Theivanai Ammal College for Women (Autonomous)

(Affiliated to the Annamalai University - Chidambaram)
(Accredited by NAAC (3rd Cycle) with CGPA of 3.2/4 at 'A' Grade)
(Recognized under 2(f) and 12(B) by UGC)
Villupuram, Tamilnadu

ACADEMIC COUNCIL BOOKLET - XIV
(Arts, Science and IQAC)

14th December 2021

தமிழாய்வுத்துறை
இளங்கலைத்தமிழ்

முகவுரை

ஆறு பருவங்களுக்குரிய பாடத்திட்ட வடிவமைப்பு இடம்பெற்றுள்ளது. **மூன்றாம் மற்றும் நான்காம்** பருவத்திற்கு உரிய பாடத்திட்டங்கள் மற்றும் அகமதிப்பீட்டுக் கூறுகள் இடம் பெற்றுள்ளன. **இப்பாடத்திட்டமானது 2021 - 2024 ஆம் கல்வியாண்டுகளில் பயிலும் மாணவியர்களுக்கு உரியது.**

பாடத்திட்ட அமைப்பு : இளங்கலைத்தமிழ் (B.A)

பாடத்திட்டப் பயன்கள்

PSO-1 தமிழ் இலக்கியம் மற்றும் இலக்கணங்களின் தோற்றம் வளர்ச்சி நிலைகளை அறிந்து கொள்வர்.

PSO-2 தமிழ் இலக்கியம் மற்றும் இலக்கணம் வழி தமிழர் வரலாற்றினையும் பண்பாட்டினையும் புரிந்து கொள்வர்.

PSO-3 இலக்கியம் வழி கண்டறிந்த வாழ்வியல் நெறிகளைப் பொருத்திப் பார்க்கும் திறனைப் பெறுவர்.

PSO-4 தமிழியலில் கூறுகின்ற மெய்மைகளைக் காரண காரிய அடிப்படையில் பகுத்தாய்வர்.

PSO-5 தமிழ் இலக்கியம் முன்மொழிகின்ற செந்நெறிகளை மதிப்பிடும் ஆற்றலைப் பெறுவர்.

PSO-6 தமிழ் இலக்கிய வகைமைகளை கற்றுத்தெளிந்து புத்திலக்கியங்களைப் படைக்கும் திறன் பெறுவர்.

பருவம்	பிரிவு	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	முன் பாடக் குறியீடு	வாரம் மணி நேரம்	தரம் Min/ Max
I	I	தமிழ்	UTAL107 UTAL108	பொதுத்தமிழ் - I/ சிறப்புத்தமிழ் - I	UTAL105/ UTAL106	5	3/4
	II	ஆங்கிலம்	UENL109/ UENL110	English for Communication (Stream-I)/ English for Communication (Stream-II)	UENL107/ UENL108	5	3/4
	III	முதன்மைப்பாடம் -I	UTAM102	நன்னூல்- எழுத்ததிகாரம்	-	6	4
		முதன்மைப்பாடம் -II	UTAM110	தமிழ் மொழி வரலாறு	-	5	4
		சார்புப்பாடம் -I	UTAA111	இக்கால இலக்கியங்கள்	-	5	4
		அலுவல்சார் ஆங்கிலம்	UPEM101	Professional English I	-	6	4
	IV	மதிப்பீட்டுக் கல்வி			-	2	1
				மொத்தம்		**34**	**23/25**
II	I	தமிழ்	UTAL207 UTAL208	பொதுத்தமிழ் -II/ சிறப்புத்தமிழ் -II	UTAL205/ UTAL 206	5	3/4
	II	ஆங்கிலம்	UENL209/ UENL210	English for Communication (Stream-I) / English for Communication (Stream-II)	UENL207/ UENL208	5	3/4
	III	முதன்மைப்பாடம் - III	UTAM202	நன்னூல் - சொல்லதிகாரம்	-	5	4
		முதன்மைப்பாடம் -IV	UTAM206	சிற்றிலக்கியங்கள்	-	5	4
		முதன்மைப்பாடம் -V	UTAR201	பயிற்சிப் பட்டறை - I		2	1
		சார்புப்பாடம் -II	UTAA207	தமிழ் இலக்கிய வரலாறு	-	5	4

		அலுவல்சார் ஆங்கிலம்	UPEM201	Professional English II	-	6	4
	IV	துறை சாரா விருப்பப்பாடம் - I	UTAE201	படைப்பிலக்கியம் - I	-	3	2
	V	கூடுதல் செயல்பாடு (ExtensionActivites)			-	-	2
				மொத்தம்		**36**	**27/29**
III	I	தமிழ்	UTAL307 UTAL308	பொதுத்தமிழ் -III/ சிறப்புத்தமிழ் -III	UTAL 305/ UTAL306	5	3/4
	II	ஆங்கிலம்	UENL309 UENL310	English for Communication (Stream-I)/ English for Communication (Stream-II)	UENL 307/ UENL 308	5	3/4
	III	முதன்மைப்பாடம் -VI	UTAM303	யாப்பருங்கலக்காரிகை	-	4	4
		முதன்மைப்பாடம் -VII	UTAM304	காப்பியங்கள்		4	4
		முதன்மைப்பாடம் -VIII	UTAM306	கவிதை இலக்கியம்		4	4
		சார்புப்பாடம் -III	UTAA306	தமிழக வரலாறும் பண்பாடும்	UTAM106	5	4
		செயல்முறைக் கற்றல்		பாரதியார் அருங்காட்சியகம்			
		மதிப்பீட்டுக்கல்வி				2	1
				மொத்தம்		**29**	**23/25**
IV	I	தமிழ்	UTAL405 UTAL406	பொதுத்தமிழ் - IV/ சிறப்புத்தமிழ் -IV	-	5	3/4
	II	ஆங்கிலம்	UENL409 UENL410	English for Communication (Stream-I) / English for Communication (Stream-II)	UENL407/ UENL 408	5	3/4
	III	முதன்மைப்பாடம் -IX	UTAM401	புறப்பொருள் வெண்பாமாலை	-	5	5
		முதன்மைப்பாடம் -X	UTAM405	அற இலக்கியங்கள்	-	4	4
		முதன்மைப்பாடம் - XI	UTAR401	பயிற்சி பட்டறை - II		2	1
		சார்புப்பாடம் -IV	UTAA404	நாட்டுப்புறவியல்	UTAM601	4	4
	IV	துறைசாரா விருப்பப்பாடம் -II	UTAE402	படைப்பிலக்கியம்- II	-	3	2
		செயல்முறைக் கற்றல்		திருவக்கரை			
		Online course		Spoken Tutorial(NPTEL)		3	1/2
		திறன்சார்கல்வி			-	2	1
	V	கூடுதல் செயல்பாடு (Extension Activites)					2
				மொத்தம்		**33**	**26/29**
V	III	முதன்மைப்பாடம் - XII	UTAM505	கவின் கலைகள்	-	6	5
		முதன்மைப்பாடம் -XIII	UTAM506	சமய இலக்கியம்	-	6	4
		முதன்மைப்பாடம் -XIV	UTAM509	நம்பியகப்பொருள்	UTAM403	6	5
		முதன்மைப்பாடம் -XV	UTAP501/ UTAM510	திட்டக்கட்டுரை/ ஊடகத்தமிழ்	-	5	4/5
		துறைசார் விருப்பாடம் -I	UTAO511 UTAO512 UTAO513	நாடகவியல் பெண்ணியம் சிந்தனையியல்	-	5	4
	IV	மதிப்பீட்டுக்கல்வி				2	1
				மொத்தம்		**30**	**23/24**
VI	III	முதன்மைப்பாடம் -XVI	UTAM603	இலக்கியத் திறனாய்வியல்	-	5	4
		முதன்மைப்பாடம் -XVII	UTAM604	இணையத்தமிழ்	-	5	4
		முதன்மைப்பாடம் -XVIII	UTAM607	தண்டியலங்காரம்	-	6	5
		முதன்மைப்பாடம் -XIX	UTAM609	சங்க இலக்கியம்	-	5	4
		முதன்மைப்பாடம் - XX	UTAR201	பயிற்சி பட்டறை - III		2	1
		துறைசார் விருப்பப்பாடம் -II	UTAO610 UTAO611 UTAO612	புலம்பெயர்வு இலக்கியம் பெண்ணியப் படைப்புகள் விளம்பரவியல்	-	5	4

	III	புறவாய்மொழித்தேர்வு	UTAC606	மீள் ஆய்வு	-	-	1
	VI	திறன்சார்கல்வி			-	2	1
		கள ஆய்வு	UTAF601				
	V	கூடுதல் செயல்பாடு (Extension Activites)			-	-	2
		கிராமபுறப் பயன்பாட்டு திட்டம்					
மொத்தம்						**30**	**26**
கூட்டு எண்ணிக்கை						**192**	**148/158**

(EXTRA CREDIT)
கோடைக்கால பயிற்சி (விருப்பம் உள்ள மாணவியருக்குரியது)

பருவம்	பிரிவு	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	மணி நேரம்	தரம்	
						Min	**Max**
II	**III**	முதன்மைப்பாடம்	UTAI201	கோடைக்கால பயிற்சி வகுப்பு	ஒரு மாதம்	-	1
IV	**III**	முதன்மைப்பாடம்	UTAI401	கோடைக்கால பயிற்சி வகுப்பு	ஒரு மாதம்	-	1
IV	**III**	முதன்மைப்பாடம்	UTAI401	கோடைக்கால பயிற்சி வகுப்பு	ஒரு மாதம்	-	1

EXPERIENTIAL LEARNING (Only for Interested Students)

Semester	Course Code	Course Title	Assessment	Place	Hour/Days/ Month	Mode of Evaluation
III	UTAM306	கவிதை இலக்கியம்	Component III	Bharathiyar Ninaivakam, Puthuvai	1 Days	செயல்முறைக் கற்றல்
VI	UTAM405	நாட்டுப்புறவியல்	Component IV	Subramaniya Bharathiyar School Of Tamil, Puthuvai	1 Days	செயல்முறைக் கற்றல்

INTERNSHIP (Only for Interested Students)

Semester	Part	Category	Course Title	Course Title	Contact Hour/Week	Credit
						Min/ Max
IV	IV	Internship / Field work / Field Project	UTAF401	விழுப்புர மாவட்ட நாட்டுப்புற விளையாட்டுகள்	15 Hours	-/1
VI	IV	Internship / Field work / Field Project	UTAF601	விழுப்புர மாவட்ட நாட்டுப்புற விளையாட்டுகள்	15 Hours	-/1

யாப்பருங்கலக்காரிகை
UTAM303

பருவம் : மூன்றாம் பருவம் **தரம் : 04**
பிரிவு : முதன்மைப்பாடம் -VI **மணிநேரம்/வாரம் : 04**
வகுப்பு : II B.A .தமிழ் **மொத்த மணிநேரம் : 52**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம் 1	யாப்பு இலக்கணம் குறித்து அறியச்செய்தல்.
கற்றலின் நோக்கம் 2	யாப்பின் உறுப்புகள் குறித்து தெளிவாக புரியச்செய்தல்.
கற்றலின் நோக்கம் 3	பா இனங்களை இலக்கியங்களுடன் பொருத்திப்பார்த்தல்.
கற்றலின் நோக்கம் 4	பா இனங்களின் தன்மைகளை பகுத்தாய்தல்.
கற்றலின் நோக்கம் 5	பா இனங்களின் தனித்தன்மைகளை மதிப்பீடு செய்தல் மற்றும் யாப்பினைக் கொண்டு மரபுக்கவிதை படைக்கும் திறன் பெறச்செய்தல்

அலகு -1 உருபியல் **10 மணி நேரம்**

உருபியல் - எழுத்து, அசை, சீர்.

அலகு - 2 உருபியல் **10 மணி நேரம்**

உருபியல் - தளை, அடி, தொடை.

அலகு -3 செய்யுளியல் **12 மணி நேரம்**

செய்யுளியல் - பாவுக்குரிய அடிகள் ஓசைகள்

அலகு -4 செய்யுளியல் **10 மணி நேரம்**

செய்யுளியல் - வெண்பா, ஆசிரியப்பா வகைகள், அதன் இனங்கள்

அலகு - 5 செய்யுளியல் **10 மணி நேரம்**

செய்யுளியல் - கலிப்பா, வஞ்சிப்பா, மருட்பா அதன் இனங்கள்.

பாடநூல்கள்

- வேங்கடசாமி நாட்டார், ந.மு. (2010). *யாப்பருங்கலக்காரிகை.* கழக வெளியீடு. சென்னை.

பார்வை நூல்கள்

- கந்தசாமி, சோ.ந. (2010). *தமிழ் யாப்பியலின் தோற்றமும் வளர்ச்சியும்.* தமிழ்ப்பல்கலைக்கழகம். தஞ்சாவூர்.
- திருஞானசம்பந்தம், ச. (2007). *யாப்பருங்கலக்காரிகை.* கதிர் பதிப்பகம். திருவையாறு.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	யாப்பு இலக்கணம் குறித்து அறிவர்.	K1
கற்றலின் பயன்கள 2	யாப்பின் உறுப்புகள் குறித்து தெளிவாக புரிந்து கொள்வர்.	K2
கற்றலின் பயன்கள் 3	பா இனங்களை இலக்கியங்களுடன் பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K2,K3
கற்றலின் பயன்கள் 4	பா இனங்களின் தன்மைகளைப் பகுத்தாய்வு செய்வர்.	K1, K4
கற்றலின் பயன்கள் 5	பா இனங்களின் தனித்தன்மைகளை மதிப்பீடு செய்தல் மற்றும் யாப்பினைக் கொண்டு மரபுக்கவிதை படைக்கும் திறனை பெறுவர்.	K2, K5

காப்பியங்கள்
UTAM 304

பருவம் : மூன்றாம் பருவம் **தரம் : 04**
பிரிவு : முதன்மைப்பாடம் -VII **மணிநேரம்/வாரம் : 04**
வகுப்பு : II B.A. தமிழ் **மொத்த மணிநேரம் : 52**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் 1	காப்பியங்கள் புலப்படுத்தும் நற்சிந்தனைகளை அறியச் செய்தல்.
கற்றலின் நோக்கம் 2	காப்பியங்களின் தொன்மையினையும் சிறப்புக் கூறுகளையும் புரியச் செய்தல்.
கற்றலின் நோக்கம் 3	காப்பியங்களின் தனித்தன்மைகளை பொருத்திப்பார்த்தல்.
கற்றலின் நோக்கம் 4	காப்பியங்கள் உணர்த்தும் அறச்செயல்களை பகுப்பாய்வு செய்தல்.
கற்றலின் நோக்கம் 5	காப்பியங்களின்வழி அறியலாகும் சமுகத்தினை மதிப்பீடு செய்தல்

அலகு -1 சிலப்பதிகாரம் **10 மணி நேரம்**

சிலப்பதிகாரம் - மதுரைக்காண்டம் - வழக்குரை காதை - ஊர்சூழ் வரி.

அலகு - 2 சீவக சிந்தாமணி **10 மணி நேரம்**

சீவக சிந்தாமணி – நாமகள் இலம்பகம் (50 பாடல்கள்).

அலகு -3 பெரிய புராணம் **10 மணி நேரம்**

பெரிய புராணம் - காரைக்காலம்மையார் (1-65 பாடல்கள்).

அலகு -4 கம்பராமாயணம் **12 மணி நேரம்**

கம்பராமாயணம் - அயோத்தியா காண்டம் - குகப் படலம். (50 பாடல்கள்).

அலகு - 5 தேம்பாவணி **10மணி நேரம்**

தேம்பாவணி - வளன் சனித்த படலம் (1-34 பாடல்கள்) குணங்குடி மஸ்தான் சாகிபு - பராபரக் கண்ணி (50 கண்ணிகள்).

பாடநூல்கள்

- வேங்கடசாமி நாட்டார், ந.மு. (2012). *சிலப்பதிகாரம்.* கழக வெளியீடு. சென்னை.
- மாணிக்கவாசகன், ஞா. (2010). *சீவகசிந்தாமணி.* மாணிக்கவாசகர் பதிப்பகம். சென்னை.
- மாணிக்கனார், ஆ. (2007). *பெரியபுராணம்.* வர்த்தமானன் பதிப்பகம். சென்னை.
- *கம்பராமாயணம். (*2003). கம்பன் கழகம். கோவை.

பார்வை நூல்கள்

- வேங்கடசாமி, மயிலை.சீனி. (2004). *தமிழும் கிறித்துவமும்.* வலம்புரி பதிப்பகம். சென்னை.
- இராசமாணிக்கனார். (2014). *பெரியபுராண ஆராய்ச்சி.* அலமு பதிப்பகம். சென்னை.
- சிவஞானம், ம.பொ. (2015). *சிலப்பதிகார ஆய்வுரை.* பூங்கொடி பதிப்பகம். சென்னை.
- சீனிச்சாமி, துரை. (2001). *தமிழில் காப்பியக் கொள்கை.* தமிழ்பல்கலைக்கழகம். தஞ்சாவூர்.
- ஜெகந்நாதன், கி.வா. (2003). *தமிழ்க் காப்பியங்கள் ஆராய்ச்சி.* அமுத நிலையம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	Bloom's Level
கற்றலின் பயன்கள் 1	காப்பியங்கள் புலப்படுத்தும் நற்சிந்தனைகளை அறிவர்.	K1
கற்றலின் பயன்கள 2	காப்பியங்களின் தொன்மையினையும் சிறப்புக்கூறுகளையும் புரிந்து கொள்வர்.	K2
கற்றலின் பயன்கள் 3	காப்பியங்களின் தனித்தன்மைகளை பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K1,K3
கற்றலின் பயன்கள் 4	காப்பியங்கள் உணர்த்தும் அறச்செயல்களை பகுப்பாய்வு செய்வர்.	K4
கற்றலின் பயன்கள் 5	காப்பியங்களின் வழி அறியலாகும் சமுகத்தினை மதிப்பீடு செய்வர்.	K5

கவிதை இலக்கியம்

UTAM306

பருவம் : மூன்றாம் பருவம் **தரம் : 04**

பிரிவு : முதன்மைப்பாடம் - VIII **மணிநேரம் / வாரம் : 04**

வகுப்பு : II B.A. தமிழ் **மொத்த மணிநேரம் : 52**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம் 1	கவிதை இலக்கியத்தின் தொன்மையினையும் தற்கால போக்குகளையும் அறியச்செய்தல்.
கற்றலின் நோக்கம் 2	மரபுக் கவிதை, புதுக்கவிதை குறித்து தெளிவாக புரியச்செய்தல்
கற்றலின் நோக்கம் 3	கவிஞர்களின் படைப்பாக்க உத்திகளை பொருத்திப்பார்த்தல்.
கற்றலின் நோக்கம் 4	தற்கால கவிதைகளில் இடம்பெற்றுள்ள பெண்ணியக் கவிஞர்களின் படைப்புக்களைப் பகுப்பாய்வு செய்தல்
கற்றலின் நோக்கம் 5	கவிதையின் வகைகளை அறிந்து மதிப்பீடு செய்தல் மற்றும் கவிதை படைக்கும் திறனை வளரச்செய்தல்.

அலகு - 1 கவிதை **10 மணி நேரம்**

கவிதை - தோற்றம் - வளர்ச்சி - உணர்வு - கற்பனை - சூழல் - சொல் - பொருள் - சந்தநயம்

அலகு - 2 மரபுக்கவிதை **12 மணி நேரம்**

பாரதியார் - பாஞ்சாலி சபதம் (முதல் பாகம் துரியோதனன் சூழ்ச்சிச்சருக்கம் வரை) - பாரதிதாசன் - புரட்சிக்கவி (முழுமையும்) - பாரதிதாசன் - புதியதோர் உலகு செய்வோம் (முதல் கவிதை) - மனோன்மணியம் சுந்தரம்பிள்ளையின் தமிழ்த் தெய்வ வணக்கம் (முதல் கவிதை)

அலகு - 3 புதுக்கவிதை - I **10 மணி நேரம்**

கவிஞர் சுரதா - சிக்கனம் (முதல் கவிதை) - கவிமணி தேசிக விநாயகம் பிள்ளை - உமர்கய்யாம் பாடல்கள் (முழுமையும்) - கவியரசு கண்ணதாசன் - தைப்பாவை (முழுமையும்) - சிற்பி பாலசுப்பிரமணியன் - கண்ணாடிச் சிறகுள்ள பறவை (முதல் கவிதை)

அலகு - 4 புதுக்கவிதை - II **10 மணி நேரம்**

அப்துல்ரகுமான் - பால்வீதி (முதல் 20 கவிதைகள்) - ந.பிச்சமூர்த்தி – தெரியவில்லை (முதல் கவிதை) - காசி ஆனந்தன் - வெற்றிவிழா (முதல் கவிதை)

அலகு - 5 பெண்படைப்பாளர்களின் கவிதைகள் **10 மணி நேரம்**

வெண்ணிலா - நீரில் அலையும் முகம் (முதல் 10 கவிதைகள்) - சல்மா - பச்சை தேவதை (முதல் 10 கவிதைகள்) - மாலதி மைத்ரி - நீலி (முதல் 10 கவிதைகள்).

பாட நூல்கள்

- அதியமான், பழ. (தொ.ஆ). (2014). பாரதி கவிதைகள். காலச்சுவடு பதிப்பகம். நாகர்கோவில்.
- அப்துல் ரகுமான். (2003). பால்வீதி. நேஷ்னல் பப்ளிசர்ஸ். சென்னை.
- கல்லாடன் (தொ.ஆ). (2012). பாரதிதாசன் கவிதைகள். மணிவாசகர் பதிப்பகம். சென்னை.
- ஈரோடு தமிழன்பன். (2012). ஜப்பானிய ஹைக்கூ 100 – குறிப்புரையுடன். விழிகள் பதிப்பகம். சென்னை.

பார்வை நூல்

- ஜெயதேவன், வ. (2006). தமிழியலின் எதிர்காலவியல். கலைஞன் பதிப்பகம். சென்னை.
- சிவத்தம்பி, கா. (2007). தமிழின் கவிதையியல். குமரன் புத்தக இல்லம். கொழும்பு.
- வல்லிக்கண்ணன். (2014). புதுக்கவிதை தோற்றமும் வளர்ச்சியும். தமிழ் வளர்ச்சி இயக்கம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	கவிதை இலக்கியத்தின் தொன்மையினையும் தற்கால போக்குகளையும் அறிவர்.	K1
கற்றலின் பயன்கள 2	மரபுக் கவிதை, புதுக்கவிதை குறித்து தெளிவாக புரியச்செய்தல்	K2
கற்றலின் பயன்கள் 3	கவிஞர்களின் படைப்பாக்க உத்திகளை பொருத்திப் பார்க்கும் திறன் பெறுவர்.	K2,K3
கற்றலின் பயன்கள் 4	தற்கால கவிதைகளில் இடம்பெற்றுள்ள பெண்ணியக் கவிஞர்களின் படைப்புக்களைப் பகுப்பாய்வு செய்யும் நிலையினை அடைவர்.	K1, K4
கற்றலின் பயன்கள் 5	கவிதையின் வகைகளை அறிந்து மதிப்பீடு செய்வர் மற்றும் கவிதை படைக்கும் கவிஞராக தம்மை வளர்த்துக் கொள்வர்	K2, K5

தமிழக வரலாறும் பண்பாடும்
UTAA306

பருவம் : மூன்றாம் பருவம் | **தரம் : 04**
பிரிவு : சார்புப் பாடம் -III | **மணிநேரம்/வாரம் : 05**
வகுப்பு : II B.A. தமிழ் | **மொத்த மணிநேரம் : 65**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் 1	தமிழக வரலாறு மற்றும் பண்பாடு குறித்து அறியச் செய்தல்.
கற்றலின் நோக்கம் 2	சங்க கால தமிழ் மக்களின் கலை, வாழ்வியல் முறை, சமூக நிலை ஆகியவற்றைப் புரியச்செய்தல்.
கற்றலின் நோக்கம் 3	மூவேந்தர்களின் ஆட்சி முறை, தமிழ் தொண்டு ஆகியவை குறித்து பகுத்தாய்தல்.
கற்றலின் நோக்கம் 4	சேர, சோழ, பாண்டிய மன்னர்களின் போர் முறை, அரசியல் நிலை, கலைப் பணி குறித்து பொருத்திப்பார்த்தல்.
கற்றலின் நோக்கம் 5	விடுதலைக்கு முன்னும் பின்னும் இருந்த தமிழகத்தின் நிலைக் குறித்து மதிப்பீடு செய்தல்.

