended judgment - Analogies - Lateral Thinking - What is a Problem - Defined Problems - Creative Problem Solving - Models of Techniques of Creative Problem Solving

UNIT - V

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

Unit - 1

Dr. P. Rizwan Ahmed - Creativity and Innovation Management - Margham Publications
NCTE Rastogi - Managing Creativity for Corporate Excellence - Mc Millan
Pradip NCTE and Khandwalla - Lifelong Creativity - Tata Mc Graw Hill.

Unit - 2

Dr. P. Rizwan Ahmed - Creativity and Innovation Management - Margham Publications
NCTE Rastogi - Managing Creativity for Corporate Excellence - Mc Millan
Pradip NCTE and Khandwalla - Lifelong Creativity - Tata Mc Graw Hill.

Unit - 3

Dr. P. Rizwan Ahmed - Creativity and Innovation Management - Margham Publications
NCTE Rastogi - Managing Creativity for Corporate Excellence - Mc Millan
Pradip NCTE and Khandwalla - Lifelong Creativity - Tata Mc Graw Hill.

Unit - 4

Dr. P. Rizwan Ahmed - Creativity and Innovation Management - Margham Publications
NCTE Rastogi - Managing Creativity for Corporate Excellence - Mc Millan
Pradip NCTE and Khandwalla - Lifelong Creativity - Tata Mc Graw Hill.

Unit - 5

Dr. P. Rizwan Ahmed - Creativity and Innovation Management - Margham Publications
NCTE Rastogi - Managing Creativity for Corporate Excellence - Mc Millan
Pradip NCTE and Khandwalla - Lifelong Creativity - Tata Mc Graw Hill.

Reference Items: Books and Journal

1. Davis Gary and Scot - Training creative Thinking - New York Pub.
2. Edward de Bono - Lateral Thinking -Penguin Pub.
3. Peter F. Drucker - Innovation and Entrepreneurship

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/

Course Outcome

1. After studying unit-1, you will be able to define What is Creativity - Individual and Group Creativity - Convergent Thinking - Divergent Thinking and Generation of Creative Ideas.
2. After studying unit-2, you will be able to learn creative Thinking Hats Methods - Redefinition Techniques - Random Stimulus - Generation of Creative Ideas in Groups - Brainstorming - Reverse Brainstorming - Synaptic - Morphological Method.

3. After studying unit-3, you will be able to practice 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.
4. After studying unit-4, you will be able to learn Innovation - Suspended judgment - Analogies - Lateral Thinking - What is a Problem - Defined Problems - Creative Problem Solving - Models of Techniques of Creative Problem Solving
5. After studying unit-5, you will be able to compare various 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

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