அலகு – 1 தொல் பழங்காலம், சங்க காலம் **15 மணி நேரம்**

நில இயற்கூறுகள் - வரலாற்றுச் சான்றுகள் - தமிழக மக்களினம் - தமிழகத்துத் தொல் பழங்கால வரலாறு - பண்டையத் தமிழகத்துக்கும் சிந்துவெளி நாகரிகத்திற்கும் இருந்த தொடர்பு - தமிழ் மொழியின் பழமை - வரி வடிவங்கள் - சங்கங்களின் வரலாறு - சங்கங்களின் காலக்கணிப்பு - சங்க இலக்கியம் - சங்க காலத்து நாடும் அரசர் குடிவழிகளும் - சங்க கால வாழ்க்கை.

அலகு – 2 சங்கம் மருவிய காலம், பல்லவர் காலம் **15 மணி நேரம்**

சங்கம் மருவிய காலம் - களப்பிரர் காலம் - தமிழகத்தில் வழிபாட்டு முறையின் வருகையும் சமஸ்கிருத மயமாக்கப்படுதலும் - முற்காலச் சித்தர்கள் - பல்லவர்கள் - பல்லவ சிற்றரசர்கள் - பல்லவ சாளுக்கியப் போட்டி - பல்லவர் இராட்டிரகூடர் உறவு - பல்லவர் பாண்டியர் உறவு.

அலகு – 3 சோழர் காலம், (கிபி 600 முதல் 900 வரை) **15 மணி நேரம்**

தமிழக அரசியல் வளர்ச்சி - சமூகப் பொருளாதார நிலை - பல்லவர் காலத் தொண்டு - சமய நிலை - பக்தி இயக்கம் - கல்வியும் இலக்கியமும் - சோழர்கள் - சாளுக்கிய சோழர்களின் ஆட்சி -பிற்கால சோழர்களின் வீழ்ச்சி - சோழர்களின் ஆட்சி முறை - சமூகப் பண்பாட்டு நிலை - தமிழகத்தில் அடிமை முறை விரிவாக்கம் - சமய நிலை - கலைகள் - கல்வி நிலை – தென்கிழக்காசிய நாடுகளுடன் தொடர்பு.

அலகு – 4 பாண்டியர்கள், அயலார் ஆதிக்கத்தின் தொடக்கம் **10 மணி நேரம்**

சோழர் பாண்டியர் உறவு - இரண்டாம் பாண்டியப் பேரரசு -தமிழகத்தில் முஸ்லீம்களின் படையெடுப்புகள் - தமிழகத்தில் விஜய நகரத்தின் ஆதிக்கம் - தமிழகத்தில் விஜய நகர ஆட்சியின் விளைவு - நாயக்கர்கள் - தஞ்சை மராட்டியர்கள் - கர்நாடக நவாபுகளின் ஆட்சி.

அலகு – 5 ஐரோப்பியர் காலம் **10 மணி நேரம்**

ஐரோப்பியர் வருகை - ஆற்காடு, தஞ்சை அரசர்களுடன் ஆங்கிலேயர் கையாண்ட கொள்கை - தென்னிந்திய விடுதலைப் புரட்சி - வேலூர்க் கலகம் - தமிழகத்தில் ஆங்கிலக் கிழக்கிந்தியக் கம்பெனியின் அதிகார விரிவாக்கம் - ஆங்கிலக் கம்பெனியார் உருவாக்கிய நிதி நிர்வாக முறை - மேல்நாட்டுக் கல்வி - ஆங்கிலக் கம்பெனியார் புகுத்திய கல்வி முறைகள்.

பாடநூல்

- செல்லம்,வே.தி. (2007). *தமிழக வரலாறும் பண்பாடும்.* மணிவாசகர் பதிப்பகம். சென்னை.

பார்வை நூல்கள்

- பிள்ளை, கே. கே. (2008). *தமிழக வரலாறும் பண்பாடும்.* உலகத் தமிழாராய்ச்சி நிறுவனம். சென்னை.
- தட்சிணாமூர்த்தி, அ .(2007). *தமிழர் நாகரிகமும் பண்பாடும்.* உலகத் தமிழாராய்ச்சி நிறுவனம். சென்னை.
- துரைசாமி, ஔவை. சு. (2006). *சேரமன்னர் வரலாறு.* வள்ளுவர் பண்ணை. சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	தமிழக வரலாறு மற்றும் பண்பாடு குறித்து அறிந்து பயன் பெறுவர்.	K1
கற்றலின் பயன்கள 2	தமிழ் மொழியின் தொன்மை, சிறப்பு குறித்து புரிந்துக் கொள்வர்.	K2
கற்றலின் பயன்கள் 3	விடுதலைக்கு முன்னும், பின்னும் இருந்த தமிழகத்தின் நிலையினை பொறுத்திப்பார்க்கும் திறன் பெறுவர்	K2,K3
கற்றலின் பயன்கள் 4	மன்னர் கால ஆட்சி முறை குறித்து மதீப்பீடு செய்து அறிவர்.	K1, K5
கற்றலின் பயன்கள் 5	சங்க கால மக்களின் வாழ்க்கை முறை, சமுதாய நிலை, கலை படைப்பு குறித்து புரிந்து வாழ்வில் மேன்படுவர்.	K2, K5

புறப்பொருள் வெண்பாமாலை
UTAM 401

பருவம் : நான்காம் பருவம் **தரம் : 05**
பிரிவு : முதன்மைப்பாடம் - IX **மணிநேரம்/வாரம் : 05**
வகுப்பு : II B.A.தமிழ் **மொத்த மணிநேரம் : 65**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் 1	புற இலக்கணங்களை அறியச் செய்தல்.
கற்றலின் நோக்கம் 2	புற இலக்கணங்களை பண்டைய மக்களின் வாழ்வியலை இக்கால மக்களுக்கு புரியச் செய்தல்.
கற்றலின் நோக்கம் 3	புற இலக்கணங்களை இலக்கியத்தில் பகுத்தாராயச் செய்தல்
கற்றலின் நோக்கம் 4	புற இலக்கணங்களை வாழ்வியலோடு பொருத்திப் பார்க்கச் செய்தல்.
கற்றலின் நோக்கம் 5	புற இலக்கணங்களை வாழ்வியலில் இக்காலத்திற்கு ஏற்றவாறு நடைமுறைப்படுத்தும் திறன் பெறச் செய்தல்.

அலகு -1 வெட்சி, கரந்தை **15 மணி நேரம்**

வெட்சிப்படலம், கரந்தைப் படலம்.

அலகு -2 வஞ்சி, காஞ்சி **13 மணி நேரம்**

வஞ்சிப்படலம், காஞ்சிப்படலம்

அலகு -3 நொச்சி, உழிஞை **13 மணி நேரம்**

நொச்சிப்படலம், உழிஞைப்படலம்

அலகு -4 தும்பை **14 மணி நேரம்**

தும்பைப்படலம்

அலகு -5 வாகை **10 மணி நேரம்**

வாகைப்படலம்.

பாடநூல்கள்

- ஐயனாரிதனார். (2012). *புறப்பொருள் வெண்பாமாலை.* கழக வெளியீடு. சென்னை.

பார்வை நூல்கள்

- கந்தசாமி, சோ .நா. (2004). *புறத்திணை வாழ்வியல்.* கழக வெளியீடு. சென்னை.
- துரைசாமி பிள்ளை.ஔவை.சு. (2006). *புறப்பொருள் வெண்பாமாலை.* கழக வெளியீடு. சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	Bloom's Level
கற்றலின் பயன்கள் 1	புற இலக்கணங்களை அறிந்துக் கொள்வர்.	K1
கற்றலின் பயன்கள 2	புற இலக்கணங்களை பண்டைய மக்களின் வாழ்வியலை இக்கால மக்கள் புரிந்து கொள்வர்.	K2
கற்றலின் பயன்கள் 3	புற இலக்கணங்களை இலக்கியத்தில் பகுத்தாராய்வர்.	K2,K3
கற்றலின் பயன்கள் 4	புற இலக்கணங்களை வாழ்வியலோடு பொருத்திப் பார்ப்பர்.	K1, K4
கற்றலின் பயன்கள் 5	புறஇலக்கணங்களை வாழ்வியலில் இக்காலத்திற்கு ஏற்றவாறு நடைமுறைப்படுத்தும் திறன் பெறுவர்.	K2, K5

அற இலக்கியங்கள்
UTAM405

பருவம் : நான்காம் பருவம் **தரம் : 04**
பிரிவு : முதன்மைப்பாடம் - X **மணி நேரம்/வாரம் : 04**
வகுப்பு : II B.A தமிழ் **மொத்த மணி நேரம் : 52**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம் 1	அறம் குறித்து அறிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம் 2	அறம் வலியுறுத்தும் வாழ்வியல் நெறிகளை புரிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம் 3	நற்சிந்தனைகளையும் நற்கருத்துக்களையும் அற இலக்கியங்கள் வெளிப்படுத்தி மதிப்பிடச் செய்தல்
கற்றலின் நோக்கம் 4	அறக்கருத்துக்களை சமூகத்துடன் பொருத்தி பார்த்து பகுப்பாயச் செய்தல்
கற்றலின் நோக்கம் 5	அறச்சிந்தனைகளை வாழ்வியலில் கடைப்பிடிக்கும் திறன் பெறச் செய்தல்.

அலகு – 1 திருக்குறள் **12 மணி நேரம்**

திருக்குறள் - பொருட்பால் முதல் 5 அதிகாரம் (இறைமாட்சி, கல்வி, கல்லாமை, கேள்வி, அறிவுடைமை) - நாலடியார்- அறன் வலியுறுத்தல், தூய்த் தன்மை (பாடல் 31 முதல் 50 வரை).

அலகு – 2 பழமொழி நானூறு **10 மணி நேரம்**

பழமொழி நானூறு (முதல் 25 பாடல்கள்) கல்வி, கல்லாமை, அவையறிதல்.

அலகு – 3 சித்தர் பாடல்கள் **10 மணி நேரம்**

சிவவாக்கியர் - சிவவாக்கியர் பாடல்கள் (முதல் 50 பாடல்கள்).

அலகு – 4 நீதிநெறி விளக்கம் **10 மணி நேரம்**

நீதிநெறி விளக்கம் - "நீரிற் குமிழி" முதல் "களைகாணா" வரை (40 பாடல்கள்).

அலகு – 5 நன்னெறி **10 மணி நேரம்**

சிவப்பிரகாசர் - நன்னெறி (முதல் 40 பாடல்கள்

பாடநூல்கள்

- அறவாணன்,க.ப.(2010). *பதினெண் கீழ்க்கணக்கு நூல்கள்.* தமிழ்க் கோட்டம். சென்னை.
- சிவவாக்கியர்.(2012). *சிவவாக்கியர் பாடல்கள்.* காசித்திருமடம் வெளியீடு. திருபனந்தாள்.
- குமரகுருபரர். (2012). *நீதிநெறி விளக்கம்.* காசித்திருமடம் வெளியீடு. திருபனந்தாள்.
- சிவப்பிரகாசர்.(2014). *நன்னெறி.*பொம்மபுரம் ஆதின வெளியீடு. மயிலம்.

பார்வை நூல்கள்

- ராஜ்கௌதமன். (2008). *தமிழ்ச் சமூகத்தில் அறமும் ஆற்றலும்.* விடியல் பதிப்பகம். கோவை.
- பொன்னுசாமி, மு. (2008). *தமிழ் நீதி இலக்கிய வரலாறு.* இந்து பதிப்பகம். கோவை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள் 1	அறம் குறித்து அறிந்து கொள்வர்.	K1
கற்றலின் பயன்கள 2	அறம் வலியுறுத்தும் வாழ்வியல் நெறிகளை புரிந்து கொள்வர்.	K2
கற்றலின் பயன்கள் 3	நற்சிந்தனைகளையும் நற்கருத்துக்களையும் அற இலக்கியங்கள் வெளிப்படுத்தி மதிப்பிடுவர்.	K2,K3
கற்றலின் பயன்கள் 4	அறக்கருத்துக்களை சமூகத்துடன் பொருத்தி பார்த்து பகுப்பாய்வு செய்வர்.	K1, K4
கற்றலின் பயன்கள் 5	அறச்சிந்தனைகளை வாழ்வியலில் கடைப்பிடிக்கும் திறன் பெறுவர்.	K2, K5

பயிற்சிப் பட்டறை –II
UTAR401

பருவம் :	**நான்காம் பருவம்**	**தரம்**	**: 01**
பிரிவு :	**முதன்மைப்பாடம் -XI**	**மணிநேரம்/வாரம்**	**: 02**
வகுப்பு :	**II B.A.தமிழ்**	**மொத்த மணிநேரம்**	**: 26**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம் 1	செய்தி தயாரிப்பதற்கான அடிப்படைகளை அறியச் செய்தல்.
கற்றலின் நோக்கம் 2	நேர்க்காணல் குறித்து புரிந்துக் கொள்ளச் செய்தல்
கற்றலின் நோக்கம் 3	செய்தியினை சூழலுக்கு ஏற்ப பகுத்தாராய்தல்
கற்றலின் நோக்கம் 4	செய்திகளை வாழ்வியலோடு பொருத்திப் பார்த்தல்
கற்றலின் நோக்கம் 5	தனிநபர் நடிப்புத் திறனை மேம்பட செய்தல்

லகு - 1 நேர்காணல் **5 மணி நேரம்**

நேர்காணல் - வினாநிரல் தயாரித்தல் - பேட்டி எடுத்தல் - பயிற்சி அளித்தல்

அலகு - 2 செய்தி சேகரித்தல் **5 மணி நேரம்**

தரவுகளை சேகரித்தல் - பயிற்சி அளித்தல்.

அலகு - 3 செய்தி எழுதுதல் **6 மணி நேரம்**

மொழிப்பயன்பாடு- நிறுத்தற்குறிகள் - கருத்துப்புலப்பாடு - தலைப்பு - பயிற்சி அளித்தல்

அலகு - 4 செய்தி வாசித்தல் **6 மணி நேரம்**

உச்சரிப்பு - வாசிக்கும் திறன் - மெய்ப்பாடு - பயிற்சி அளித்தல்.

அலகு - 5 நாடகம் **4 மணி நேரம்**

நடிப்புத்திறன் - தனிநபர் நடிப்பு – குழுநடிப்பு - பயிற்சி அளித்தல்.

பாடநூல்கள்

- இராசா,கி. (2008). *தகவல் தொடர்பியல்.* வானதி பதிப்பகம். சென்னை.
- பரந்தாமனார்,அ.கி. (2000). *நல்ல தமிழ் எழுத வேண்டுமா?.* பாரி நிலையம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	செய்தி தயாரிப்பதற்கான அடிப்படைகளை அறிந்து கொள்வர்	K1
கற்றலின் பயன்கள 2	நேர்க்காணல் குறித்து புரிந்துக் கொள்வர்	K2
கற்றலின் பயன்கள் 3	செய்தியினை சூழலுக்கு ஏற்ப பகுத்தாராய்வர்	K2,K3
கற்றலின் பயன்கள் 4	செய்திகளை வாழ்வியலோடு பொருத்திப் பார்க்கும் திறன் பெறுவர்	K1, K4
கற்றலின் பயன்கள் 5	நடிப்புத் திறன் மற்றும் செய்தி சேகரிக்கும் திறன் ஆகியவற்றால் பணி வாய்ப்பினை பெறுவர்.	K2, K5

நாட்டுப்புறவியல்
UTAA404

பருவம் : நான்காம் பருவம் **தரம் : 04**
பிரிவு : சார்புப்பாடம் -IV **மணிநேரம்/வாரம் : 04**
வகுப்பு : II B.A. தமிழ் **மொத்தமணிநேரம் : 52**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் 1	நாட்டுப்புற மக்களின் வாழ்க்கை முறைகள், பழக்க வழக்கங்கள், சடங்குகள், விளையாட்டுகள், மருத்துவம் போன்றவற்றை அறிந்துக் கொள்ளச் செய்தல்.
கற்றலின் நோக்கம் 2	நாட்டுப்புற இலக்கியத்தின் வகைமைகளையும் தனித்தன்மைகளையும் புரிந்துக் கொள்ளச் செய்தல்.
கற்றலின் நோக்கம் 3	நாட்டுப்புற இலக்கியங்கள் மற்றும் கலைகள் குறித்து மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம் 4	நாட்டுப்புற இலக்கியங்களில் இடம்பெற்றுள்ள கருத்தாக்கங்களை வாழ்வியலோடு ஒப்பிட்டு பகுத்தாராயச் செய்தல்.
கற்றலின் நோக்கம் 5	நாட்டுப்புற கலைகளின் சிறப்புகளை அறிந்து தனித்திறத்துடன் கலைகளில் ஈடுபடும் திறன் பெறச் செய்தல்.

.
.

அலகு- 1 நாட்டுப்புறவியல் அறிமுகம் **10 மணி நேரம்**

நாட்டுப்புறவியல் அறிமுகம் - நாட்டுப்புறவியல் பாடல்கள் - பாடல் வகைகள் - கதைகள் - கதைகள் வகைப்பாடு.

அலகு–2 கதைப்பாடல்கள் **12 மணி நேரம்**

நாட்டுப்புறக் கதைப்பாடல்கள் - கதைப்பாடல் நம்பிக்கைகளும் பழக்கவழக்கங்களும் - பழமொழிகள் - விடுகதைகள்.

அலகு- 3 நிகழ்த்துக்கலைகள் **10 மணி நேரம்**

புராணக் கதைகள் - கலைகள் - கைவினைப் பொருட்கள் - ஆடல் வகைகள் - கூத்து வகைகள் - நம்பிக்கைகள் - நம்பிக்கைகளின் வகைகள் - நாட்டுப்புறசகுனங்கள்.

அலகு- 4 விழாக்கள் **10 மணி நேரம்**

நாட்டுப்புற தெய்வங்கள் - நாட்டுப்புற திருவிழாக்கள்.

அலகு–5 விளையாட்டுக்கள் **10 மணி நேரம்**

நாட்டுப்புற விளையாட்டுக்கள் - நாட்டுப்புற மருத்துவம் - மருத்துவ நம்பிக்கைகள்.

பாடநூல்கள்

- சக்திவேல். சு. (2010). நாட்டுப்புற இயல் ஆய்வு. மணிவாசகர் பதிப்பகம். பாரிமுனை. சென்னை.

பார்வை நூல்கள்

- சக்திவேல்,சு. (2011). சமூகக் கதைப்பாடல். தமிழ் பல்கலைக்கழகம். தஞ்சை.
- சரசுவதி வேணுகோபால். (2010). நாட்டுப்புறப் பாடல்கள் சமூகஒப்பாய்வு. மதுரைகாமராசர் பல்கலைக்கழகம். மதுரை.
- பெருமாள்,ஏ.என். (2011). தமிழகநாட்டுப்புறக் கலைகள். உலகத்தமிழாராய்ச்சி நிறுவனம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	நாட்டுப்புற மக்களின் வாழ்க்கை முறைகள், பழக்க வழக்கங்கள், சடங்குகள், விளையாட்டுகள், மருத்துவம் போன்றவற்றை அறிந்துக் கொள்வர்.	K1
கற்றலின் பயன்கள 2	நாட்டுப்புற இலக்கியத்தின் வகைமைகளையும் தனித்தன்மைகளையும் புரிந்துக் கொள்வர்.	K2
கற்றலின் பயன்கள் 3	நாட்டுப்புற இலக்கியங்கள் மற்றும் கலைகள் குறித்து மதிப்பிடும் திறன் பெறுவர்.	K2,K3
கற்றலின் பயன்கள் 4	நாட்டுப்புற இலக்கியங்களில் இடம்பெற்றுள்ள கருத்தாக்கங்களை வாழ்வியலோடு ஒப்பிட்டு பகுத்தாராய்வர்.	K1, K4
கற்றலின் பயன்கள் 5	நாட்டுப்புற கலைகளின் சிறப்புகளை அறிந்து தனித்திறத்துடன் கலைகளில் ஈடுபடும் திறன் பெறுவர்.	K2, K5

படைப்பிலக்கியம் - II

UTAE402

பருவம் : நான்காம் பருவம் **தரம் : 02**

பிரிவு : துறைசாரா விருப்பப்பாடம் - II **மணிநேரம் / வாரம் : 03**

வகுப்பு : II B.A. தமிழ் **மொத்த மணிநேரம் : 39**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம்-1	இலக்கியங்களில் தன்மைகளையும் படைப்பிலக்கியத்தின் தோற்றம், வளர்ச்சி குறித்து அறியச் செய்தல்.
கற்றலின் நோக்கம்-2	தமிழ் இலக்கிய மரபில் மரபுக்கவிதை, புதுக்கவிதைகளை படைக்கும் உத்திகளை புரிந்துக் கொள்ளச் செய்தல்
கற்றலின் நோக்கம்-3	தமிழ் இலக்கியங்களில் அமைந்துள்ள நாடகம் வகைமைகள் நாடக முன்னோடிகள் ஆகியவற்றை மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம் -4	இலக்கியங்களில் உரைநடையின் தனித்துவம், உரைநடையின் முக்கியத்துவம் ஆகியவற்றை சமூகத்தோடு பொருத்திப் பகுத்தாராயச் செய்தல்.
கற்றலின் நோக்கம் -5	தற்கால சூழலுக்கு ஏற்ப ஹைக்கூ, சென்ரியு நவீன கவிதைகளை படைக்கும் திறன் பெறச் செய்தல்.

அலகு - 1 **8 மணி நேரம்**

நவீன குறுங்கவிதை வடிவங்கள் - ஹக்கூ அறிமுகம் - ஹைக்கூ எழுத பயிற்சியளித்தல் - லிமரைக்கூ அறிமுகம் - லிமரைக்கூ எழுத பயிற்சியளித்தல்

அலகு - 2 **8 மணி நேரம்**

சென்ரியு அறிமுகம் - சென்ரியு எழுத பயிற்சியளித்தல் - ஹை.ூன் அறிமுகம் - ஹை.ூன் எழுத பயிற்சியளித்தல்.

அலகு - 3 **8 மணி நேரம்**

நிகழ்ச்சி நிரல் தயார் செய்தல் - நிகழ்ச்சித் தொகுப்பாளர் - திறன் மேம்படுத்துதல்

அலகு - 4 **8 மணி நேரம்**

நேர்முக வர்ணனை எழுதுதல் - கோயில் திருவிழா, கலை இலக்கிய விழா, பண்பாட்டு நோக்கு விழாவிளையாட்டு ஆகியன பற்றிய நேர்முக வர்ணனை, வானொலி தொலைக்காட்சிகளுக்கு ஏற்பக் கற்றுத் தருதல்

அலகு - 5 **7 மணி நேரம்**

நூல் மதிப்பீடு செய்தல் - ஆய்வு அறிக்கை வெளியிடுதல்

பாட நூல்கள்

- ஈரோடு தமிழன்பன். (2000) ஒரு வண்டி சென்ரியு. கிழக்குப் பதிப்பகம். சென்னை.
- ஈரோடு தமிழன்பன். (2012). ஜப்பானிய ஹைக்கூ 100 – குறிப்புரையுடன். விழிகள் பதிப்பகம். சென்னை.
- ஈரோடு தமிழன்பன். (2012). கவின் குறுநூறு. அன்னை முத்தமிழ். சென்னை.
- இராமலிங்கம், மா. (1978). புதிய உரைநடை. தமிழ் புத்தகாலயம். சென்னை.
- சுஜாதா. (2012). ஹைக்கூ ஒரு புதிய அறிமுகம். உயிர்மை பதிப்பகம். சென்னை.
- வரதராசன், மு. (2015). இலக்கியத் திறன். பாரி நிலையம். சென்னை.

பார்வை நூல்கள்

- ஜகந்நாதன், கி.வா. (2012). கவி பாடலாம். அமுத நிலைய பதிப்பகம். சென்னை.
- சுந்தரமூர்த்தி, இ. (1994). நடையியல் சிந்தனை. நியூ செஞ்சுரி புக் ஹவுஸ். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள்-1	தமிழ்ச் சிறுகதைகள் முதல் மேலைநாட்டு சிறுகதைகள் வரை அவற்றின் தோற்றம் வளர்ச்சி நிலைகளை அறிவர்.	K1
கற்றலின் பயன்கள்-2	தமிழ் மரபில் இருந்து தோன்றிய மரபுக்கவிதைகள் மரபில் இருந்து வேறுபட்ட புதுக்கவிதைகள் ஆகியவற்றை வாழ்க்கை முறையில் பொருத்திப் பார்க்கும் நிலையினை பெறுவர்.	K2
கற்றலின் பயன்கள்-3	தமிழ் இலக்கிய வகைமைகளை கற்றுத்தெளிந்து நாடக புத்திலக்கியங்களை படைக்கும் திறனை பெறுவர்.	K2,K3
கற்றலின் பயன்கள்-4	படைப்பிலக்கியங்களின் மூலம் தமிழ் இலக்கியத்தில் இடம்பெற்றுள்ள வாழ்வியல் கூறுகளை வாழ்க்கையில் பொருத்திப் பார்த்து தெளிவர்.	K1, K4
கற்றலின் பயன்கள் 5	புதுக்கவிதை, மரபுக்கவிதை, ஹைக்கூ கவிதை, சென்ரியு கவிதை போன்ற கவிதைகளில் உள்ள செந்நெறிகளை சமூகத்தில் மதிப்பிட்டு நடைமுறைப்படுத்தும் ஆற்றலை பெறுவர்.	K2, K5

பொதுத்தமிழ் - III

UTAL307

பருவம் : மூன்றாம் பருவம் **தரம் : 03**

பிரிவு : பொதுத்தமிழ் **மணிநேரம் / வாரம் : 05**

வகுப்பு : II UG **மொத்த மணி நேரம் : 65**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் 1	தமிழில் தொல் மற்றும் நவீன இலக்கியங்கள் குறித்து அறியச்செய்தல்
கற்றலின் நோக்கம் 2	தமிழிலக்கியத்தின் வளர்ச்சி நிலைகள் மற்றும் தனித்தன்மைகளை புரியச்செய்தல்
கற்றலின் நோக்கம் 3	தமிழிலக்கிய வகைமைகளின் வாயிலாக வாழ்வியல் நெறிகளைப் பொருத்திப்பார்க்கச் செய்தல்.
கற்றலின் நோக்கம் 4	தமிழிலக்கிய வளர்ச்சி நிலைகளை இலக்கியங்களின் வழி பகுத்தாராயச் செய்தல்.
கற்றலின் நோக்கம் 5	தமிழிலக்கியங்களை கற்றுதேர்ந்து சமூகத்தில் நன்நடத்தையுடன் செயல்படும் திறன் பெறச்செய்தல்.

அலகு – 1 காப்பியங்கள் **15 மணி நேரம்**

சிலப்பதிகாரம் - மனையறம் படுத்த காதை - சீவகசிந்தாமணி - நாமகள் இலம்பகம் (முதல் 20 பாடல்கள்) - கும்பகர்ணன் வதைப்படலம் - (முதல் 10 பாடல்கள்).

அலகு – 2 இலக்கிய வரலாறு **15 மணி நேரம்**

ஐம்பெருங்காப்பியம் - ஐஞ்சிறுங்காப்பியம் - சிற்றிலக்கியம் - (பரணி, உலா, தூது, பிள்ளைத்தமிழ், பள்ளு, கலம்பகம்).

அலகு – 3 சிற்றிலக்கியங்கள் **15 மணி நேரம்**

கலிங்கத்துப்பரணி - காளிக்குக் கூளி கூறியது (முதல் 10 பாடல்கள்) - தமிழ்விடுதூது - தமிழின் சிறப்பு -குற்றாலக்குறவஞ்சி - குறத்தி குறி கூறுதல்.

அலகு – 4 புதினம் **10 மணி நேரம்**

கி.ராஜநாராயணன் - கோபல்லபுரத்து கிராமம் (முழுவதும்)

அலகு – 5 பயிற்சி **10 மணி நேரம்**

விமர்சனம் எழுதுதல், மேடைப்பேச்சு, வல்லினம் மிகும் இடம், வல்லினம் மிகா இடம்.

பாட நூல்கள்

- வரதராசனார், மு. (2000). *தமிழ் இலக்கிய வரலாறு*, சாகித்ய அகாதமி. புதுடெல்லி.
- புலியூர்கேசிகன். (2012). *கலிங்கத்துப்பரணி*. சாரதா பதிப்பகம். சென்னை.
- செம்பியன். (2001). *வல்*லினம் *மிகும் இடம் வல்*லினம் மிகா *இடம்*. சாரதா பதிப்பகம். மயிலாடுதுறை.
- குமரி ஆனந்தன். (2012). *நீங்களும் பேச்சாளராகலாம்*. வானதி பதிப்பகம். சென்னை.
- இராஜநாராயணன். கி. (2016). கோபல்லபுரத்து கிராமம். காலச்சுவடு பதிப்பகம். நாகர்கோவில்.

பார்வை நூல்கள்

- சீனுச்சாமி, து. (1985). தமிழில் காப்பியக் கொள்கை: முதற்பகுதி. தமிழ் பல்கலைக்கழகம். தஞ்சாவூர்.
- செயராமன், ந.வீ. (2007). *சிற்றிலக்கியச் செல்வம்*. மணிவாசகர் பதிப்பகம்.சிதம்பரம்.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள் 1	தமிழில் தொல் மற்றும் நவீன இலக்கியங்கள் குறித்து அறிந்துக் கொள்வர்.	K1
கற்றலின் பயன்கள 2	தமிழிலக்கியத்தின் வளர்ச்சி நிலைகள் மற்றும் தனித்தன்மைகளை புரிந்துக்கொள்வர்.	K2
கற்றலின் பயன்கள் 3	தமிழிலக்கிய வகைமைகளின் வாயிலாக வாழ்வியல் நெறிகளைப் பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K2,K3
கற்றலின் பயன்கள் 4	தமிழிலக்கிய வளர்ச்சி நிலைகளை இலக்கியங்களின் வழி பகுத்தாராய்வர்.	K1, K4
கற்றலின் பயன்கள் 5	தமிழிலக்கியங்களை கற்றுதேர்ந்து சமூகத்தில் நன்நடத்தையுடன் செயல்படும் திறன் பெறுவர்.	K2, K5

சிறப்புத்தமிழ் - III

UTAL308

பருவம் : மூன்றாம் பருவம் **தரம் : 04**
பிரிவு : சிறப்புத்தமிழ் **மணிநேரம்/ வாரம் : 05**
வகுப்பு : II UG (Advanced Level) **மொத்த மணிநேரம் : 65**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம் 1	தமிழில் தொல் மற்றும் நவீன இலக்கியங்கள் குறித்து அறியச்செய்தல்
கற்றலின் நோக்கம் 2	தமிழிலக்கியத்தின் வளர்ச்சி நிலைகள் மற்றும் தனித்தன்மைகளை புரியச்செய்தல்
கற்றலின் நோக்கம் 3	தமிழிலக்கிய வகைமைகளின் வாயிலாக வாழ்வியல் நெறிகளைப் பொருத்திப்பார்க்கச் செய்தல்.
கற்றலின் நோக்கம் 4	தமிழிலக்கிய வளர்ச்சி நிலைகளை இலக்கியங்களின் வழி பகுத்தாராயச் செய்தல்.
கற்றலின் நோக்கம் 5	தமிழிலக்கியங்களை கற்றுதேர்ந்து சமூகத்தில் நன்நடத்தையுடன் செயல்படும் திறன் பெறச்செய்தல்.

அலகு – 1 காப்பியங்கள் **10 மணி நேரம்**

சிலப்பதிகாரம் - கானல் வரி முழுவதும் - மணிமேகலை – விழா வரை காதை - சீவகசிந்தாமணி - விமலையார் இலம்பகம்.

அலகு – 2 இலக்கிய வரலாறு **10 மணி நேரம்**

ஐம்பெருங்காப்பியம் - ஐஞ்சிறுங்காப்பியம் - சிற்றிலக்கியம் (பரணி, தூது, கலம்பகம், அந்தாதி, பிள்ளைத்தமிழ், பள்ளு).

அலகு – 3 சிற்றிலக்கியம் **15 மணி நேரம்**

கலிங்கத்துபரணி - காடுபாடியது, தமிழ்விடுதூது - தமிழின் பெருமை, மீனாட்சியம்மை குறம் - முதல் 10 பாடல்கள்.

அலகு – 4 புதினம் **15 மணி நேரம்**

சி.சு. செல்லப்பா – வாடிவாசல் (முழுவதும்).

அலகு – 5 பயிற்சி **15 மணி நேரம்**

வானொலி, பத்திரிக்கை, தொலைக்காட்சிக்கு செய்திகள் எழுதுதல் - வல்லினம் மிகும் இடம், மிகா இடம் - தொகைகள்.

பாட நூல்கள்

- வரதராசனார், மு. (2014). *தமிழ் இலக்கிய வரலாறு.* சாகித்ய அகாதமி. புதுடெல்லி.
- குமரகுருபரர். (2004). *மீனாட்சியம்மை குறம்.* காசித்திருமடம் பதிப்பகம். திருபனந்தாள்.
- திலகவதி, கோ. (2010). கல்மரம். அம்ருதா பதிப்பகம். சென்னை.
- புலியூர்கேசிகன். (2012). *கலிங்கத்துப்பரணி.* சாரதா பதிப்பகம். சென்னை.
- செல்லப்பா, சி.சு. (2014). வாடிவாசல். காலச்சுவடு பதிப்பகம். நாகர்கோவில்.

பார்வை நூல்கள்

- சீனுச்சாமி, து. (1985). தமிழில் காப்பியக் கொள்கை: முதற்பகுதி. தமிழ் பல்கலைக்கழகம். தஞ்சாவூர்.
- செயராமன், ந.வீ. (2007). *சிற்றிலக்கியச் செல்வம்.* மணிவாசகர் பதிப்பகம். சிதம்பரம்.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள் 1	தமிழில் தொல் மற்றும் நவீன இலக்கியங்கள் குறித்து அறிந்து கொள்வர்.	K1
கற்றலின் பயன்கள் 2	தமிழிலக்கியத்தின் வளர்ச்சி நிலைகள் மற்றும் தனித்தன்மைகளை புரியச் செய்தல்.	K2
கற்றலின் பயன்கள3	தமிழிலக்கிய வகைமைகளின் வாயிலாக வாழ்வியல் நெறிகளைப் பொருத்திப்பார்க்கச் செய்தல்.	K2,K3
கற்றலின் பயன்கள் 4	தமிழிலக்கிய வளர்ச்சி நிலைகளை இலக்கியங்களின் வழி பகுத்தாராயச் செய்தல்.	K1, K4
கற்றலின் பயன்கள் 5	தமிழிலக்கியங்களை கற்றுதேர்ந்து சமூகத்தில் நன்நடத்தையுடன் செயல்படும் திறன் பெறச்செய்தல்.	K2, K5

பொதுத்தமிழ் - IV

UTAL405

பருவம் : நான்காம் பருவம் **தரம் : 03**

பிரிவு : பொதுத்தமிழ் **மணிநேரம் /வாரம் : 05**

வகுப்பு : II UG (Basic Level) **மொத்த மணி நேரம் : 65**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம் 1	தமிழ் இலக்கியத்தின் தோற்றம் வளர்ச்சி நிலைகளை அறியச்செய்தல்
கற்றலின் நோக்கம் 2	தமிழ் இலக்கிய வகைமைகளின் தனித்தன்மைகளை புரியச்செய்தல்
கற்றலின் நோக்கம் 3	இலக்கியத்தின் வழி வாழ்வியல் நெறிமுறைகளை மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம் 4	தமிழ் இலக்கிய வகைமைகளை தெளிந்து பகுத்தாராயச் செய்தல்.
கற்றலின் நோக்கம் 5	தமிழ் இலக்கியங்களை கற்றறிந்து சமூகத்தில் திறன் பெறச் செய்தல்.

அலகு – 1 பழந்தமிழ் இலக்கியம் **15 மணி நேரம்**

நற்றிணை - குறிஞ்சித்திணை 5 பாடல்கள் (204,209,213,217,225) - குறுந்தொகை - முல்லைத்திணை 5 பாடல்கள் (66,167,183,186,188) - ஐங்குறுநூறு - மருதத்திணை முதல் ஐந்து பாடல்கள் - புறநானூறு (231) - அகநானூறு (140).

அலகு – 2 அற இலக்கியம் **15 மணி நேரம்**

திருக்குறள் - வினைத்திட்பம் - ஏலாதி - முதல் பத்து பாடல்கள் - நாலடியார் முதல் பத்து பாடல்கள்.

அலகு – 3 தமிழ் இலக்கிய வரலாறு **15 மணி நேரம்**

பதினெண்மேற்கணக்கு நூல்கள் - பதினெண்கீழ்க்கணக்கு நூல்கள்.

அலகு – 4 நாடகம் **10 மணி நேரம்**

அறிஞர் அண்ணா - வேலைக்காரி (முழுவதும்).

அலகு – 5 பயிற்சி **10 மணி நேரம்**

நேர்காணல் - மயங்கொலி பிழை அறிதல், இலக்கணக்குறிப்பு அறிதல்.

பாட நூல்கள்

- நாகராசன். வி. (ப.ஆ) (2004). *குறுந்தொகை.* நியூசெஞ்சுரி புத்தக நிலையம். சென்னை.
- மாணிக்கனார்.ஆ, (2014). *பதினெண்கீழ்க்கணக்கு நூல்கள்.* மாணவர் பதிப்பகம். சென்னை.
- வரதராசனார்,மு.(2014). *தமிழ் இலக்கிய வரலாறு.* சாகித்ய அகாதெமி. சென்னை.

பார்வை நூல்கள்

- நாகராசன், வி. (ப.ஆ).(2009). *நற்றிணை.* நியூசெஞ்சுரி புத்தக நிலையம். சென்னை.
- நாகராசன், வி. (ப.ஆ).(2002). *புறநானூறு.* திருநெல்வேலி தென்னிந்திய சைவசித்தாந்த நூற் பதிப்புக்கழகம். சென்னை.
- மாணிக்கனார்,ஆ. (உரை). (2009). *ஐங்குறுநூறு.* சாரதா பதிப்பகம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள் 1	தமிழ் இலக்கியத்தின் தோற்றம் வளர்ச்சி நிலைகளை அறிந்துக் கொள்வர்.	K1
கற்றலின் பயன்கள 2	தமிழ் இலக்கிய வகைமைகளின் தனித்தன்மைகளை புரிந்துக் கொள்வர்.	K2
கற்றலின் பயன்கள் 3	இலக்கியத்தின் வழி வாழ்வியல் நெறிமுறைகளை மதிப்பிடும் திறன் பெறுவர்.	K2,K3
கற்றலின் பயன்கள் 4	தமிழ் இலக்கிய வகைமைகளை தெளிந்து பகுத்து ஆராய்வர்.	K1, K4
கற்றலின் பயன்கள் 5	தமிழ் இலக்கியங்களை கற்றறிந்து சமூகத்தில் திறன்பட செயல்படும் திறன் பெறுவர்.	K2, K5

சிறப்புத்தமிழ் - IV
UTAL406

பருவம் : நான்காம் பருவம் **தரம் : 04**
பிரிவு : சிறப்புத்தமிழ் **மணிநேரம்/வாரம் : 05**
வகுப்பு : II UG (Advanced Level) **மொத்த மணிநேரம் : 65**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம் 1	தமிழ் இலக்கியத்தின் தோற்றம் வளர்ச்சி நிலைகளை அறியச்செய்தல்
கற்றலின் நோக்கம் 2	தமிழ் இலக்கிய வகைமைகளின் தனித்தன்மைகளை புரியச்செய்தல்
கற்றலின் நோக்கம் 3	இலக்கியத்தின் வழி வாழ்வியல் நெறிமுறைகளை மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம் 4	தமிழ் இலக்கிய வகைமைகளை தெளிந்து பகுத்தாராயச் செய்தல்.
கற்றலின் நோக்கம் 5	தமிழ் இலக்கியங்களை கற்றறிந்து சமூகத்தில் திறன் பெறச் செய்தல்.

அலகு – 1 பழந்தமிழ் இலக்கியம் **15 மணி நேரம்**

நற்றிணை - குறிஞ்சித்திணை (32, 151), குறுந்தொகை - முல்லைத்திணை (65, 167) - ஐங்குறுநூறு - மருதத்திணை - புனலாட்டுப் பத்து - கலித்தொகை - பாலைக்கலி (9) - புறநானூறு - ஔவையார் (87, 95) - அகநானூறு - பாலைத்திணை (101).

அலகு – 2 அற இலக்கியம் **15 மணி நேரம்**

சிறுபஞ்சமூலம் - முதல் பத்து பாடல்கள் - நாலடியார் - நல்லினம் சேர்தல் - முதல் 10 பாடல்கள் - திருக்குறள் - அமைச்சு, சொல்வன்மை, காதல் சிறப்புரைத்தல்.

அலகு – 3 தமிழ் இலக்கிய வரலாறு **15 மணி நேரம்**

எட்டுத்தொகை - பத்துப்பாட்டு - பதினெண்கீழ்க்கணக்கு.

அலகு – 4 நாடகம் **10 மணி நேரம்**

சுகிசிவம் - மாங்கல்ய பிச்சை - அறிஞர் அண்ணா - ஓர் இரவு

அலகு - 5 பயிற்சி **10 மணி நேரம்**

ஓரங்க நாடகம் எழுதுதல் - நூல் மதிப்புரை எழுதுதல் - மயங்கொலி பிழை அறிதல், இலக்கண குறிப்பு அறிதல்.

பாட நூல்கள்

- நாகராசன்,வி. (ப.ஆ) (2004). *குறுந்தொகை*. நியூசெஞ்சுரி புத்தக நிலையம்.சென்னை.
- மாணிக்கனார்,ஆ. (ப.ஆ) (2014). *பதினெண்கீழ்க்கணக்கு நூல்கள்*. மாணவர் பதிப்பகம். சென்னை.

பார்வை நூல்கள்

- நாகராசன்,வி. (ப.ஆ) (2004). *நற்றிணை*. நியூசெஞ்சுரி புத்தக நிலையம். சென்னை.
- நாகராசன்,வி. (ப.ஆ) (2002). *புறநானூறு*. திருநெல்வேலி தென்னிந்திய சைவசித்தாந்த நூற் பதிப்புக்கழகம். சென்னை.
- மாணிக்கனார்,ஆ. (உரை) (2009). *ஐங்குறுநூறு*. சாரதா பதிப்பகம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள் 1	தமிழ் இலக்கியத்தின் தோற்றம் வளர்ச்சி நிலைகளை அறிந்துக் கொள்வர்.	K1
கற்றலின் பயன்கள 2	தமிழ் இலக்கிய வகைமைகளின் தனித்தன்மைகளை புரிந்துக் கொள்வர்.	K2
கற்றலின் பயன்கள் 3	இலக்கியத்தின் வழி வாழ்வியல் நெறிமுறைகளை மதிப்பிடும் திறன் பெறுவர்.	K2,K3
கற்றலின் பயன்கள் 4	தமிழ் இலக்கிய வகைமைகளை தெளிந்து பகுத்து ஆராய்வர்.	K1, K4
கற்றலின் பயன்கள் 5	தமிழ் இலக்கியங்களை கற்றறிந்து சமூகத்தில் திறன்பட செயல்படும் திறன் பெறுவர்.	K2, K5

அகமதிப்பீட்டிற்கான உட்கூறுகள்
இளங்கலைத்தமிழ்

பருவம்	பிரிவு	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	III உட்கூறுகள்	IV உட்கூறுகள்
III	I	தமிழ்	UTAL307/ UTAL308	பொதுத்தமிழ் - III / சிறப்புத்தமிழ் -III	ஒப்படைப்புத்தாள்	தலையங்கம் எழுதுதல்
	III	முதன்மைப்பாடம் – VI	UTAM303	யாப்பருங்கலக்காரிகை	ஒப்படைப்புத்தாள்	வெண்பா இயற்றுதல்
		முதன்மைப்பாடம் – VII	UTAM304	காப்பியங்கள்	ஒப்படைப்புத்தாள்	வினாடிவினா
		முதன்மைப்பாடம்- VIII	UTAM306	கவிதை இலக்கியம்	ஒப்படைப்புத்தாள்	எழுத்துப் பயிற்சி
IV	I	தமிழ்	UTAL405/ UTAL406	பொதுத்தமிழ் - IV / சிறப்புத்தமிழ் - IV	ஒப்படைப்புத்தாள்	நேர்காணல் எழுதுதல்
	III	முதன்மைப்பாடம் – IX	UTAM401	புறப்பொருள் வெண்பாமாலை	ஒப்படைப்புத்தாள்	வினாடிவினா
		முதன்மைப்பாடம் – X	UTAM405	அற இலக்கியங்கள	ஒப்படைப்புத்தாள்	வினாடிவினா
		முதன்மைப்பாடம் – XI	UTAR401	பயிற்சி பட்டறை - II	ஒப்படைப்புத்தாள்	தெரிவு வினாக்கள் தயாரித்தல்
		சார்புப் பாடம் – IV	UTAA404	நாட்டுப்புறவியல்	தகவல் அட்டவணை	கள ஆய்வு தரவு சேமிப்பு
		துறைச்சாரா விருப்பப் பாடம் – II	UTAE402	படைப்பிலக்கியம் -II	ஒப்படைப்புத்தாள்	கவிதைப் படைப்பு

அகமதிப்பீட்டிற்கான உட்கூறுகள்
பயிற்சி பட்டறை - II

பருவம்	பிரிவு	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	உட்கூறுகள்
IV	**III**	முதன்மைப்பாடம்	UTAR401	பயிற்சி பட்டறை	1.நேர்காணல் 2.செய்தி எழுதுதல் 3.மேடைப் பேச்சு 4.செய்தி வாசித்தல் 5.தரவு சேகரித்தல் 6.தனி நபர் நடிப்பு 7.பிற மொழி கலப்பின்மை 8.நேரடி வர்ணனை 9.கதைமாந்தர் சித்தரிப்பு 10. நாடகம் எழுதுதல்

பாடத்திட்ட அமைப்பு : M.A(முதுகலைத்தமிழ்)

பருவம்	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	வாரம் மணி நேரம்	தரம்	
					Min	Max
I	முதன்மைப்பாடம் -I	PTAM102	தொல்காப்பியம் - எழுத்ததிகாரம்	6	5	5
	முதன்மைப்பாடம் -II	PTAM104	தொல்லியல்	6	5	5
	முதன்மைப்பாடம் -III	PTAM109	ஒப்பிலக்கியம்	6	4	4
	முதன்மைப்பாடம் -IV	PTAM108	தமிழ் இலக்கியச் சூழலில் பெண்ணியம்	5	4	4
	முதன்மைப்பாடம் -V	PTAM111	நவீன இலக்கியம்	6	5	5
		நூலகம்		1	-	-
			மொத்தம்	**30**	**23**	**23**
II	முதன்மைப்பாடம் -VI	PTAM203	தொல்காப்பியம் - சொல்லதிகாரம்	5	4	4
	முதன்மைப்பாடம் -VII	PTAM209	திறனாய்வுக்கோட்பாடுகள்	5	4	4
	முதன்மைப்பாடம் -VIII	PTAM210	அற இலக்கியங்கள்	4	3	3
	முதன்மைப்பாடம் -IX	PTAM211	அகராதியியல்	5	3	3
	முதன்மைப்பாடம் -X	PTAM213	காப்பியங்கள்	5	4	4
	துறைசாரா விருப்பப் பாடம் - I	PTAE201/ PTAE202	ஊடகத்தமிழ் சுற்றுலாவியல்	5	4	4
	SERVICE LEARNING	PTAX202	பயன்பாட்டுத்தமிழ்	-	1	1
		நூலகம்		1	-	-
			மொத்தம்	**30**	**23**	**23**
III	முதன்மைப்பாடம் - XI	PTAM301	தொல்காப்பியம்-பொருளதிகாரம் - I	6	5	5
	முதன்மைப்பாடம் - XII	PTAM305	ஆராய்ச்சி நெறிமுறைகள்	6	5	5
	முதன்மைப்பாடம் - XIII	PTAM306	உரையாசிரியர்கள்	5	5	5
	முதன்மைப்பாடம் - XIV	PTAM310	சிற்றிலக்கியங்கள்	5	4	4
	பல்துறை சார்புபாடம் -I	PTAI301	மொழிபெயர்ப்பியல்	5	4	4
	திட்டக்கட்டுரை		ஆய்வு திட்டக்கட்டுரை	2	-	-
		நூலகம்		1	-	-
			மொத்தம்	**30**	**23**	**23**
IV	முதன்மைப்பாடம் - XV	PTAM401	தொல்காப்பியம்-பொருளதிகாரம் -II	6	5	5
	முதன்மைப்பாடம் - XVI	PTAM410	ஊடகவியல்	6	4	4
	முதன்மைப்பாடம் - XVII	PTAM406	தமிழ்க்கணினி பயன்பாட்டியல்	6	4	4
	முதன்மைப்பாடம் -XVIII	PTAM411	சங்க இலக்கியம்	6	4	4
	திட்டக்கட்டுரை	PTAP401	ஆய்வு திட்டக்கட்டுரை	4	4	4
		நூலகம்		2	-	-
			மொத்தம்	**30**	**21**	**21**
			கூட்டு எண்ணிக்கை	**120**	**90**	**90**

தொல்காப்பியம் - பொருளதிகாரம் I

PTAM301

பருவம் : மூன்றாம் பருவம் **தரம் : 05**
பிரிவு : முதன்மைப்பாடம் -XI **மணி நேரம்/வாரம் : 06**
வகுப்பு : II M.A தமிழ் **மொத்த மணிநேரங்கள் : 78**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம்-1	பண்டையத்தமிழ் மக்களின் அகம் மற்றும் புறம் தொடர்பான சிந்தனைகளை உலகளாவிய சிந்தனைத்தளத்தில் அறிந்து கொள்ளச் செய்தல்.
கற்றலின் நோக்கம்-2	தமிழர்களின் போர் மரபு குறித்த கருத்தாக்கங்களை புரிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம்-3	தமிழர்களின் வாழ்வியலில் இயற்கைக்கு அளித்த முக்கியத்துவத்தை மதிப்பிடச் செய்தல்
கற்றலின் நோக்கம்-4	தொல் தமிழரின் திருமண முறைகளை இக்கால திருமண முறையோடு பொருத்திப் பார்க்கச் செய்தல்
கற்றலின் நோக்கம்-5	களவு மற்றும் கற்பு நெறிகளில் பெண் இலக்கிய மாந்தர்களின் திறன்களை அறியச் செய்தல்

அலகு-1 **12 மணி நேரம்**

அகத்திணையியல்

அலகு-2 **18 மணி நேரம்**

புறத்திணையியல்

அலகு-3 **16 மணி நேரம்**

களவியல்

அலகு-4 **16 மணி நேரம்**

கற்பியல்

அலகு-5 **16 மணி நேரம்**

பொருளியல்

பாடநூல்

- *தொல்காப்பியம்-பொருளதிகாரம்.* இளம்பூரணர் உரை.(2003). தமிழ்மண் பதிப்பகம். சென்னை.

பார்வை நூல்கள்

- சண்முகம் பிள்ளை, மு. (2003). *தொல்காப்பியம் பொருளதிகாரம்.* 184, பிராட்வே. முல்லை நிலையம். சென்னை.

- சிவலிங்கனார், ஆ. (1982).*தொல்காப்பியர் உரை வளம்.* உலகத் தமிழ் ஆராய்ச்சி நிறுவனம். தரமணி. சென்னை.
- சுந்தரமூர்த்தி, கு. (1986). *தொல்காப்பியம் - பொருளதிகாரம்.* அண்ணாமலைப் பல்கலைக் கழகம். சிதம்பரம். மு.ப.
- சுப்ரமணியன், ச.வே. (2008). *தொல்காப்பியம்- பொருளதிகாரம்*
- *(உரை வளங்கள்).* உலகத் தமிழ் ஆராய்ச்சி நிறுவனம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள்-1	பண்டையத்தமிழ் மக்களின் அகம் மற்றும் புறம் தொடர்பான சிந்தனைகளை உலகளாவிய சிந்தனைத்தளத்தில் அறிந்து கொள்வர்.	K1
கற்றலின் பயன்கள்-2	தமிழர்களின் போர் மரபு கருத்தாக்கங்களை விமர்சனத்துடன் புரிந்து கொள்வர்.	K2
கற்றலின் பயன்கள்-3	தமிழர்களின் வாழ்வியலில் இயற்கைக்கு அளித்த முக்கியத்துவத்தை மதிப்பிடும் திறன் பெறுவர்.	K2,K3
கற்றலின் பயன்கள்-4	தொல் தமிழரின் திருமண முறைகளை இக்கால திருமண முறையோடு பொருத்திப்பார்க்கும் திறன் பெறுவர்.	K1, K4
கற்றலின் பயன்கள்-5	களவு மற்றும் கற்பு நெறிகளில் பெண் இலக்கிய மாந்தர்களின் திறனைப் பெறுவர்	K2, K5

ஆராய்ச்சி நெறிமுறைகள்
PTAM305

பருவம் : மூன்றாம் பருவம் **தரம் : 05**
பிரிவு : முதன்மைப்பாடம் -XII **மணி நேரம் /வாரம் : 06**
வகுப்பு : II MA தமிழ் **மொத்த மணிநேரங்கள் : 78**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம்-1	உலகளாவிய சிந்தனைத் தளத்தில் ஆய்வு நெறிமுறைகளை அறிந்து கொள்ள செய்தல்.
கற்றலின் நோக்கம்-2	ஆய்வு குறித்த கருத்தாக்கங்களை விமர்சன முன்னோடி ஆய்வுகளில் பொருத்திய பார்க்கச் செய்தல்.
கற்றலின் நோக்கம்-3	ஆய்வு நெறிமுறைகளின் பயன்பாட்டை வழிமுறையை பகுத்தாராயும் திறன் பெறச் செய்தல்.
கற்றலின் நோக்கம்-4	படைப்புகளையும் முன்ஆய்வுகளையும் ஆய்வு நெறிமுறைகள் அடிப்படையில் மதிப்பிடும் திறனை பெறச் செய்தல்.
கற்றலின் நோக்கம்-5	ஆய்வு நெறிமுறைகளை உள்வாங்கிக் கொண்டு புதிய ஆய்வுக் கட்டுரையை படைக்கும் திறன் பெறச் செய்தல்.

அலகு - 1 **16 மணி நேரம்**

ஆராய்ச்சி – ஒரு விளக்கம்- ஆய்வாளர் தகுதிகள் - ஆய்வுச்சிக்கல்கள்.

அலகு - 2 **15 மணி நேரம்**

ஆராய்ச்சி முறைகள் - ஆய்வில் உத்திகள் - கருதுகோள்.

அலகு - 3 **15 மணி நேரம்**

களஆய்வு –நேர்காணல் - வினாநிரல்

அலகு - 4 **16 மணி நேரம்**

நூலகப்பயன்பாடு -ஆய்வேட்டின் கட்டமைப்பு - மேற்கோளும் - அடிக்குறிப்பும்

அலகு - 5 **16 மணி நேரம்**

குறியீடு – பிழைகளை அகற்றுதல் - ஆய்வுக்குரிய தலைப்புகள் -20ஆம் நூற்றாண்டு தமிழியல் ஆய்வுகள்.

பாடநூல்

- பாலசுப்பிரமணியன். கு.வெ. (2007). *ஆய்வியல் நெறிகள்.* உமா நூல் வெளியிட்டகம். தஞ்சாவூர்.

பார்வை நூல்

- பொற்கோ. (2004). *ஆராய்ச்சி நெறிமுறைகள்.* ஐந்திணைப் பதிப்பகம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள்-1	உலகளாவிய சிந்தனைத் தளத்தில் ஆய்வு நெறிமுறைகளை அறிந்து கொள்வர்.	K1
கற்றலின் பயன்கள்-2	ஆய்வு குறித்த கருத்தாக்கங்களை விமர்சன முன்னோடி ஆய்வுகளில் பொருத்திய பார்க்கும் திறன் பெறுவா.	K2
கற்றலின் பயன்கள்-3	ஆய்வு நெறிமுறைகளின் பயன்பாட்டை வழிமுறையை பகுத்தாராயும் திறன் பெறுவர்.	K2,K3
கற்றலின் பயன்கள்-4	படைப்புகளையும் முன்ஆய்வுகளையும் ஆய்வு நெறிமுறைகள் அடிப்படையில் மதிப்பிடும் திறனை பெறுவர்.	K1, K4
கற்றலின் பயன்கள்-5	ஆய்வு நெறிமுறைகளை உள்வாங்கிக் கொண்டு புதிய ஆய்வுக் கட்டுரையை உருவாக்கும் திறன் பெறுவர்.	K2, K5

உரையாசிரியர்கள்
PTAM306

பருவம் : மூன்றாம் பருவம் **தரம் : 05**
பிரிவு : முதன்மைப்பாடம் - XIII **மணி நேரம்/வாரம் : 05**
வகுப்பு : II M.A தமிழ் **மொத்த மணிநேரங்கள் : 65**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம்-1	உரையாசிரியர்களின் திறனாய்வு நெறிகளை விமர்சன சிந்தனையுடன் அறிந்து கொள்ளச் செய்தல்.
கற்றலின் நோக்கம்-2	பண்டைய இலக்கிய மரபுகளின் தொடர்ச்சிக்கு செயல்மிகு கருத்து பரிமாற்றக் கருவியாக உரைகள் செயல்படும் முறையை புரிந்து கொள்ளச் செய்தல்.
கற்றலின் நோக்கம்-3	இலக்கியங்களின் சமூக ஊடாட்டத்தல் உரைகளின் பங்கினை மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம்-4	பல்வேறுபட்ட உரைகளையும் காலவரிசைபடுத்தப்பட்ட உரையாசிரியர்களையும் பகுத்தாராயச் செய்தல்.
கற்றலின் நோக்கம்-5	புதிய கருத்தியல் மாற்றத்திற்கும் கால மாற்றத்திற்கும் ஏற்ப பண்டைய நூல்களுக்கு புத்துரைகளை படைக்கும் திறனைப் பெறச்செய்தல்.

அலகு – 1 உரை பொதுவிளக்கம் **13 மணி நேரம்**

உரை வரையறை - விளக்கம் - உரை வகைகள் - இலக்கண, இலக்கிய உரைகள் - அதன் உள்வகைகள் - எழுத்துரை - வாய்மொழி உரை - பொழிப்புரை - பதவுரை - குறிப்புரை - விருத்தியுரை - செய்யுள் உரை - மூலநூலாசிரியர் உரை - வேறு ஆசிரியர் உரை - உடன்பாட்டுரை - மறுப்புரை - உரைக் கூறுகள் - கருத்துரை - மூலபாடம் - அருஞ்சொற்பொருள் - எடுத்துக்காட்டு - பாடபேதம் - விளக்கம் - ஒப்பிட்டு விளக்குதல் - காரண, காரிய விளக்கம் - பலபொருள் சொல் வழக்குக் கூறுதல் - உரை, உரைநடை வேறுபாடு - உரைக்கூறு அடிப்படையில் வகைமை - நய உரை.

அலகு - 2 இலக்கண உரைகள் **12 மணி நேரம்**

வகைமை அடிப்படையில் உரையாசிரியர் - எழுத்திலக்கண, சொல்லிலக்கண, பொருளிலக்கண, யாப்பிலக்கண, அணியிலக்கண உரைகள் - நூல் அடிப்படையில் உரை - தொல்காப்பியம் நன்னூல் முதலாக இலக்கண உரைகளுக்கு இடையே உள்ள பொதுத்தன்மைகள் - இலக்கண உரை வரலாறு.

அலகு – 3 இலக்கிய உரைகள் **14 மணி நேரம்**

வகைமை அடிப்படையில் உரைகள் - சங்க இலக்கியம், அற இலக்கியம், காப்பியம், புராணம், பக்தி, சிற்றிலக்கிய உரைகள் - சைவ, வைணவ, பௌத்த, சமண இலக்கிய உரைகள் - நூல் அடிப்படை வகை - புறநானூறு, சிலப்பதிகாரம், திருக்குறள் முதலான உரைகள் - சமய உரைகள் - தத்துவ உரைகள் - கிறித்துவ உரை - சமண உரை - சைவ உரை - வைணவ உரை.

அலகு – 4 உரை ஆய்வுகள் **13 மணி நேரம்**

உரை வளம் - உரைக் கொத்து - தொகுப்புரைகள் - மதிப்பீடுகள் - உரையின் வரலாற்றுப் பின்னணி - இலக்கண இலக்கியம் முதலான வகைமை நோக்கில் ஆய்வு வரலாறு -ஒரு உரையாசிரியரின் பல உரைகள் பற்றிய ஆய்வு வரலாறு - ஒரு நூலுக்கு எழுதப்பட்ட உரைகளின் ஆய்வு வரலாறு - உரை மொழி - உரை அமைப்பு பற்றிய ஆய்வுகள் - உரைகளைப் பற்றிய ஆராய்ந்தவர்கள் - உரை ஆராய்ச்சியின் வகைமைகள் - உரையின் மொழி குறித்த ஆய்வுகள் - மொழிக்கலப்பு - மணிப்பிரவாளம் முதலான மரபு உரை ஆய்வுகள் - நூலமைப்பு பற்றிய உரைக்கருத்துகள் ஆராய்தல்.

அலகு - 5 உரை ஆளுமைகள் - தனித்தன்மைகள் **13 மணி நேரம்**

இலக்கண உரையாசிரியர்கள் - இளம்பூரணர், பேராசிரியர், நச்சினார்க்கினியர், சேனாவரையர், கல்லாடனார், மயிலைநாதர், சிவஞானமுனிவர், ஆறுமுகநாவலர், கு.சுந்தரமூர்த்தி, ஆ.சிவலிங்கனார், ஆ.பூவராகம்பிள்ளை, தேவநேயப்பாவாணர், பாலசுந்தரம், புலியூர்க்கேசிகன், நக்கீரர், தமிழண்ணல், இலக்கிய உரையாசிரியர்கள் - நச்சினார்க்கினியர் அடியார்க்குநல்லார், பரிமேலழகர், மணக்குடவர், காளிங்கர், சி.கே.சுப்பிரமணியம், உ.வே.சாமிநாதையர், பெருமழைப்புலவர், சோமசுந்தரனார், ஔவை சு.துரைசாமிப்பிள்ளை, மு.வ.

பாடநூல்கள்

- அரவிந்தன். மு.வை. (2002). *உரையாசிரியர்கள்.* மணிவாசகர் பதிப்பகம். சென்னை.
- மோகன் இரா.சொக்கலிங்கம், ந. (2003). *உரைமரபுகள்.* மெய்யப்பன் பதிப்பகம். சென்னை.

பார்வை நூல்கள்

- சுப்பிரமணியன்,சு.வெ. (2006). *அடியார்க்குநல்லார் உரைத்திறன்.* மெய்யப்பன் பதிப்பகம். சிதம்பரம்.
- அரங்கராஜன், இரா. (2002). *திருவாய் மொழிப் பேருரையாளர் நம்பிள்ளை உரைத்திறன்.* மெய்யப்பன் தமிழாய்வகம். சிதம்பரம்.
- சிவலிங்கராஜா, எஸ். (2003). *ஈழத்துத் தமிழ் உரை மரபு.* குமரன் புத்தக இல்லம் சென்னை.
- சுப்பிரமணியன், ச.வே. (2005). *அடியார்க்குநல்லார் உரைத்திறன்.* மெய்யப்பன் பதிப்பகம்.சிதம்பரம்.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள்-1	உரையாசிரியர்களின் திறனாய்வு நெறிகளை விமர்சன சிந்தனையுடன் அறிந்து கொள்வர்	K1
கற்றலின் பயன்கள்-2	பண்டைய இலக்கிய மரபுகளின் தொடர்ச்சிக்கு செயல்மிகு கருத்து பரிமாற்றக் கருவியாக உரைகள் செயல்படும் முறையை புரிந்து கொள்வர்	K2
கற்றலின் பயன்கள்-3	இலக்கியங்களின் சமூக ஊடாட்டத்தல் உரைகளின் பங்கினை மதிப்பிடுவர்	K2,K3
கற்றலின் பயன்கள்-4	பல்வேறுபட்ட உரைகளையும் காலவரிசைபடுத்தப்பட்ட உரையாசிரியர்களையும் பகுத்தாராயும் திறன் பெறுவர்	K1, K4
கற்றலின் பயன்கள்-5	புதிய கருத்தியல் மாற்றத்திற்கும் கால மாற்றத்திற்கும் ஏற்ப பண்டைய நூல்களுக்கு புத்துரைகளை படைக்கும் திறன் பெறுவர்.	K2, K5

சிற்றிலக்கியங்கள்
PTAM310

பருவம் : மூன்றாம் பருவம் | **தரம் : 04**
பிரிவு : முதன்மைப் பாடம் -XIV | **மணிநேரம் / வாரம் : 05**
வகுப்பு : II M.A.தமிழ் | **மொத்த மணிநேரம் : 65**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம்-1	சிற்றிலக்கிய தோற்றத்திற்கும் சமூக மாற்றத்திற்குமான தொடர்பை விமர்சன அடிப்படையில் அறிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம்-2	உழவர், குறவர் போன்ற அடித்தள மக்களுக்கிடையே நிலவிய சமூக ஊடாட்டத்தினை சிற்றிலக்கியங்கள் பதிவு செய்துள்ள முறையை புரிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம்-3	பள்ளு, குறவஞ்சி போன்ற இலக்கியங்களில் சித்திரிக்கப்பட்டுள்ள இயற்கைச் சூழல் சார்ந்த நிலவியலை இக்காலச் சூழலுக்குப் பொருத்திப்பார்க்கும் திறம் பெறச் செய்தல்
கற்றலின் நோக்கம்-4	உலா, பிள்ளைத்தமிழ், கலம்பகம், குறவஞ்சி போன்ற சிற்றிலக்கியங்களில் வெளிப்படும் பெண் சார்ந்த புனைவுகளை பகுத்தாரயச் செய்தல்.
கற்றலின் நோக்கம்-5	நவீன காலத்திற்கும் கருத்தியலுக்கும் ஏற்றார் போல புது சிற்றிலக்கிய வகைகளையும் சிற்றிலக்கியங்களையும் படைக்கும் திறன் பெறச்செய்தல்

அலகு - 1 சிற்றிலக்கிய அறிமுகம் **13 மணி நேரம்**

சிற்றிலக்கியங்களின் தோற்றமும் வளர்ச்சியும் - சிற்றிலக்கிய வகைகள், சிற்றிலக்கிய இலக்கணங்கள் - சிற்றிலக்கியங்கள் பெயர் பெறும் முறை.

அலகு - 2 சிற்றிலக்கிய வகைகள் **13 மணி நேரம்**

முக்கூடற் பள்ளு (முழுவதும்).

அலகு - 3சிற்றிலக்கிய வகைகள் **14 மணி நேரம்**

மீனாட்சியம்மை பிள்ளைத்தமிழ் (முதல் ஐந்து பருவங்கள்)

அலகு - 4 சிற்றிலக்கிய வகைகள் **13 மணி நேரம்**

அபிராமி அந்தாதி – முதல் 20 பாடல்கள், தஸ்தகீர் சதகம் (முதல் 20 பாடல்கள்)

அலகு - 5 புதுவகை சிற்றிலக்கியங்கள் அறிமுகம் (கிருத்துவம், இசுலாமியம்) **12 மணி நேரம்**

கலம்பகம், மாலை- அந்தாதி - அம்மானை - கோவை – கிஸ்ஸா – மஸ்அலா – முனாஜத்து – நாமா.

பாட நூல்கள்

- சண்முகம் பிள்ளை, மு. (2005). *சிற்றிலக்கிய வளர்ச்சி*. மணிவாசகர் பதிப்பகம். சிதம்பரம்.
- *முக்கூடற்பள்ளு*. (2007). வானதி பதிப்பகம. பாரி நிலையம். சென்னை.
- *அபிராமி அந்தாதி*. (2011). கண்ணதாசன் பதிப்பகம். சென்னை.
- ஊலகநாதன், செ. (2004). மீனாட்சியம்மை பிள்ளைத்தமிழ். பாரி நிலையம். சென்னை.

- ஜமாலுதீன். ஏஸ். சேகு. (2018). *இலக்கியம் வளர்த்த இஸ்லாமிய தமிழ்ச்சான்றோர்.* வானதி பதிப்பகம். சென்னை.

பார்வை நூல்கள்

- செயராமன், ந.வீ. (2007). *சிற்றிலக்கியச் செல்வம்.* மணிவாசகர் பதிப்பகம்.சிதம்பரம்.
- முத்துராசன், கு. (2002). *சிற்றிலக்கியச் சிந்தனைகள்.* தேன் தமிழ் பதிப்பகம். சேலம்.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள்-1	சிற்றிலக்கிய தோற்றத்திற்கும் சமூக மாற்றத்திற்குமான தொடர்பை விமர்சன அடிப்படையில் அறிந்து கொள்வர்	K1
கற்றலின் பயன்கள்-2	உழவர், குறவர் போன்ற அடித்தள மக்களுக்கிடையே நிலவிய சமூக ஊடாட்டத்தினை சிற்றிலக்கியங்கள் பதிவு செய்துள்ள முறையை புரிந்து கொள்வர்	K2
கற்றலின் பயன்கள்-3	பள்ளு, குறவஞ்சி போன்ற இலக்கியங்களில் சித்திரிக்கப்பட்டுள்ள இயற்கைச் சூழல் சார்ந்த நிலவியலை இக்காலச் சூழலுக்குப் பொருத்திப்பார்க்கும் திறன் பெறுவர்	K2,K3
கற்றலின் பயன்கள்-4	உலா, பிள்ளைத்தமிழ், கலம்பகம், குறவஞ்சி போன்ற சிற்றிலக்கியங்களில் வெளிப்படும் பெண் சார்ந்த புனைவுகளை பகுத்தாரயும் திறம் பெறுவர்.	K1, K4
கற்றலின் பயன்கள்-5	நவீன காலத்திற்கும் கருத்தியலுக்கும் ஏற்றார் போல புது சிற்றிலக்கிய வகைகளையும் சிற்றிலக்கியங்களையும் படைக்கும் திறன் பெறுவர்.	K2, K5

மொழிபெயர்ப்பியல்
PTAI301

பருவம் : மூன்றாம் பருவம் **தரம் : 04**
பிரிவு : பல்துறை சார்புப் பாடம் -I **மணிநேரம்/வாரம் : 05**
வகுப்பு : பிறத்துறை மாணவியர்கள் **மொத்த மணிநேரம் : 65**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம்-1	உலக தழுவிய நிலையில் மொழிபெயர்ப்பின் வரலாற்றினை அறிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம்-2	வேற்றுமைகள் கடந்த நற்குடிமக்களை உள்ளடக்கிய சமுதாயத்தை உருவாக்குவதில் மொழிபெயர்ப்பின் பங்களிப்பைப் புரிந்து கொள்ளச் செய்தல்.
கற்றலின் நோக்கம்-3	புதிய சிந்தனைகள் சமூகக் கருத்துப் பரிமாற்றதிற்குள் இடம்பெறும் முறைமையினை மொழிபெயர்ப்பின் பின்புலத்தில் மதிப்பிடச் செய்தல்
கற்றலின் நோக்கம்-4	மொழிபெயர்ப்பை அறம் சார்ந்து நிலையில் பகுத்தாராயச் செய்தல்
கற்றலின் நோக்கம்-5	புத்துலக மாற்றத்திற்கு ஏற்ப புதிய அறிவு சார் நூல்களை மொழிபெயர்யர்க்கும் திறனை பெறச்செய்தல்.

அலகு -1 மொழியின் பயன்பாடு **13 மணி நேரம்**

மொழிபெயர்ப்பின் இன்றியமையாமை - மொழியின் பயன்பாடு - மொழிபெயர்ப்பு - மொழிபெயர்ப்பின் நோக்கம். (ஆகிய பகுதிகள் மட்டும்)

அலகு -2 மொழிபெயர்ப்பு வகைகள் **13 மணி நேரம்**

மொழி பெயர்ப்பும் மொழிபெயர்ப்பாளரும் - மொழிபெயர்ப்பு விளக்கம் - மொழிபெயர்ப்பின் இயல்புகள் - மொழி மரபு - மொழிபெயர்க்கும் முறை - மூலச் சொல்லும் மொழிபெயர்ப்புச் சொல்லும் - அகராதி அறிவு மொழிபெயர்ப்பாளர் - மொழிபெயர்ப்பாளருக்கான அடிப்படைத் தகுதிகள் - உரிமைகள் - மொழிபெயர்ப்பாளர் வகைப்பாடுகள். (ஆகிய பகுதிகள் மட்டும்).

அலகு -3 மொழிபெயர்ப்பு உத்திமுறைகள் **14 மணி நேரம்**

மொழிபெயர்ப்பு முறைகளும் உத்திகளும் - மொழிபெயர்ப்பில் உள்ள பிரிவுகள் - கவிதை மொழி பெயர்ப்பு - கவிதை மொழிபெயர்ப்பும் உரைநடை மொழிபெயர்ப்பும் - சொல்லாக்கம் - துறைச் சொல்லாக்க சிறப்புப்பெயர்கள் - இலக்கிய மொழிபெயர்ப்பின் இடர்பாடுகள் - இலக்கிய இயல்பு - மரபுச் சிக்கல். (ஆகிய பகுதிகள் மட்டும்)

அலகு -4 பயிற்சி அளித்தல் (ஆங்கிலத்தில் மொழிபெயர்த்தல்) **13 மணி நேரம்**

இலக்கியப் பொன்மொழிகள் - கலைச் சொல்லாக்கம் - மரபுத்தொடர்கள் - பழமொழிகள் - விடுகதைகள் - வழக்குச் சொற்கள் - விளம்பரம்.

அலகு -5 பயிற்சி அளித்தல் (ஆங்கிலத்தில் மொழிபெயர்த்தல்) **12 மணி நேரம்**

கட்டுரை மொழிபெயர்ப்பு - கவிதை மொழிபெயர்ப்பு - சிறுகதை மொழிபெயர்ப்பு.

பாட நூல்கள்

- வளர்மதி,மு. (2011). *மொழிபெயர்ப்புக்கலை.* திருமகள் நிலையம். சென்னை.
- இராதாகிருஷ்ணன். (2010). *மொழிபெயர்ப்புக்கலை.* தஞ்சாவூர் பல்கலைக்கழகம்.

பார்வை நூல்கள்

- ஈஸ்வரன், ச. (2010).*மொழிபெயர்ப்பியல்.* பாவை பப்ளிகேஷன்ஸ் சென்னை.
- முருகேசன், ந. (2012). *மொழிபெயர்ப்புக் கலை.* நியு செஞ்சுரி புக் ஹவுஸ். சென்னை.
- சண்முகவேலாயுதம். (2010). *மொழிபெயர்ப்பியல்.* உலகத்தமிழ் ஆராய்ச்சி நிறுவனம்.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	**Bloom's Level**
கற்றலின் பயன்கள்-1	உலக தழுவிய நிலையில் மொழிபெயர்ப்பின் வரலாற்றினை அறிந்து கொள்வர்	K1
கற்றலின் பயன்கள்-2	வேற்றுமைகள் கடந்த நற்குடிமக்களை உள்ளடக்கிய சமுதாயத்தை உருவாக்குவதில் மொழிபெயர்ப்பின் பங்களிப்பைப் புரிந்து கொள்வர்	K2
கற்றலின் பயன்கள்-3	புதிய சிந்தனைகள் சமூகக் கருத்துப் பரிமாற்றதிற்குள் இடம்பெறும் முறைமையினை மொழிபெயர்ப்பின் பின்புலத்தில் மதிப்பிடும் திறம் பெறுவர்	K2,K3
கற்றலின் பயன்கள்-4	மொழிபெயர்ப்புச் செயல்பாட்டில் அறம் சார்ந்து நிலையில் பகுத்தாராயும் திறம் பெறுவர்	K1, K4
கற்றலின் பயன்கள்-5	புத்துலக மாற்றத்திற்கு ஏற்ப புதிய அறிவு சார் நூல்களை மொழிபெயர்க்கும் திறனைப் பெறுவர்	K2, K5

ஆய்வுத் திட்டக்கட்டுரை
PTAP401

தரம் : 04

பருவம் : மூன்று மற்றும் நான்காம் பருவம் **மணி நேரம் வாரம் : 02+04**

பிரிவு : திறன் சார் திட்டக்கட்டுரை **மொத்த மணிநேரங்கள் : 26**

நோக்கம்

- மாணவிகளிடம் ஆய்வு பார்வையை அறிமுகப்படுத்துதல்.

ஒரு குறிப்பிட்ட பொருண்மையைத் தெரிவு செய்து அது தொடர்பாக ஆசிரியர்களின் நெறிபடுத்துதல் துணையோடு சுமார் 50 பக்க அளவில் திட்டக்கட்டுரையைச் சமர்ப்பிப்பர்.

தொல்காப்பியம்-பொருளதிகாரம் - II
PTAM401

பருவம் : நான்காம் பருவம் **தரம் : 05**

பிரிவு : முதன்மைப்பாடம் - XVI **மணி நேரம்/வாரம் : 06**

வகுப்பு : II M.A தமிழ் **மொத்த மணிநேரங்கள் : 78**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம்-1	தொல்தமிழரின் மெய்ப்பாட்டுக் கோட்பாட்டை உலகு தழுவிய மெய்ப்பாட்டு சிந்தனை தளத்தில் புரிந்துகொள்ளச் செய்தல்
கற்றலின் நோக்கம்-2	தொல்காப்பியரின் உவமை கருத்தாக்கம் செயலாக்கமுள்ள கருத்துத் தொடர்பாடலில் பயன்படும் முறையை ஒப்பிட்டுப் பார்க்கச்செய்தல்
கற்றலின் நோக்கம்-3	தொல்காப்பியரின் மரபியல் பின்புலத்தில் தமிழரின் சூழலியல் சிந்தனையை மதிப்பிடச் செய்தல்
கற்றலின் நோக்கம்-4	தொல் தமிழரின் நூல் குறித்த சிந்தனைகளை விமர்சனத்துடன் பகுத்தாரயச் செய்தல்
கற்றலின் நோக்கம்-5	செய்யுளியல் அறிவுடன் புதிய இலக்கியப் படைப்புகளை உருவாக்கச் செய்தல்

அலகு-1 **12 மணி நேரம்**

மெய்ப்பாட்டியல்

அலகு-2 **13 மணி நேரம்**

உவமவியல்

அலகு-3 **20 மணி நேரம்**

செய்யுளியல் (நூற்பா 1-73)(அசை, சீர், அடி)

அலகு-4 **20 மணி நேரம்**

செய்யுளியல் (நூற்பா 74 -147)(தொடை, வெண்பா முதல் கலிப்பா வரை)

அலகு-5 **13 மணி நேரம்**

மரபியல்

பாடநூல்

- தொல்காப்பியம். பொருளதிகாரம் இளம்பூரணர் உரை.

பார்வை நூல்கள்

- சண்முகம் பிள்ளை.மு. (2006). *தொல்காப்பியம் பொருளதிகாரம்.* சென்னை.
- சிவலிங்கனார்.ஆ. *தொல்காப்பியர் உரை வளம்.* உலகத் தமிழ் ஆராய்ச்சி நிறுவனம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	Bloom's Level
கற்றலின் பயன்கள்-1	தொல்தமிழரின் மெய்ப்பாட்டுக் கோட்பாட்டை உலகு தழுவிய மெய்ப்பாட்டு சிந்தனை தளத்தில் புரிந்துகொள்வர்.	K1
கற்றலின் பயன்கள்-2	தொல்காப்பியரின் உவமை கருத்தாக்கம் செயலூக்கமுள்ள கருத்துத் தொடர்பாடலில் பயன்படும் முறையை ஒப்பிட்டுப்பார்க்கும் திறன் பெறுவர்.	K2
கற்றலின் பயன்கள்-3	தொல்காப்பியரின் மரபியல் பின்புலத்தில் தமிழரின் சூழலியல் சிந்தனையை மதிப்பிடுவர்.	K2,K3
கற்றலின் பயன்கள்-4	தொல் தமிழரின் நூல் குறித்த சிந்தனைகளை விமர்சனத்துடன் பகுத்தாரயும் திறன் பெறுவர்.	K1, K4
கற்றலின் பயன்கள்-5	செய்யுளியல் அறிவுடன் புதிய இலக்கியப் படைப்புகளை உருவாக்கும் திறன் பெறுவர்.	K2, K5

ஊடகவியல்
PTAM410

பருவம் : நான்காம் பருவம் **தரம் : 04**
பிரிவு : முதன்மைப்பாடம் -XVII **மணிநேரம்/ வாரம் : 06**
வகுப்பு : II M.A தமிழ் **மொத்த மணி நேரம் : 78**

கற்றலின் நோக்கம் வரிசை எண்	**கற்றலின் நோக்கம்**
கற்றலின் நோக்கம்-1	ஊடகங்கள் திறன்மிக்க கருத்துப்பரிமாற்றத்தில் செயல்படும் முறையை அறிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம்-2	சமூக ஊடாட்டத்தின் வாயிலாக பண்பாட்டைக் கட்டமைப்பதில் ஊடகங்களின் செயல்பாட்டைப் புரிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம்-3	ஊடகங்களில் வெளிவரும் செய்திகளின் மெய்மைத் தன்மையை விமர்சன ரீதியில் மதிப்பிடச் செய்தல்
கற்றலின் நோக்கம்-4	ஊடகங்களின் செயல்பாட்டு முறையை அற உணர்வோடு மதிப்பிடச் செய்தல்.
கற்றலின் நோக்கம்-5	நவீன தகவல் தொழில்நுட்ப ஊடகங்களில் செயல்முறை அறிவோடு ஊடகவியலாளராக பணி வாய்ப்புப் பெறச் செய்தல்

அலகு – 1 ஊடகம் - அறிமுகம் **16 மணி நேரம்**

ஊடகம் விளக்கம் - தகவல் தொடர்பு – அடிப்படைகள் - விளைவுகள் - பணிகள் - தடைகள் - தகவல் ஏற்போரின் தகுதிகள் - தகவல் தொடர்பு கோட்பாடுகள்.

அலகு – 2 செய்தித்தாள் **16 மணி நேரம்**

செய்தி இலக்கணம் - செய்தி எழுதும் முறை – செய்தி நிறுவனங்கள் - செய்தித்தாள் வரலாறு -இதழியல் சட்டங்கள் - செய்தித்தாள் தொடங்குவதற்கான வழிமுறைகள் - இதழ் நிர்வாக அமைப்பு – செய்திகளைச் செப்பனிடுதல் நுட்பங்கள்- செய்தியின் கட்டமைப்பு – பக்க வடிவமைப்பு- அச்சுப்படி திருத்துதல்

அலகு – 3 வானொலி **15 மணி நேரம்**

வானொலியின் வரலாறு – வானொலி நிகழ்ச்சி – செய்தி ஒலிபரப்பு – கிராம ஒலிபரப்பு – நாடகங்கள் - உரைக்கோவை – நகர்வலம் - நேர்காணல் - கலந்துரையாடல் - பிறநாட்டு தமிழ் ஒலிபரப்புகள் - வானொலியும் தன்னாட்சியும் - அரசு, தனியார் வானொலி சேவை ஒப்பீடு, இணைய வானொலி.

அலகு – 4 தொலைக்காட்சி **15 மணி நேரம்**

தொலைக்காட்சி வரலாறு – பல்வேறு நிகழ்ச்சிகள் - தயாரிப்பு முறை – நேரடி ஒளிபரப்பு – தொலைக்காட்சியும் பிற தகவலியல் சாதனங்களும் - தகவல் ஒளிப்படங்கள் - அரசு, தனியார் ஒளிபரப்பு ஒப்பீடு – தொலைக்காட்சியால் ஏற்படும் மன உணர்வுகள்.

அலகு – 5 திரைப்படங்கள் **16 மணி நேரம்**

திரைப்படம் தோற்றம் - வளர்ச்சி - இந்தியாவில் திரைப்பட வளர்ச்சி – தமிழில் படத் தயாரிப்புகள் - தணிக்கைகள் - தேசியப் படச்சுருள் - திரைப்பட விழாக்கள் - ஊடகங்களில் இணையம், மின்னஞ்சல், வரைகலை, (கிராபிக்ஸ்), அசைவுபடம் (அனிமேஷன்) தொழில்நுட்பங்கள் - பல்லூடகம், மின்னிதழ், வலைப்பூ.

பாடநூல்கள்:

- இராசா,கி.(2003). *மக்கள் தகவல் தொடர்பியல்.* பாவை பப்ளிகேஷன்ஸ். சென்னை.
- மா.பா.குருசாமி. (1988).“*இதழியல் கலை*”. தாயன்பகம் பதிப்பகம். திண்டுக்கல். பதிப்பு.

பார்வை நூல்கள்

- துரையரசன், க. (2009). *இணையமும் இனிய தமிழும்.* இசைப்பதிப்பம். கும்பகோணம்.
- சாந்தா, அ. மோகன்.வீ. (பதி.ஆ).(2007). *மக்கள் ஊடகத் தொடர்பியல் அடிப்படைகள்.* மீடியா பப்ளிகேஷன்ஸ். மதுரை.
- சுரேஷ் பால், (1999). *மீடியா உலகம்.* தீபிகா. சென்னை.
- செல்வம், கோ. (1992). *உங்கள் வானொலி.* புவனம் பதிப்பகம். சென்னை.
- சமத்துவன், பவா. (2007). *தொலைக்காட்சி உலகம்.* புதுயுகம் செய்முறை செம்மையாக்கம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	கற்றலின் பயன்கள்	Bloom's Level
கற்றலின் பயன்கள்-1	ஊடகங்கள் திறன்மிக்க கருத்துப்பரிமாற்றத்தில் செயல்படும் முறையை அறிந்து கொள்ளச் செய்தல்	K1
கற்றலின் பயன்கள்-2	சமூக ஊடாட்டத்தின் வாயிலாக பண்பாட்டைக் கட்டமைப்பதில் ஊடகங்களின் செயல்பாட்டைப் புரிந்து கொள்ளச் செய்தல்	K2
கற்றலின் பயன்கள்-3	ஊடகங்களில் வெளிவரும் செய்திகளின் மெய்மைத் தன்மையை மதிப்பிடச் செய்தல்	K2,K3
கற்றலின் பயன்கள்-4	ஊடகங்களின் செயல்பாட்டு முறையை அற உணர்வோடு மதிப்பிடச் செய்தல்	K1, K4
கற்றலின் பயன்கள்-5	நவீன தகவல் தொழில்நுட்ப ஊடகங்களில் சுய கற்றலும் படைப்புத்திறனும் கொண்ட ஊடகவியலாளராக பரிணமித்தல்	K2, K5

சங்க இலக்கியம்
PTAM411

பருவம் : நான்காம் பருவம், **தரம் : 04**
பிரிவு : முதன்மைப்பாடம் - XVIII **மணி நேரம் / வாரம் : 06**
வகுப்பு : II M.A. தமிழ் **மொத்த நேரங்கள : 78**

கற்றலின் நோக்கம் வரிசை எண்	கற்றலின் நோக்கம்
கற்றலின் நோக்கம்-1	சங்க இலக்கியப் பாடல்களை விமர்சன சிந்தனையுடன் அறிந்து கொள்ள செய்தல்
கற்றலின் நோக்கம்-2	சங்க இலக்கியங்களில் வெளிப்படும் இயற்கை சூழல் சார்ந்த நிலவியலையும் வாழ்வியலையும் புரிந்து கொள்ளச் செய்தல்
கற்றலின் நோக்கம்-3	சங்க காலம் முதல் இக்காலம் வரை தொடரும் ஏறு தழுவுதல், பாவை நோன்பு போன்ற பண்பாடுகளின் சமூக ஊடாட்டத்தினைப் பகுத்தாரயச் செய்தல்
கற்றலின் நோக்கம்-4	திணை இலக்கியங்கள் திணைக் கோட்பாடு என்கிற கருத்தாக்கத்தை உலகு தழுவிய நிலையில் மதிப்பிடச் செய்தல்
கற்றலின் நோக்கம்-5	சங்க கால திணை சமூகத்தின் நீட்சியாக புத்திணை சமுதாயத்தையும் புத்திணை இலக்கியங்களையும் படைக்கச் செய்தல்

அலகு - 1 **16 மணி நேரம்**

குறுந்தொகை - 10 பாடல்கள் (221 - 230 பாடல்கள்) - நற்றிணை - 10 பாடல்கள் (31 – 40 பாடல்கள்) - அகநானூறு - 5 பாடல்கள் - (241 – 245 பாடல்கள்)– புறநானூறு – 10 பாடல்கள் - ஐங்குநுறூறு 10 பாடல்கள்.

அலகு - 2 **16 மணி நேரம்**

கலித்தொகை – 20 பாடல்கள் (குறிஞ்சிக்கலி – 10 பாடல்கள், மருதக்கலி - 10 பாடல்கள்)

அலகு - 3 **15 மணி நேரம்**

பரிபாடல் - செவ்வேள் (முதல் 3 பாடல்கள்)– வையை (முதல் 3 பாடல்கள்) – திருமால் (முதல் 3 பாடல்கள்)

அலகு - 4 **15 மணி நேரம்**

திருமுருகாற்றுப்படை (முழுவதும்)

அலகு - 5 **16 மணி நேரம்**

முல்லைப்பாட்டு (முழுவதும்)

பாடநூல்கள்

- வையாபுரிப்பிள்ளை, எஸ். (1967). சங்க இலக்கியம். பாரி நிலையம். சென்னை.
- பாலசுப்ரமணியன், கு.வே. (ப.ஆ) (2012). சங்க இலக்கியம் (14 தொகுதிகள்). நியூ செஞ்சுரி புக்ஹவுஸ். சென்னை.

பார்வை நூல்கள்

- மாதையன், பெ. (2008). அகத்திணைக் கோட்பாடுகள். நியூ செஞ்சுரி புக் ஹவுஸ். சென்னை.
- அம்மன்கிளி முருகதாஸ். (2008). சங்க அகத்திணை மரபும் மாற்றமும். குமரன் புத்தக நிலையம். சென்னை.
- சிவத்தம்பி, கா. (2000). பண்டைத் தமிழ்ச் சமூகம் - வரலாற்றுப் புரிதலை நோக்கி. மக்கள் வெளியீடு. சென்னை.
- கைலாசபதி, க. (2012). தமிழ் வீரநிலைக் கவிதை. குமரன் புத்தக நிலையம். சென்னை.
- மாணிக்கனார், வ.சுப. (1980). தமிழ் காதல். பாரி நிலையம். சென்னை.

கற்றலின் பயன்கள் வரிசை எண்	**கற்றலின் பயன்கள்**	Bloom's Level
கற்றலின் பயன்கள்-1	சங்க இலக்கியப் பாடல்களை விமர்சன சிந்தனையுடன் அறிந்து கொள்வர்	K1
கற்றலின் பயன்கள்-2	சங்க இலக்கியங்களில் வெளிப்படும் இயற்கை சூழல் சார்ந்த நிலவியலையும் வாழ்வியலையும் புரிந்து கொள்வர்	K2
கற்றலின் பயன்கள்-3	சங்க காலம் முதல் இக்காலம் வரை தொடரும் ஏறு தழுவுதல், பாவை நோன்பு போன்ற பண்பாடுகளின் சமூக ஊடாட்டத்தினைப் பகுத்தாராயும் திறம் பெறுவர்	K2,K3
கற்றலின் பயன்கள்-4	திணை இலக்கியங்கள் திணைக் கோட்பாடு என்கிற கருத்தாக்கத்தை உலகு தழுவிய நிலையில் மதிப்பிடும் திறம் பெறுவர்	K1, K4
கற்றலின் பயன்கள்-5	சங்க கால திணை சமூகத்தின் நீட்சியாக புத்திணை சமுதாயத்தையும் புத்திணை இலக்கியங்களையும் படைக்கும் திறம் பெறுவர்.	K2, K5

அகமதிப்பீட்டிற்கான உட்கூறுகள்
முதுகலைத்தமிழ்

பருவம்	வகை	பாடக் குறியீடு	பாடத்தலைப்பு	III உட்கூறுகள்	IV உட்கூறுகள்
III	முதன்மைப்பாடம்-XI	PTAM301	தொல்காப்பியம்-பொருளதிகாரம்-I	கருத்தரங்கம்	இலக்கண ஒப்பீடு
	முதன்மைப்பாடம்-XII	PTAM305	ஆராய்ச்சி நெறிமுறைகள்	நூல் மதிப்பீடு	களஆய்வு
	முதன்மைப்பாடம்-XIII	PTAM306	உரையாசிரியர்கள்	கருத்தரங்கம்	நூல் மதிப்பீடு
	முதன்மைப்பாடம்-XIV	PTAM310	சிற்றிலக்கியங்கள்	தகவல் அட்டவணை	தல வரலாறு
	முதன்மைப்பாடம்-XV	PTAI301	மொழிபெயர்ப்பியல்	கவிதை மொழிபெயர்ப்பு	சிறுகதை மொழி பெயர்ப்பு
IV	முதன்மைப்பாடம்-XV	PTAM401	தொல்காப்பியம்-பொருளதிகாரம்-II	கருத்தரங்கம்	இலக்கணக் குறிப்பினைக் கண்டறிதல்
	முதன்மைப்பாடம்-XVI	PTAM410	ஊடகவியல்	கருத்தரங்கம்	தலையங்கம் எழுதுதல் திரைப்பட விமர்சனம் எழுதுதல்
	முதன்மைப்பாடம்-XVII	PTAM406	தமிழ்க்கணினி பயன்பாட்டியல்	கருத்தரங்கம்	கலைச்சொல்லாக்கம்
	முதன்மைப்பாடம்-XVIII	PTAM411	சங்க இலக்கியம்	கருத்தரங்கம்	இலக்கிய ஒப்பீடு

DEPARTMENT OF ENGLISH

PREAMBLE

UG: Programme Profile and the Syllabi of courses offered in the III and IV Semesters along with evaluation components III & IV (with effect from 2021-2024 batch onwards)

PG: Programme Profile and the Syllabi of courses offered in the III and IV Semesters along with evaluation components III & IV (with effect from 2021-2023 batch onwards)

PROGRAMME PROFILE B.A. ENGLISH

Programme Specific Outcomes (PSO)

Upon Completion of the Programme, the students will be able to

PSO 1 - Apply the critical pondering in different forms of literature.

PSO 2 -Analyze the socio-political aspects in literary texts.

PSO 3 - Compare the cultural context in different literature in analyzing the Literary text.

PSO 4- Pronounce and transcribe the sounds of English language and to make perfect stress and intonation.

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/Week	Credit
							Min/Max
I	I	Language/AECC-II	UTAL107/ UTAL108/ UHIL 101/ UFRL 101	Basic Tamil I Advanced Tamil I Hindi I/ French I	UTAL103/ UTAL104	5	3/4
	II	English/AECC-I	UENL109/ UENL 110	English for Communication (Stream – I) English for Communication (Stream – II)	-	5	3/4
	III	Major Core I/ DSC	UENM110	Indian Writing in English	-	6	5
	III	Major Core II/ DSC	UENM111	British Literature- I	-	6	5
	III	Allied(GE)/	UENA104	Literary Forms	-	6	4
	III	PE	UPEM101	Professional English -1	-	6	4
	IV	VE(SEC)		Family Life Education		2	2
TOTAL						**36**	**26/28**
II	I	Language/AECC-II	UTAL205/ UTAL206/ UHIL 201/ UFRL201	Basic Tamil II Advanced Tamil II Hindi II/ French II	UTAL203/ UTAL204	5	3/4
	II	English/AECC-I	UENL209/ UENL 210	English for Communication (Stream – I) English for Communication (Stream – II)	-	5	3/4

	III	Major Core I/ DSC	UENM209	British Literature- II	-	6	4
	III	Major Core II/ DSC	UENM210	American Literature	UENM502, UENM506, UENM306	5	4
	III	Allied (GE)	UENA204	Women In Literature	-	6	4
	III	PE	UPEM201	Professional English –II	-	6	4
	IV	SEC/NME	UENE203/204	Film Studies/Public speaking		3	2
		Extension Activity/ Physical Education				-	1/2
	III	INTERNSHIP	UENI201	Internship/Field work /Field project	-	30(Hour)	-/1
				TOTAL		**36**	**25/29**
III	I	Language/AECC-II	UTAL307/ UTAL308/ UHIL 301/ UFRL 101	Basic Tamil I Advanced Tamil I Hindi I/ French I	UTAL103/ UTAL104	5	3/4
	II	English/AECC-I	UENL309/310	General English I / Advanced English I	-	5	3/4
	III	Major Core I/ DSC	UENM307	Language and Linguistics	-	4	4
	III	Major Core II/ DSC	UENM308	Introduction to Comparative Literature	-	5	5
	III	Allied(GE)/	UENA304	Introduction to English Language Teaching	-	6	4
	IV	SEC		Environmental Studies	-	2	1
		Online course		Online course		3	1/2
				TOTAL		**30**	**21/24**
IV	I	Language/AECC-II	UTAL407/ UTAL408/ UHIL 401/ UFRL 401	Basic Tamil II Advanced Tamil II Hindi II/ French II	UTAL203/ UTAL204	5	3/4
	II	English/AECC-I	UENL409/410	General English II/ Advanced English-II	-	5	3/4
	III	Major Core I/ DSC	UENM408	Shakespeare	UENM508, UENM612	5	5
	III	Major Core II/ DSC	UENM409	Cinema and Literature	-	5	5
	III	Allied(GE)/	UENA404	Phonetics and Spoken English	-	5	5
	IV	SEC/Non major Elective	UENE401/402	One act play/ Media writing	-	3	2
	IV	SEC/Soft skill		Personality Development	-	2	1
	III	INTERNSHIP	UENI201	Internship/Field work /Field project	-	30(Hour)	-/1
	V	Extension Activity/ Physical Education				-	-/2
				TOTAL		**30**	**24/29**

	III	MAJORE CORE/ DSC	UENM516	Popular Literature	-	6	5
	III	MAJORE CORE/ DSC	UENM517	Australian and Canadian Literature	-	6	5
	III	Core MAJORE CORE/ DSC I	UENM518	Literary Criticism	UENM503, UENM507, UENM512	6	6
	III	Major Elective/DSE	UENO501/502	Detective Fiction/ World Classics in Translation	-	5	4
	III		UENP501	Project	-	5	5
	IV	VE/SEC		Cyber Security/ Health Issues	-	2	1
TOTAL						**30**	**26**
V I	III	MAJOR CORE/ DSC	UENM614	Introduction to Feminism	-	6	5
	III	MAJOR CORE/ DSC	UENM615	Asian Literature in English	-	6	5
	III	MAJOR CORE/ DSC	UENM616	Diasporic Literature	UENM504, UENM405	6	5
	III	MAJOR CORE/ DSC I	UENM618	Women's Life Writing	-	5	5
	III	MAJOR CORE	UENO602	Comprehensive Viva Voce	UENC601	-	1
	III	Major Elective/DSE	UENO605/606	Creative Writing/ English for Competitive Exams	-	5	4
	III	INTERNSHIP	UENI201	Internship/Field work /Field project	-	30(Hour)	-/1
	IV	Soft Skill/SEC		Career skill/ Foundation course Entrepreneurship and Innovatio		2	1
	V	Extension Activity/ Physical Education				-	-/2
	V	Extension Activity		Rural Outreach Programme		-	-/1
TOTAL						**30**	**26/30**
GRAND TOTAL						**192**	**148/166**

NON MAJOR ELECTIVES

Semester	Part	Category	Course Code	Course Title	Contact/Week	Credit
II	IV	NON MAJOR ELECTIVES	UENE203/ 204	Film studies/Public speaking	3	2
IV	IV	NON MAJOR ELECTIVES	UENE401/402	Once Act play/ Media writing	3	2

MAJOR ELECTIVES

Semester	Part	Category	Course Code	Course Title	Contact/Week	Credit
V	III	MAJOR ELECTIVES	UENO501/502	Science and Detective Fiction/ Folk Literature	5	4
VI	III	MAJOR ELECTIVES	UENO605/606	Once Act Play/ Media writing	5	4

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Course Code	Course Title	Contact Hour/week	Credit
II	III	Core	UENI201	Summer Internship	-	1
IV	III	Core	UENI401	Summer Internship	-	1
V	III	Core	UENS501	Practice of Translation (Self – Study)	26	1
VI	III	Core	UENP601	Mini-Project	26	1

LANGUAGE AND LINGUISTICS
UENM307

Semester: III **Credits: 4**
Category: Major Core /DSC **Hours/Week: 4**
Class& Major: II BA English **Total Hours: 52**

CO No.	Course Objectives To enable the students
CO-1	Recognize the need for learning correct (RP) pronunciation.
CO-2	Examine different stages of speech production.
CO-3	Organize the criteria for the description of English vowels and consonants
CO-4	Defend with the use supra-segmental features.
CO-5	Develop the structural, grammatical and functional aspects in language.

UNIT-I THE HISTORY OF ENGLISH LANGUAGE 11 Hour

The descent of English language; Old English Period; Middle English; Renaissance & After; Growth of Vocabulary; Change of Meaning; Evolution of Standard English.

UNIT- II PHONOLOGY 11 Hour

Air stream mechanisms - The organs of speech – Classification and description of sounds, Cardinal Vowels, English Vowels, Diphthongs and Consonants, Transcription, Syllable

UNIT –III PHONOLOGY 10 Hour

Accent, Rhythm and Intonation, Assimilation, Elision, Liaison and Juncture, Phonetic transcription of dialogues

UNIT -IV LEVELS OF LINGUISTIC ANALYSIS 10 Hour

Morphology, Phrases Sentence, Grammar, phrases, semantics, Pragmatics, Discourse Analysis

UNIT V SEMANTICS AND SYNTAX 10 Hour

Semantics - Properties of Meaning- Syntax

Text Book:

- Yule, G. (2017). The Study of Language (7th edition). Cambridge: Cambridge University Press. Oxford University Press, Oxford.
- Balasubramanian .(1993) A Textbook of English Phonetics for Indian Students. Madras Macmillan.
- Wood F.T.(, 2001) An Outline History of the English Language. Madras.Macmillan.

- Hall, Christopher, J. (2008). Introduction to Language & Linguistics. Delhi: Vivabooks.

Reference Books:

- Akmajian, A; Demers, R.A.; Farmer, A.K. and Harnish, R.M.(2001). Linguistics: An Introduction to Language and Communication. MIT, Cambridge, USA.
- Fasold, R. & J. Connor-Linton. (2006). An introduction to language and linguistics. Cambridge: Cambridge University Press,
- Fromkin, V., and R. Rodman and Nina Hyams. (2013). An Introduction to Lan-guage. New York: Cengage Learning. (10thEdition).
- Majumdar, A. (2014). Bhasha-Prasanga O dhvanivijnan, Kolkata, Deys Publishers.

E –Resources

- https://linguistics.ucla.edu/people/stabler/20-14.pdf
- https://linguistics.ucla.edu/people/Kracht/courses/ling20-fall07/ling-intro.pdf

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the concepts of linguistics	K1
CO-2	Discuss the basic symbols of the International Phonetic Alphabet.	K2
CO-3	Demonstrate intrinsic values of language usage.	K3
CO-4	Argue the various aspects of articulation effects.	K5
CO-5	Design structures of modern English and to write transcription.	K6

INTRODUCTION TO COMPARATIVE LITERATURE
UENM308

Semester: III **Credits: 5**
Category: Core I **Hours/Week: 5**
Class & Major: II BA English **Total Hours: 65**

CO.NO	COURSE OBJECTIVE TO ENABLE STUDENTS
CO 1	Understand different varieties of literature.
CO 2	Describe various theories in Literary texts.
CO 3	Interpret the theoretical perspectives of literature.
CO 4	Examine the relationship between literature and other modes of cultural production, including digital and new media.
CO 5	Develop the research skills in comparative literature.

UNIT- I Introduction to Comparative Literature **13 Hour**

Definition and Scope - Theories - Motifs, myths and archetypes

UNIT- II Poetry **13 Hour**

Prelude- Wordsworth
Leaves of Grass- Whitman

UNIT-III Prose **13 Hour**

Tolkaapiyam- Tolkaapiyar
Poetics- Aristotle

UNIT-IV Drama **14 Hour**

Shakuntala- Kalidasa
Tempest-Shakespeare

UNIT-V Fiction **12 Hour**

The Untouchable- Mulk Raj Anand
Scavenger's Son- ThakazhiSivasankaran Pillai

Reference Books

- Bassnett, Susan. Comparative Literature: A Critical Introduction. Oxford UK: Blackwell Publishers, 1993.
- Bassnett, Susan and Harish Trivedi. Post-Colonial Translation: Theory and practice. London:
  Routledge, 1999.
- Bassnett-McGuire, Susan. Translation Studies, London: Methuen, 1980.
- Bassnett, S. & A. Lefevere (eds.).Translation, History, and Culture, London: Pinter Publishers, 1990.
- Bernheimer, Charles, ed. Comparative Literature in the Age of Multiculturalism. Baltimore: Johns Hopkins UP, 1995.
- George. K. M. Comparative Indian Literature. Vol I and II. Kerala SahityaAkademi, 1984.
- Weisstein, Ulrich. Comparative Literature and Literary Theory: Survey and Introduction. London: Indiana University Press, 1974.

E-Resources:

- ACLA - Journals - American Comparative Literature Association www.acla.org/journals.html
- Comparative Literature www.complit.dukejournals.org
- Project MUSE - Comparative Literature Studies www.muse.jhu.edu
- Comparative Literature Studies www.cl-studies.psu.edu
- Journals - Comparative Literature - Yale University Library www.guides.library.yale.edu
- Journal of Comparative Literature and Aesthetics www.jclaonline.org

Course outcome

CO. NO	The Students will be able to	Cognitive Level
CO 1	Understand the basic Literary Techniques.	K1
CO 2	Interpret the literary text based on critical concepts.	K3
CO 3	Analyze the text in the broader sense.	K4
CO 4	Defend the scope of comparative literature into wider perspectives.	K5
CO 5	Develop the scope for research in the context of Comparative studies	K6

INTRODUCTION TO ENGLISH LANGUAGE TEACHING

UENA304

Semester: III **Credits: 4**
Category: Allied (GE) III **Hours/ Week: 6**
Class & Major: II-B.A, English **Total Hours: 78**

CO.NO	COURSE OBJECTIVE TO ENABLE STUDENTS
CO 1	Define the basics of English Language Teaching**.**
CO 2	Describe various approaches and methods, aspects and strategies of teaching English.
CO 3	Interpret the essential components and concepts of language teaching.
CO 4	Examine the forms and content of language.
CO 5	Construct the scientific systems of the language.

UNIT-1 Introduction **16Hour**

Present position of English in India- Issues involved in English- English as Foreign Language, Second Language, and English for Specific Purposes.

UNIT- II Methods an approaches of ELT -I **16 Hour**

Methods of teaching English: Grammar Translation Method- Direct Method- Audio- Lingual Method.

Approaches of teaching English: Structural approaches – Situational approaches – Oral approaches.

UNIT-III Methods an approaches of ELT -II **16 Hour**

Total Physical Response – The Silent Way – Community Language Teaching – Suggestopedia – The Natural Approach – Content-based Instruction – Task-based, Game-based Language Teaching – Post-methods era

UNIT- IV Test **16 Hour**

Testing – types of Test, characteristics of good test, preparation of model exercises and questions

UNIT- V Usage of Audio-Visual Aids **14 Hour**

Audio Visual aids, types- advantages of audio-visual aids (Television, Language lab)

Text Books:

- Baruah . T.C (1991) *The English Teacher's Handbook*. New Delhi: Sterling Publishers.
- Krishnaswamy, N, and LalithaKrishnaswamy (2007). *Methods of Teaching English*.: Macmillan India. Delhi.

Reference Books:

- Lado, Robert. (1964)Language *Testing: The Construction and Use of Foreign Language Tests: a Teacher's Book*. McGraw-Hill. New York.
- Larsen-Freeman, Diane. (1986) *Techniques and Principles in Language Teaching .*, N.Y., USA: Oxford University Press. New York
- Varghese, Paul. (1990) *Teaching English as a Second Language,* New Delhi: Sterling Publishers.
- Jack C. Richards &Theorde S. Rodgers (1986), *Approaches and Methods in Language Teaching.* Cambridge: Cambridge University Press.

Course outcome

CO. NO	The Students will be able to	Cognitive Level
CO 1	Describe English language proficiency in the aspects of reading, writing, listening and speaking.	K1
CO 2	Recognize academic literacy required for undergraduate learning further studies and research.	K2
CO 3	Apply the requisite communicative skills and strategies to future careers.	K3
CO 4	Value varied range of vocabulary.	K5
CO 5	Develop the English Language Teaching Skills.	K6

SHAKESPEARE
UENM408

Semester : IV **Credits : 5**
Category : Major Core I/ DSC **Hours/Week: 5**
Class & Major: II UG **Total Hours: 65 Hour**

Course Objectives

CO No.	To enable the students
CO-1	Discus the style of Shakespearian works in Literature.
CO-2	Explain the aesthetics of Shakespeare
CO-3	Demonstrate the historical and present day value of Shakespeare.
CO-4	Compare Shakespeare‘s skill of characterization, plot construction, use of humor and wit.
CO-5	Construct the strengths and weaknesses of the characters in the play.

UNIT I INTRODUCTION **09 Hour**

Shakespearean Theatre and Audience, Shakespearean Women, Supernatural Elements in Shakespearean Plays, Shakespearean Soliloquies, Shakespeare as a Sonneteer and a Narrative Poet.

UNIT II SHAKESPEARIAN SONNETS **10 Hour**

Sonnet No. 18, 64, 94, 96, 114, 124, 116.

UNIT III Tragedy **12 Hour**

Detail: Hamlet

Non-Detail: Othello

UNIT IV COMEDY **17 Hour**

Detail: Twelfth Nigh

Non-Detail: A Midsummer Night’s Dream

UNIT V TRAGIC-COMEDY AND ROMANTIC COMEDY **17 Hour**

Detail: Tempest

Non-Detail: Winter’s Tale

Text Book:

- Shakespeare William (2014). *The Complete Works of William Shakespeare.* Wordsworth Edition Ltd, *UK.*

References:

- Shakespeare, William. (2010). *Sonnets.* Random House, New York.
- De Somogyi, N. (2016). *Shakespeare’s Theatre of War*. Routledge, United Kingdom.
- Brown, J. R. (2013). *New sites for Shakespeare: Theatre, the audience, and Asia*. Routledge , United Kingdom.
- Pinto, Xavier & P. S. Latika. (2020). *The Tempest* (Text with Paraphrase). Beeta Publication, New Delhi.

- Shakespeare William (2020). *Greatest Tragedies of Shakespeare*, Finger Print Publishing, New Delhi.
- Cantor, P. A. (2004). *Shakespeare: Hamlet*. Cambridge University Press, London.
- Honigmann, E. A. J. (2013). *The Texts of Othello and Shakespearean Revision*. Routledge, United Kingdom.
- Shakespeare, William. (2008). *Twelfth night*. Yale University Press, London.
- Shakespeare, William. (1898). *A New Variorum Edition of Shakespeare: The Winter's Tale* Cambridge University Press, London.

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom's Level
CO-1	Recognize the religious and philosophical insight through dramatic monologues.	K1
CO-2	Explain the writers' vision for the betterment of mankind	K2
CO-3	Examine the values and ideas propagated by the Victorian era.	K2,K4
CO-4	Critique several social problems in England.	K1,K5
CO-5	Construct human values and ethics in real life.	K4,K6

CINEMA AND LITERATURE
UENM409

Semester: IV **Credits : 5**
Category: Core III **Hours/week : 5**
Class& Major: II B.A English **Total Hours : 65**

CO No.	Course Objectives To enable the students
CO-1	Define film and its relationship to literature.
CO-2	Discuss film literacy through a working knowledge of basic film terminology and critical approaches to engage with films
CO-3	Analyse the plot structure, setting, characterization, theme, and narrative point of view
CO-4	Differentiate between films and literature through adaptations of literary texts.
CO-5	Construct the key concepts and issues that are addressed in movies and novels.

UNIT I The Language of Cinema **13Hour**

What is Cinema? Genre and Sub Genres, Avant-Grade, Documentary, Film noir
History of Cinema in India; Major landmarks in India Cinema

Unit II **13Hour**

Film Narrative: Title –Story-Plot-Script-Narration(Restricted and Omniscient)-duration-motivation- motif-parallelism- character traits- causes and effects-exposition- climax-point of view

Unit III **13Hour**

Kinds of Films: Historical, Patriotic, Documentary, Thrillers etc.

Unit-IV **13Hour**

Ang Lee's Sense and Sensibility (1995)
Rajiv Menon's Kandukondain Kandukondain (2000) (Tamil)
Steven Spielberg's War of the Worlds (2005)

UNIT-V **13 Hour**

Components of a Film Review: Plot, Genre, Role of actors, Background information, condensed synopsis, argument/analysis, evaluation, recommendation, opinion

Text Books:

- Bill Nichols. (1993)*Movies and Methods* Vol. I, Edition Seagull Books, Calcutta
- Bill Nichols. (1993) *Movies and Methods* Vol. II, Edition Seagull Books, Calcutta.

Reference Books:

- Susan Hayward, (2004), *Key Concepts in Cinema Studies*, Routledge, London.
- Louis Giannetti, (1972), *Understanding Movies*, Prentice Hall, New Jersey.
- S. Vasudevan,(2000), *Making Meaning in Indian Cinema*, OUP, New Delhi.
- Zatlin,Phyllis. (2005)*The Theatrical Translation and Film Adaptation*. A Practitioner ’s View. Multilingual Matters Ltd.Clevedon,Boston,Toronto.

E-Resources:

- http://www.india-seminar.com/2003/525/525%20madhava%20prasad.htm
- www.sensesofcinema.com / imdb.com / www.imdb.com
- www.brightlightsfilm.com
- www.academic info.net/film.html.
- www.filmsite.org
- www.cinemascope.com

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom’s Level
CO-1	Understand the elements involved in adapting texts to film.	K1
CO-2	Implement analytical skills in visual literacy and reading text.	K3
CO-3	Relate films as reflections of cultures and source texts.	K4
CO-4	Defend the processes and practice of writing for the media.	K5
CO-5	Construct the meaning of films beyond the surface level of narrative or character.	K6

PHONETICS AND SPOKEN ENGLISH
UENA404

Semester: IV **Credits: 5**
Category: Allied (GE) **Hours/Week: 5**
Class & Major: I MA English **Total Hours: 65**

CO No.	Course Objectives To enable the students
CO-1	Recognize the need for learning correct (RP) pronunciation.
CO-2	Examine different stages of speech production.
CO-3	Demonstrate the criteria for the description of English vowels and consonants.
CO-4	Argue the use supra-segmental features.
CO-5	Develop the structural, grammatical and functional aspects in language.

UNIT- I SOUND OF ENGLISH **13 Hour**
Vowels-Consonants-Speech organs-Place of articulation-Manner of articulation

UNIT -II PHONEMES **13 Hour**
International Phonetic Alphabet (IPA)-Phonetic transcription-Learning difficult words Pronunciation with the help of standard dictionaries

UNIT-III ARTICULATION EXERCISES **13 Hour**
Homophones -Foreign words in English-Reading texts (newspapers, stories, one act plays, soliloquies, jokes aloud)

UNIT-IV CONVERSATION PRACTICE SENTENCE **13 Hour**
Domestic situations. Social situations, Academic situations, Official situations – Pair and share activities, Role plays, Interviews, etc.

UNIT- V PRESENTATION SKILLS **13 Hour**
Self presentation Extempore (topic chosen, prepared well and presented without reading from paper – topics may include description of everyday objects etc.)
Impromptu (simple topics to be announced on the spot) – all the presentations would be followed by a few questions related to the topic and the presenter would answer the questions)

Text Books

- Interactive English", Bloomsbury Publishers, New Delhi 2017.
- Modern Linguistics:An introduction" – S.K.Verma, N.Krishnaswamy, Oxford University Press, New Delhi, 1994.

- Bansal, R. K., & Harrison J.B. (2006). *Spoken English*. : Orient Longman. Hyderabad.
- Balasubramanian, T. (2008). *A Textbook of English Phonetics for Indian Students*. Macmillan. Chennai.
- Hedwig, L. (1998). *Body Language: A Guide for Professionals*. Response Books. New Delhi.
- Hockett, C. (1960). *A Course in Modern Linguistics*. Macmillan. London
- Jones, D. (1992).*The Pronunciation of English*. Cambridge University Press. Cambridge.

Reference Books

- Connor, J.D. (1997). *Better English Pronunciation*. UBS. New Delhi.
- Roach, P. (1990).*English Phonetics and Phonology: A Practical Course*. Cambridge University Press. Cambridge:
- Sethi J., Sadanand. K., & Jindal, D. V. (2004). *A Practical Course in English Pronunciation*. PHI. New Delhi.
- Yule, G. (1995). *The Study of Language*. Cambridge University Press. Cambridge.
- Mandal, Steeve. (1988). *Effective Presentation Skills*. Kogan Page. India.
- Dilts, Robert Brien. (2017). *Effective Presentations Skills*. Dilts Strategy. United States.

E –Resources

- https://scholar.harvard.edu/files/adam/files/phonetics.ppt.pdf
- https://www.londonschool.com/blog/phonetic-alphabet/
- https://www.slideshare.net/MonirHossenCou/the-organs-of-speech-72150755
- https://www.ccsuniversity.ac.in/ccsu/Departmentnews/2020-05-04_83.pdf
- https://all-about-linguistics.group.shef.ac.uk/branches-of-linguistics/phonology/

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Understand the concepts of linguistics and its components	K1
CO-2	Discuss the basic symbols of the International Phonetic Alphabet.	K2
CO-3	Demonstrate intrinsic values of language usage.	K3
CO-4	Argue the various aspects of articulation effects.	K5
CO-5	Design structures of modern English and to write transcription.	K6

ONE ACT PLAY
UENM401

Semester : IV **Credits : 2**
Category : NME **Hours/Week : 3**
Class &Major : II UG **Total Hours : 39**

CO No.	Course Objectives To enable the students	Cognitive Level
CO1	Understand the salient features of one-act plays.	**K1**
CO2	Implement the unique characteristics and styles of one act play.	**K2**
CO3	Apply the various concepts and techniques in drama.	**K3**
CO4	Examine one act plays concepts and symbols.	**K4**
CO5	Create acting skills and to write one act play.	**K5 &K6**

Unit – I (British) **7 HOUR**
J. M. Synge : "Riders to the Sea"

Unit – II (Russian)
8 HOUR
Anton Chekov : "The Swan Song"

Unit– III (American) **8 HOUR**
Tennessee Williams : "Lord Byron's Love Letter"

Unit – IV (Indian) **8 HOUR**
Asif Currimbhoy : "The Refugee"

Unit – V (African) **8 HOUR**
Erisa Kironde : "The Trick"

Text Books

- Synge J. M. (1903). *Riders to the Sea*, Dublin, Print.
- Kironde Erisa. (1968). *The Trick*, Print.

Reference Books

- Elias, M., *Plays in One Act.* Chennai: Orient BlackSwan, 2013.
- Sujatha K., ed. *On the Stage: One-Act Plays*. New Delhi: Orient BlackSwan, 2011.

- Ruckenstein, Lelia and James A. O'Malley. "Irish Revival; John Millington Synge; "Everything Irish: The History, Literature, Art, Music, People and Places of Ireland, from A-Z. New York: Ballantine, 2003,

- Donnelly, James S. "Drama, Modern; Literary Renaissance (Celtic Revival);" Encyclopedia of Irish History and Culture. Vol. 2. Detroit: Gale, 2004.

E-Resources:

- http://vnsgulibrary.org.in/Free_Ebooks/0519%20Riders%20to%20the%20Sea.pdf
- http://www.loyalbooks.com/book/Swan-Song-by-Anton-Pavlovich-Chekhov
- https://www.cram.com/essay/The-Refugee-By-Asif-Cuurrimbhoy-Analysis/FJ4G6W3C5U

CO No.	Course Outcomes The student will be able to	Cognitive Level
CO1	Recall the effects of one act plays on other literature.	K1
CO2	Discuss the themes of one act plays of different cultures.	K2
CO3	Demonstrate familiarity with key elements of dramas.	K3
CO4	Relate the genre to non-dramatic forms of cultural expression such as poetry and literature.	K4
CO5	Design theatrical techniques in one act plays.	K6

MEDIA WRITING

UENM402

Semester : IV **Credits : 2**
Category : NME **Hours/Week : 3**
Class &Major : II UG **Total Hours : 34**

CO No.	Course Outcomes The student will be able to	Cognitive Level
CO1	Understand the fundamentals of media writing.	K1
CO2	Develop exceptional textual, visual, and verbal communication skills	K2
CO3	Communicate to diverse audiences in a variety of contexts and genres.	K3
CO4	Analyze and learn communication technologies	K4
CO5	Write the content to the social media.	K6

Unit – I Understanding Writing Process **6 Hour**

Writing Process: Brainstorming for Ideas, Idea Organization and Audience Analysis -Writing Mechanism: Opening, Developing and Winding up the Argument/ Narrative -Editing, redrafting and Formatting -Abstract, Essay and Column Writing

Unit – II Introduction to Media Writing **7 Hour**

Fundamentals of Media Writing: Descriptive, Narrative, Objective and Reflective -Media Writing: Grammar and Vocabulary-Writing for News and Non-news Mediums for Print media- Writing for News and Non-news Mediums for Electronic media-The Art of Interviewing-Editorial Writing

Unit– III New Media and Journalism **7 Hour**

Concept and definition of online journalism - Features of online journalism - Types of online journalism A. News websites B. Blogs: Creation and writing C. Citizen Journalism -Social Media: Facebook, Twitter, Instagram, LinkedIn etc

Unit – IV Writing for Web **7 Hour**

Writing news stories, features and articles for Web. 2. Interview and chats on the web as news source. 3. Mobile digital news formats 4. Computer Assisted Journalism (CAJ) 5. Introduction to CMS (Content Management System)

Unit – V Practice **6 Hour**

Exercise related to Writing, Media Writing and Social Media Writing (Unit I-IV)

Reference Books

- Choudhary, R. (2010). Media Writing. New Delhi: Centrum Press.
- Howard, P. (1986). Perfect your Punctuation. Melbourne: Longman Cheshire.
- Sinha, P. K. (2006). Media Writing. Delhi: Indian Distributors.
- Vander Mey, R. (2004). The College Writer: A guide to Thinking, Writing and Researching. Boston: Houghton Mifflin.
- W., M., & V., P. R. (2008). High School English: Grammar &Composition. Batu Caves, Selangor: Crescent News.
- Whitaker, W. R., Ramsey, J. E., & Smith, R. D. (2012). Media writing: Print, Broadcast, and Public Relations. New York: Routledge.

CO No.	Course Outcomes The student will be able to	Cognitive Level
CO1	Understand the importance of media writing.	K1
CO2	Familiarize with media writing skills	K2
CO3	Express clearly both in oral and written format	K3
CO4	Think critically, creatively and independently	K4
CO5	Create good content for blogs.	K6

GENERAL ENGLISH -I
UENL309

Semester: III **Credits: 3**
Category: Language **Hours/Week: 5**
Class & Major: B.A & B.Sc. **Total Hours: 65**

CO No.	Course Objectives To enable the students
CO-1	Understand English effectively and to address an audience without fear.
CO-2	Describe the unique aspects in different genres.
CO-3	Implement the importance of language.
CO-4	Critique the present flaws & mistakes in pronunciation.
CO-5	Develop Communicative skills.

UNIT- I POETRY **13 Hour**

William Shakespeare : From *As You Like It* (All the World's a Stage)
Wilfred Owen : Strange Meeting
Nisim Ezekiel : Night of the scorpion
Kamala Das : My Grandmother's House

UNIT –II PROSE **13 Hour**

Francis Bacon : Of Travel
Swami Vivekananda : Secret of Work

UNIT-III SHORT STORIES & ONE ACT PLAY **16Hour**

Short Stories:
Ernest Hemmingway : Hills like White Elephants
Rabindranath Tagore : Cabuliwallah
One Act Play:
Samuel Beckett : Krapp's Last Tape

UNIT-IVGRAMMAR **10 Hour**

Parts of Speech – Tenses - Sentence Pattern- Voices - Question Tag - Types of sentence, Article, Simple, Compound and Complex, Degrees of comparison, & Reported Speech.

UNIT-V COMPOSITION **13 Hour**

Letter Writing, Dialogue Writing, Reading Comprehension, Preparing Resume, Bio-data & Curriculum Vitae, Note Making, & Summarizing, Precis Writing, Essay Writing.

Text Books

- Nayar., (2011). *A Galaxy of English Essayists: From Bacon To Beerbohm,* Macmillan, NewDelhi.
- Beckett, S. (2010). *The Collected Shorter Plays of Samuel Beckett: All That Fall, Act Without Words, Krapp's Last Tape, Cascando, Eh Joe, Footfall, Rockaby and others*. Grove/Atlantic, Inc..
- Tagore, R. (2018). *Selected Stories of Rabindranath Tagore*. Prabhat Prakashan.
- Wren & Martin. (2006). *Key to High School English Grammar and Composition,* S. Chand, NewDelhi.
- David Green. (2013). *The Winged Word,* Macmillan India Limited, New Delhi.

Reference Books

- Abrams, M.H. (2005). *Glossary of Literary Terms,* Cengage , US.
- Kelly J May. (2013). *Introduction to Norton's Anthology of English Poetry*. 11th ed, Nortonand Company, NY.
- Muralitharan.M.(Ed.). (2005), *Immortal Stories,* AnuChitra Pub, Madras.

E –Resources

- http://www.indiaonline.in/about/personalities/writersandpoets/Nisim Ezekiel
- http://www.indiaonline.in/about/personalities/writersandpoets/ Kamala Das

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Understand different types of genres in English.	K1
CO-2	Use English for global competency.	K3
CO-3	Execute effective communication skills.	K4
CO-4	Value the grammar in the sentence structures.	K5
CO-5	Plan to improve their LSRW skills.	K6

ADVANCED ENGLISH -I
UENL310

Semester: III **Credits: 4**
Category: Language **Hours/Week: 5**
Class & Major: B.A & B.Sc. **Total Hours: 65**

CO No.	Course Objectives To enable the students
CO-1	Understand various styles in English.
CO-2	Identify different themes in Literature.
CO-3	Apply the basic principles used in different genres.
CO-4	Examine the basic elements of English Grammar.
CO-5	Create the grammatical enlightenment in the language.

UNIT- I POETRY **13 Hour**

John Donne : The Good- Morrow
Robert Frost : Stopping by Woods on a Snowy Evening
Arun Kolatkar : Jejuri
Toru Dutt : Christmas

UNIT –II PROSE **13 Hour**

Francis Bacon : Of Ambition
Charles Lamb : Essays of Elia, A Dream Children: A Reverie

UNIT-III DRAMA **13 Hour**

William Shakespeare : Tempest

UNIT-IV FICTION **13 Hour**

Jane Austen : Sense and Sensibility

UNIT-V GRAMMAR & COMPOSITION **13 Hour**

Grammar: Tenses, Sentences- Simple, Compound and Complex, Degrees of Comparison
Composition: Poetry Comprehension- Paraphrase, Poetry Writing, Hints Developing, Reading Comprehension-General Essay Writing.

Text Books

- Nayar.(2011). *A Galaxy of English Essayists: From Bacon To Beerbohm,* Macmillan, NewDelhi, 2011.
- Austen, J. (2004). *Sense and sensibility*. OUP Oxford.
- Wren & Martin. (2006). *Key to High School English Grammar and Composition,* S. Chand, NewDelhi.
- David Green.(2013). *The Winged Word,* Macmillan India Limited, New Delhi.

Reference Books

- Abrams, M.H.(2005). *Glossary of Literary Terms,* Cengage , US, 2005.
- Hulme, P., Sherman, W., & Sherman, W. H. (Eds.). (2000). *The Tempest and its travels*. Reaktion books.
- Kelly J May.(2013). *Introduction to Norton's Anthology of English Poetry*. 11th ed, Nortonand Company, NY.
- Muralitharan.M.(Ed.). (2005), *Immortal Stories,* AnuChitra Pub, Madras,.

E –Resources

- http://kea.kar.nic.in/vikasana/bridge/english/chap_14_ppt.pdf
- https://www.poetryfoundation.org/poems/44104/the-good-morrow
- http://askliterature.com/prose/francis-bacon/of-ambition-by-sir-francis-bacon/

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the techniques used in different genres.	K1
CO-2	Discuss the varieties of English through inputs in British and American Vocabulary.	K2
CO-3	Analyze the productivity of language in scientific ways.	K4
CO-4	Appraise the work of literature.	K5
CO-5	Construct different style of language and to communicate professionally.	K6

GENERAL ENGLISH -II
UENL409

Semester: IV **Credits: 3**
Category: Language **Hours/Week: 5**
Class & Major: B.A & B.Sc. **Total Hours: 65**

CO No.	Course Objectives To enable the students
CO-1	Understand the various functions of language.
CO-2	Describe different genres like Prose ,Poetry, Short story
CO-3	Examine different techniques used in literature.
CO-4	Value the basic elements of English Grammar.
CO-5	Plan to improve their LSRW skills.

UNIT- I POETRY **13 Hour**

Robert Frost	:	Mending Wall
William Wordsworth	:	The World is Too Much with Us
Rabindranath Tagore	:	Where the Mind is Without Fear
Sujata Bhatt	:	Search for My Tongue

UNIT –II PROSE **13 Hour**

Leo Tolstoy	:	Where Love is, There God is.
Indira Ghandhi	:	What Makes an India?

UNIT-III SHORT STORIES & ONE ACT PLAY **16 Hour**

Short Stories:

Katherine Mansfield	:	A Cup of Tea
Anita Desai	:	Devoted Son

One Act Play:

Anton Chekhov	:	A Marriage Proposal

UNIT-IV GRAMMAR **10 Hour**

Gender, Verb Forms, Prepositions, Phrasal verbs and patterns with prepositions, Correction of Errors, Transformation of Sentences, Punctuation Marks

UNIT-V COMPOSITION **13 Hour**

Paragraph Writing, Hints Developing, Story Telling, Expansion of Proverbs, Bio-Data, Report Writing, Writing Email, Writing Stories, Resume Writing.

Text Books

- Nayar. (2011). *A Galaxy of English Essayists: From Bacon To Beerbohm,* Macmillan, NewDelhi.
- Mansfield, K., & Eriksson, G. (1959). *A Cup of Tea*. Sv. bokförl. Bonnier.
- Desai, A. (1978). A Devoted Son. *Games at Twilight*, 70-81.
- Wren & Martin., *Key to High School English Grammar and Composition,* S. Chand, NewDelhi, 2006.
- David Green. (2013). *The Winged Word,* Macmillan India Limited, New Delhi.

Reference Books

- Abrams, M.H.(2016). *Glossary of Literary Terms,* Cengage , US.
- Kelly J May. (2013). *Introduction to Norton's Anthology of English Poetry*. 11th ed, Nortonand Company, NY.
- Muralitharan.M.(Ed.). (2005), *Immortal Stories,* AnuChitra Pub, Madras,.
- Landry, H. (1964). Anton Chekhov:" Selected Stories"(Book Review). *Studies in Short Fiction*, *1*(3), 233.

E –Resources

- https://www.poetryfoundation.org/poems/44266/mending-wall
- https://www.poemhunter.com/poem/indian-weavers/
- https://www.allenisd.org/cms/lib/TX01001197/Centricity/Domain/1846/A%20Devoted%20Son.pdf

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the basics of literature.	K1
CO-2	Discuss the manifold shades of literature.	K2
CO-3	Implement the technique of writing and to polish the standard of Grammar.	K3
CO-4	Compare the socio- cultural aspects of the writers.	K4
CO-5	Assess the plot, characterization, themes and techniques of literature.	K5

ADVANCED ENGLISH -II
UENL410

Semester: IV **Credits: 4**
Category: Language **Hours/Week: 5**
Class & Major: B.A & B.Sc. **Total Hours: 65**

CO No.	Course Objectives To enable the students
CO-1	Understand various styles in English.
CO-2	Identify different themes in Literature.
CO-3	Apply the basic principles used in different genres.
CO-4	Examine the basic elements of English Grammar.
CO-5	Create the grammatical enlightenment in the language.

UNIT- I POETRY **13 Hour**

W.B.Yeats : Prayer for My Daughter
Carl Sandburg : Fog
A.K.Ramanujan : A River
Meena Kandasamy : Mascara

UNIT –II PROSE **13 Hour**

G.K.Chesterton : A Piece of Chalk
Arundhati Roy : The End of Imagination

UNIT-III DRAMA **13 Hour**

G.B.Shaw : Pygmalion

UNIT-IV FICTION **13 Hour**

J.K.Rowling : Harry Potter and Goblet of Fire

UNIT-V GRAMMAR & COMPOSITION **13 Hour**

Grammar: Transformation of Sentences, Correction of Errors, Punctuation

Composition: Note Making, Dialogue Writing, Story Writing, Letter Writing, Expansion of Proverbs, Report Writing and Article Writing.

Text Books

- Nayar. (2011). *A Galaxy of English Essayists: From Bacon To Beerbohm,* Macmillan, NewDelhi..
- Shaw, G. B. (2008). *Pygmalion and Major Barbara*. Bantam Classics.
- Wren & Martin. (2006). *Key to High School English Grammar and Composition,* S. Chand, NewDelhi.
- David Green. (2013). *The Winged Word,* Macmillan India Limited, New Delhi.

Reference Books

- Abrams, M.H. (2005). *Glossary of Literary Terms,* Cengage , US.
- Kelly J May., *Introduction to Norton's Anthology of English Poetry*. 11th ed, Norton and Company, NY.
- Drayden, B. C. R. (2016). Harry Potter and the Goblet of Fire by JK Rowling. *The Deakin Review of Children's Literature*, *6*(2).
- Muralitharan.M.(Ed.). (2005). *Immortal Stories,* AnuChitra Pub, Madras.

E –Resources

- http://www.indiaonline.in/about/personalities/writersandpoets/a-kramanujan
- https://poets.org/poem/prayer-my-daughter
- youtube.com/watch?v=3MMKGaLeTdc

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Understand the techniques used in different genres.	K1
CO-2	Discuss the varieties of English through inputs in British and American Vocabulary.	K2
CO-3	Analyze the productivity of language in scientific ways.	K3
CO-4	Appraise the work of literature.	K4
CO-5	Construct different style of language and to communicate professionally.	K6

UG III AND IV EVALUATION AND COMPONENTS OF CIA

Semester	Category	Course code	Course Title	Component – III	Component – IV
III	English/AECC-I	UENL309/310	GENERAL ENGLISH - I/ ADVANCED ENGLISH- I	Album Making	Poster Presentation
	Major Core I/ DSC	UENM307	Introduction to Linguistics	Seminar	Case Study/ Assignment
	Major Core II/ DSC	UENM308	Introduction to Comparative Literature	Paper Presentation	Seminar
	Allied(GE)/	UENA304	Introduction to English Language Teaching	Assignment	Paper Presentation
IV	Language/ AECC-II	UENL409/410	GENERAL ENGLISH-II / ADVANCED ENGLISH- II	Assignment	Seminar
	Major Core I/ DSC	UENM408	Shakespeare	Role Play	Soliloquy
	Major Core II/ DSC	UENM409	Cinema and Literature	Review Writing	Documentary Film
	Allied(GE)	UENA404	Phonetics and Spoke English	Reading Activities	Phonetics Transcription
	SEC/Non major Elective	UENE401/ 402	One Act Play/ Medi Writing	Drama/Review Writing	Role Play/ Report Writing

PROGRAMME PROFILE: M.A. ENGLISH

PSO 1: Critical appreciation of the different literature and its values since 16th century to 21st Century.
PSO 2: Interpretation of the classical literary text and its rich translation.
PSO 3: Usage of strategies of textual interpretation appropriate to different literary genres.
PSO 4: Development of the Pronunciation skills through phonetics and linguistics terms.
PSO 5: Ability to defend equalities in the feminist literary writings and its values

Semester	Category	Course Code	Course Title	Contact	Credit
				Hours / Week	Min / Max
I	Major Core/ DSC	PENM118	British Literature – I	6	4
	Major Core/ DSC	PENM119	American Literature	6	4
	Major Core/ DSC	PENM110	Advanced English Grammar	6	4
	Major Core/ DSC	PENM111	Literary Criticism	6	4
	Major Core/ DSC	PENM112	Human Rights and Subaltern Literature	6	4
			TOTAL	**30**	**20**
II	Major Core/ DSC	PENM218	British Literature – II	5	4
	Major Core/ DSC	PENM219	Literatures in Translation	5	4
	Major Core/ DSC	PENM220	Women and Literature	5	4
	Major Core/ DSC	PENM221	Principles and Methods of ELT	5	4
	Major Core/ DSC	PENM222	Applied linguistics	5	4
	Non-Major Elective/ SEC	PENE202	Academic Writing	5	4
	Service Learning			-	1
			TOTAL	**30**	**25**
III	Major Core/ DSC	PENM316	Post colonial literature	6	4
	Major Core/ DSC	PENM317	Feminist Theories	6	4
	Major Core/ DSC	PENM318	Ecology and Literature	6	4
	Interdisciplinary/GE	PENI302	Translation studies	5	4
	Major Core/ AECC	PRMC301	Research Methodology	5	4
	Major Core/ DSC	PENP311	Project	2	-
			TOTAL	**30**	**20**

IV	Major Core/ DSC	PENM415	Literary Theory and Practice	5	4
	Major Core/ DSC	PENM416	Shakespearean Studies	5	4
	Major Core/ DSC	PENM417	North- East Literature	5	4
	Major Core/ DSC	PENM418	Single Author Study(Women): Nobel and Booker Prize Winners	5	4
	Major Core/ DSC	PENM419	Cultural Studies	6	4
	Major Core/ DSC	PENP401	Project	4	5
			TOTAL	**30**	**25**
			GRAND TOTAL	**120**	**90**

NON MAJOR ELECTIVES

SEMESTER	PART	CATEGORY	COURSE CODE	COURSE TITLE	Contact/Week	Credit
II	IV	Core/SEC	PENE202	Academic Writing	5	4

POSTCOLONIAL LITERATURE
PENM316

Semester: III **Credits: 4**
Category: Core XI/DSC **Hours/Week: 6**
Class & Major: I MA English **Total Hours: 78**

CO No.	Course Objectives To enable the students
CO-1	Understand the works of the Postcolonial writers through the postcolonial lens.
CO-2	Analyze the political and cultural independence of formerly subjugated people.
CO-3	Defend how Postcolonial texts treat the issues surrounding the decolonized people.
CO-4	Value Postcolonial literature, texts, and modes of interpretation.
CO-5	Construct key questions, authors, and literary forms in Postcolonial literature.

UNIT- I POETRY **13 Hour**

K. Ramanujan : Self Portrait
Dom Moraes : A Letter, Sinbad
Leopold Senghor : New York
Gabriel Okara : The Mystic Drum
Derek Walcott : The sea Is History
Allen Curnow : House and Land
A.D. Hope : Australia

UNIT -II PROSE **17 Hour**

NgugiwaThiong'o : Decolonizing the Mind (Chapter-I The Language of African Literature)
Frantz Fanon : Black Skin & White Masks

UNIT-III SHORT STORIES **17 Hour**

Katherine Mansfield : The Garden Party
Chinua Achebe : The Sacrificial Egg

UNIT-IV DRAMA **15 Hour**

Wole Soyinka : The Strong Breed
Athol Fugard : Master Harold… and the Boys

UNIT-V FICTION **16 Hour**

Chinua Achebe : No Longer at Ease

Rohinton Mistry : A Fine Balance

Text Books

- Ashcroft, Bill, Gareth Griffiths, Helen Tiffin, eds.(1989). *The Empire Writes Back: Theory and Practice in Post- Colonial Literatures*. Routledge. London.
- ---. (1998). *Key Concepts in Post-Colonial Studies*. Routledge. London.
- Bhabha, Homi K, ed. (1990). *Nation and Narration*. Routledge. London.
- Boehmer, Elleke. (2005). *Colonial and Postcolonial Literature: Migrant Metaphors*. OUP. Oxford.
- Fanon, Frantz. *The Wretched of the Earth*. (1963). Trans. Richard Philcox. Grove Press. New York.
- Gandhi, Leela. (1998). *Postcolonial Theory: A Critical Introduction*. *OUP*, New *Delhi*.
- Gilbert, Helen, and Joanne Tompkins. (1996). *Post-Colonial Drama: Theory, Practice, Politics*. Routledge. London.
- King, Bruce. *Post-Colonial English Drama: Commonwealth Drama Since 1960*. New York: St. Martin's Press, 1992.
- ---.(1996) *New National and Post-Colonial Literatures: An Introduction*. Clarendon Press. New York.

Reference Books

- Rutherford, Anna, Holst Petersen, and H. Maes Jelinek, eds. (1992). *From Commonwealth to Post-colonial*. Dangaroo Press. Sydney.
- Said, Edward. (1978). *Orientalism*. Pantheon Books. New York.
- Spivak, Gayatri Chakravorty. (1988). *"*Can the Subaltern Speak*?*" *Marxism and the Interpretation of Culture*. Ed. Cary Nelson and Lawrence Grossberg. U of Illinois Press. Urbana. 271-313.
- Trivedi, Harish and Meenakshi Mukherjee. (1996). *Interrogating Post-Colonialism: Theory, Text and Context*. Indian Institute of Advanced Studies. Shimla.
- Young, Robert JC. (2003). *Postcolonialism: A Very Short Introduction*. OUP. Oxford.

E –Resources

- https://www.theatlantic.com/magazine/archive/1959/04/the-sacrificial-egg/306021/
- https://www.bl.uk/20th-century-literature/articles/an-introduction-to-katherine-mansfields-short-stories
- https://www.poetrynook.com/poem/self-portrait-2
- https://www.uibk.ac.at/anglistik/staff/davis/decolonising-the-mind.pdf
- https://retrospectjournal.com/2019/02/10/review-a-fine-balance-by-rohinton-mistry/
- https://bannedbooks.library.cmu.edu/the-kite-runner-by-khaled-hosseini/
- https://www.poetrylibrary.edu.au/poets/hope-a-d/poems/australia-0146006

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the historical background of colonization and its effects on Literature.	**K1&K2**
CO-2	Apply the Postcolonial concepts like identity, Hybridity on Canonical mainstream texts.	**K3**
CO-3	Analyze the narrative strategies and predominant themes employed in postcolonial historiography.	**K4**
CO-4	Evaluate the conditions and plights of natives under Neo-colonialism and Nationalism.	**K5**
CO-5	Develop and improvise the scope for research in the context of Postcolonial studies.	**K6**

FEMINIST THEORIES
PENM317

Semester : III **Credits : 4**
Category : Core XII **Hours/Week : 6**
Class &Major: II MA English **Total Hours : 78**

CO No.	Course Objectives To enable the students
CO-1	Define origin and growth of new theories in Feminism.
CO-2	Analyse the concepts and social patterns of different feminist writers.
CO-3	Assess the patriarchal society and to create self-identity
CO-4	Evaluate arguments and assumptions about Feminist literature, texts, and modes of interpretation.
CO-5	Investigate key questions, authors, and literary symbols in Feminist literature.

UNIT I INTRODUCTION **15Hour**

Feminism – five waves of feminism- Feminist Literature – Feminist Criticism, Post feminism, Black feminism, Eco-Feminism.

UNIT II INTERSECTIONAL FEMINISM **16 Hour**

AudreLorde : Age, Race, Class and Sex: Women Redefining Difference
Kimberle Crenshaw : Seeing Race Again: Countering Colorblindness across the Disciplines

UNIT III POST COLONIAL FEMINISM **15Hour**

Chandra Talpade Mohanty : Feminism Without Borders: Decolonizing Theory, Practicing Solidarity
Zora Neale Hurston : How it feels to be Colored Me

UNIT IV FEMINISM AND MARXISM **16 Hour**

Alexander Kollontai : Working Woman and Mother
MitcheleBarret : Ideology and the cultural production Of Gender

UNIT V ECO FEMINISM **16 Hour**

Susan Griffin **:** Woman and Nature: The Roaring Inside Her
Rosemary Radford Ruether : Gaia and God: An Ecofeminist Theology of Earth Healing

Reference Books

- Wilbur Scott (2009).*Five Approaches of Literary Criticism*, Collier Books. New York.
- MircheleBarret. (1989). "Ideology and the Cultural production of Gender" *Women's Oppression Today*, Verso. New York.
- Griffin, Susuan. (1978).*Woman and Nature: The Roaring Inside Her.* Harper &Row.New York.
- Neale Hurston, Zora. (2015).*How it Feels to be Colored Me.*Applewood Books.United States.
- Mohanty, Chandra Talpade.(2003). *Feminism Without Borders: Decolonizing Theory, Practicing Solidarity*. Duke University Press, United Kingdom.

E-Resources

- https://thebookshelfofemilyj.com/2013/10/30/roaring-and-reclaiming-womans-connection-to-nature/

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Understand the significance of feministic theories.	**K1**
CO-2	Apply the patterns and concepts of feministic literature	**K3**
CO-3	Analyse voice against patriarchal society through their own writings.	**K2**
CO-4	Evaluate the conditions and plights of Women through critical light	**K5**
CO-5	Develop and improvise the scope for research in the context of feminist studies.	**K6**

ECOLOGY AND LITERATURE
PENM417

Semester	**: IV**	**Credits**	**: 4**
Category	**: Core XIII**	**Hours/Week**	**: 6**
Class & Major	**: II MA ENGLISH**	**Total Hours**	**: 78**

CO No.	Course Objectives To enable the students
CO-1	Describe the environment and its influence on literature
CO-2	Understand the representation of Nature in literary works and of the relationship between literature and environment
CO-3	Interpret how individuals in society behave and react in relation to nature and ecological aspects
CO-4	Analyse the literary text from the environmental perspectives
CO-5	Construct understanding of interdisciplinary debates in the Environmental humanities.

Unit 1: Introduction to Ecology and Ecocriticism **16 Hour**

Glotfelty, Cheryll. "Introduction: Literary Studies in an Age of Environmental Crisis."

Rueckert , William. "Literature and Ecology: An Experiment in Ecocriticism"

Dana Philip. "Ecocriticism, Literary Theory, and the Truth of Ecology"

Heise, Ursula "The Hitchhiker'sGuide to Ecocriticism"

Unit 2: Non-Fiction **16 Hour**

Ed. Gottlieb, Robert S "This Sacred Earth: Religion,Nature and Environment." Selections

Thoreau, Henry David. *Walden* "Where I Lived, and What I Lived For"; "The Bean-Field"

Carson, Rachel. Silent Spring

Unit 3: Fiction **15 Hour**

Callenbrach, Ernest, *Ecotopia: The Notebooks and Reports of William Weston*

Atwood, Margaret. *Oryx and Crake (2003)*

Unit 4: Ecofeminism **15 Hour**

"The Feminism of Ecology and the Ecology of Feminism" by Ynestra King

Kingslover, Barbara, *Prodigal Summer*

Unit 5: Indian Writings **16 Hour**

Sinha, Indra. *Animal's People*

Ghosh, Amitav. *The Hungry Tide*

Shiva, Vandana. *Staying Alive*

Text Books:

- Eds. Glotfeity, Cheryl and Harold Fromm1 (1996)*The Ecocriticism Reader: Landmarks in Literary Ecology*,.University of Georgia, London,
- Ghosh, Amitav.(2016) *The Great Derangement: Climate Change and the Unthinkable.* Gurgaon: Allen Lane.
- Buell, L. (1995*) The Environmental Imagination: How Literary Naturalists From Henry Thoreau and Rachel Carson Have Shaped America.* San Francisco, CA: Sierra Club Books.
- Callenbrach, Ernest, (2004) *Ecotopia: The Notebooks and Reports of William Weston.* Banyan Tree Books. Berkeley

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Describe the contemporary ecological concerns, methods and theories incorporated into literature	K1
CO-2	Discuss the environmental issues through literary narratives	K2
CO-3	Apply the environmental concerns and its impact on literature	K3
CO-4	Examine the way Nature/ Environment is understood, imagined and made in literature	K4
CO-5	Construct the environmental crises through different genres of literature	K6

TRANSLATION STUDIES
PENI302

Semester : III **Credits : 4**
Category : Major Core XIV/ DSC **Hours/Week: 5**
Class & Major: II MA English **Total Hours: 65 Hour**

CO No.	Course Objectives To enable the students to
CO-1	Describe the origin and development of translation.
CO-2	Demonstrate the history of translation.
CO-3	Analyze the significance of translation in India.
CO-4	Appraise various theories & techniques of comparative studies.
CO-5	Develop literary & non-literary texts of other languages.

UNIT I Fundamentals of translation **12 Hour**

Definitions – a brief history of translation - Theories of translation – linguistic – literary – cultural – communicative – Types of translation – Literary – Non-Literary – Technology aided translation.

UNIT II Linguistics aspects of translation **12 Hour**

Structure of Language – Semantic Categories - Linguistic and cultural systems – The Scale of Linguistics intensity.

UNIT III Problems of Translation **13 Hour**

Problem of Translation Prose and Poetry – Translation of Scientific & technical legal, Writings of Metaphor & other figures of speech idioms.

UNIT IV Translation Methods **13 Hour**

Word for word Translation – Literal translation- faithful translation –Semantic translation – Communicative translation-Idiomatic translation.

UNIT V Analysis of a Translated Text and Practice: **15 Hour**

Thirukkural (Chapters 11, 13, 19, 44)

Poem:

Kutty Revathi – Naam Deivathaigal alla

Novel:

Ambai - Veetin Moolaiyil Oru samaiyalara

Text Book:

- Bassnett, Susan (2002). *Translation Studies*. Methuen, London.
- Ambai (2020). Veetin Moolaiyil oru samaiyalara, Kalachuvadu Publications Pvt. Ltd, Tamil Nadu,India.
- Revathi, Kutty (2018). kutty revathi kavithaigal- part 1, Ezutthu Prachuram, India.

References:

- Hatim, Basil and Jeremy Munday (2004).*Translation: An Advanced Resource Book.* London: Routledge.
- Palumbo, Giuseppe (2009.). *Key Terms in Translation Studies.* Continuum.

E-Resources:

- **http://www.davidpublisher.com/Public/uploads/Contribute/58db778dd5499.pdf**.
- https://www.routledgehandbooks.com/pdf/doi/10.4324/9781315749129.ch3
- http://egyankosh.ac.in/bitstream/123456789/14110/1/Unit-1.pdf
- file:///C:/Users/admin/Downloads/498-507-1-PB.pdf

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Record and appreciates translated genres.	K1
CO-2	Apply the different theories of translation in their research work.	K3
CO-3	Explain & interpret texts from multilingual country like India.	K2
CO-4	Analyze the history of translation by studying the texts belonging to various ages.	K4
CO-5	Judge & interpret problems in translation studies	K5

RESEARCH METHODOLOGY

PRMC301

Semester	**: III**	**Credit**	**: 4**
Category	**: Core XIV**	**Hours/Week**	**: 5**
Class &Major	**: II M.A ENGLISH**	**Total Hours**	**: 65**

CO No.	Course Objectives To enable the students
CO-1	Understand the Basic Concepts Of Research using various Methodologies
CO-2	Identify Appropriate Research Topics
CO-3	Select appropriate Research Problem and Parameters
CO-4	Prepare A Project Proposal (To Undertake A Project)
CO-5	Organize and Conduct Research (Advanced Project) in a more appropriate Manner and write a Research Report.

UNIT I INTRODUCTION TO RESEARCH METHODOLOGY 7 Hour

Meaning of research – Objective of Research – Motivation in Research – Types of Research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical – Research Approaches – Significance of Research – Research Methods versus Methodology – Research and Scientific Methods – Importance of Knowing How Research is Done – Research Process – Criteria for Good Research.

UNIT II RESEARCH PROBLEM AND RESEARCH DESIGN 15 Hour

Research Problem – Selecting Research Problem – Necessity of Defining A Problem – Techniques of Defining Problem – Formulation of Research Problem, Objectives of Research Problem. Meaning of Research Design – Need for Research Design – Important Concept Related to Research Design – Different Research Designs – Basic Principles of Experimental Design; Important Experimental Design.

UNIT III SAMPLING DESIGN, DATA COLLECTION AND ANALYSIS

18 Hour

Census And Sample Surveys – Characteristics of Good Sample Design – Different Types of Sample Designs – Techniques of Selecting a Random Sample-Accepts of Method Validation – Observation and Collection of Data – Methods of Data Collection – Sampling Methods – Data Processing and Analysis Strategies and Tools – Data Analysis with Statically Package (Sigma STAT,SPSS For Student T-Test, ANOVA, Etc.), Hypothesis Testing.

UNIT IV INTERPRETAION, REPORT WRITING, RESEARCH ETHICS AND IPR 15 Hour

Interpretation and Report Writing – Meaning of Interpretation; Techniques of Interpretation; Precautions in Interpretation; Significance of Report Writing, Layout of Research Report, Types of Reports; Presentation of Research Work-Oral, Poster and Writing Research Paper; Precautions for Writing Research Report, Conclusion.

Ethics-Ethical Issues, Related to Research, IPR-Intellectual Property Rights in Research and Development-Patents and Patent Laws: Objectives of the Patent System - Basic, Principles and General Requirements of Patent Law.

UNIT V DOCUMENTATION 10 Hour

Language and Style in Research Writing- Formatting Research Documents – MLA Style–Footnotes-Endnotes Diagrams, Bibliographies, Webliographies, Index-Quotation &Translation (In- text & end citation)- Body of a thesis– Summation – Work cited or consulted- Revising – Proof reading – Parenthetical Documentation.

Text books

- Kothari, C. R. (1980). Research Methodology: Research and techniques, New Delhi:
  New Age International Publishers
- Carlos, C.M.,2000.Intellectual property rights. The WTO and developing countries: the TRIPS agreement and policy options. ZedBooks, New York.
- Beier F.K, Crespi R.S and Straus T. Biotechnology and Patent protection, Oxford
  and IBH Publishing Co. New Delhi.
- Darren George and Paul Mallery – SPSS for Windows, Pearson Education
- David F Griffiths and Desmond J. Higham," *Learning LaTex",* SIAM (Society for Industrial and Applied Mathematics) Publishers, Phidel Phia, 1996.
- Joseph Gibaldi, et. al, MLA Handbook for Writers of Research Papers, Eighth ed, 2016.

References

- Kothari, C. R. (1990). Research Methodology: Research and techniques, New Delhi:
  New Age International Publishers.
- Singh, Y. K. (2006). Fundamental of Research Methodology and Statistics. New
  Delhi. New International (P) Limited, Publishers.

- Wallinman, N. (2006). Your Research Project: A step-by-step guide for the first-time
  researcher. London: Sage Publications
- Senthil Kumar Sadasivam and Mohammed Jaabir M. S. (2008). IPR, Biosafety andBiotechnology Management, Jasen Publications, India.
- Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

CO No.	Course Outcomes The student will be able to	PSOs Addressed	Cognitive Level
CO 1	Discuss research articles and papers.	PSO 3	K1
CO 2	Sketch a literature review.	PSO 5	K2
CO 3	Organize research questions to do better research.	PSO 1	K3
CO 4	Appraise a research proposal or industry project plan.	PSO 2	K4
CO 5	Design the collection methods and ethics proposals.	PSO 4	K4

LITERARY THEORY AND PRACTICE
PENM415

Semester: IV **Credits: 4**
Category: Core XVI **Hours/Week: 5**
Class & Major: II MA English **Total Hours: 65**

CO No.	Course Objectives To enable the students
CO-1	understand contemporary trends in critical theory in the context of literature, culture and media
CO-2	establish links between theory and text
CO-3	to provide a critical understanding of the developments in literary criticism from the beginnings to the end of 19th century
CO-4	Develop an understand of the function and practice of traditional modes of literary Theory
CO-5	Recall the fundamentals of Literary Criticism and Theory

Unit I Structuralism and Deconstruction Theory **13 Hour**

Ferdinand de Saussare : Course in general Linguistics

Jacques Derrida : Structure, Sign and Play in the discourse

Of the human sciences

Unit II Post-Modernism **13Hour**

Jean-François Lyotard: The Postmodem Condition : A Report on Knowledge
Jean Baudillard: Simulacra and Simulation

Unit III Postcolonial theory **13Hour**

HomiBhaba: Of Mimicry and Man: The Ambivalence of colonial discourse
GayatriSpivak: Can the Subaltern Speak?

Unit IV Ecocriticism and Ecofeminism **13Hour**

Raymond Williams: The country and the city

Vandana Shiva: Staying Alive

Unit V Practical Application **13 Hour**

Application of prescribed theory on the prescribed text in this Semester

Text Books:

- Bill Ashcroft,Gareth Griffith and Helen Tiffins.ed The Empire Writes Back.London:Routledge,1989. Print.
- Fredric Jameson .Marxism and Form:Twentieth Century Dialectical Theories of Literature. U.S.A: Princeton University Press, 1974. Print.
- GayatriCharavortySpivak, "Can The Subaltern Speak?"Gary Nelson and Lawrence rossberg. ed. Marxism and the Interpretation of Culture.London: Macmillan, 1988. Print.
- Geyh, Paula, Fred Leebron, and Andrew Levy. Postmodern American Fiction: A Norton Anthology. New York: W.W. Norton, 1998. Print.
- HomiBhabha. The Location of Culture. London: Routledge, 1994. Harvey, Robert, and Lawrence R. Schehr. Jean- ran oisyotard: Time and Judgement. New Haven, CT: Yale UP, 2001. Print.

Reference Books:

- Jacques Derrida.Of Grammatology. U.S.A.: John Hopkins University Press, 1997. Print.
- Lietch B. Vincent.The Norton Anthrology of Theory and Criticism, second Edition. London: Routledge, 2010. Print.
- Linda Hutcheon. The Politics of Post Modernism.: Routledge, 2000.Print

- MCCaan R. Carole, SEUNG-KYUNG KIM. Feminist Theory Reader, Fourth Edition.USA. Print.
- Niall Lucy. Postmodern Literary Theory: An Introduction .Oxford :Blackwell Publishers Inc.,1998. Print.
- Sumathy U. Ecocriticism in Practice. New Delhi. Print
- Roland Barthes. The Pleasure of the Text Trans. R. Millar .New York: Hill and Wang, 1975. Print.
- Terry Eagleton. Literary Theory: An Introduction. London: University of Minnesota Press, 1983. Print.
- ------. Marxism and Literary Criticism. California: University of California Press, 1976. Print.
- Taylor, Victor E., and Gregg Lambert. Jean ran oisyotard: Critical Evaluations in Cultural Theory. London: Routledge, 2006. Print.

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	State the issues discussed in the text in the socio-historic & cultural context.	K1
CO-2	Discuss languages of different cultures.	K2
CO-3	Sketch the elements of Literary text such as narrative techniques, setting, point of view and style.	K3
CO-4	Compare with diverse literary concepts written in various languages & translated by different writers.	K4
CO-5	Construct knowledge & skills of translation in English.	K6

SHAKESPEAREAN STUDIES

PENM416

Semester: IV **Credits: 4**

Category: Core XVII **Hours/Week: 5**

Class& Major: II M.A English **Total Hours: 65Hour**

CO No.	Course Objectives To enable the students
CO-1	Understand the magnitude of the Shakespearean world
CO-2	Discuss the mythical and fantastical elements of Shakespeare's last romances
CO-3	Demonstrate the distinctiveness of Shakespeare's plays with special reference to the immortal characters he created.
CO-4	Examine Shakespeare's contribution to the English language.
CO-5	Construct the first-hand knowledge of the plays of Shakespeare.

UNIT: I **15Hour**

Shakespeare Theatre; Theatre Conventions; Sources; Problems of categorization; Trends in Shakespeare Studies up to the 19th Century; Sonnet and court politics; famous actors; theatre criticism; Shakespeare into film & play production.

UNIT-II STUDIES IN SHAKESPEARE'S WORK **10Hour**

Supernatural Elements in Shakespearean Plays ,Shakespearean Soliloquies ,Shakespearean Comedy – Classical –Romantic, Shakespearean Tragedy ,Shakespeare's Historical Plays

UNIT-III SHAKESPEARE'S CHARACTERS **10Hour**

Shakespeare's Character – Marcus Antony

Shakespeare's Character – Cleopatra

Shakespeare's Character - Enobarbus

UNIT- IV SHAKESPEAREAN PLAYS **13Hour**

Henry IV Part I

Twelfth Night

UNIT –V- CRITICAL ESSAYS **17Hour**

Arnold Kettle - Shakespeare in a Changing World

Charles Lamb - On the Tragedies of Shakespeare

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the theories, concepts, methods used in cultural studies framework.	K1
CO-2	Interpret different approaches, concepts, and theoretical legacies in the interdisciplinary field of cultural studies.	K2
CO-3	Apply the impact of the economic, social and political environment from a global, national and regional level.	K3
CO-4	Determine the concepts of cultural studies in different literatures.	K5
CO-5	Formulate the ideas of cultural diversity and socio-economic change at the local, national and global level.	K6

Text Book:

- Shakespeare, W., & Bevington, D.M. (1994). *Henry IV, Part 1*. Oxford: Oxford University Press.

Reference Books:

- Bowers, Fredson. (1959) *Elizabethan Revenge Tragedy: 1587-1642*. Gloucester: Peter Smith.
- Bradley, A C. (1905) *Shakespearean Tragedy: Lectures on Hamlet, Othello, King Lear, Macbeth.* London: Macmillan and Co,.
- Charlton, H B. (1938) *Shakespearean Comedy*. London: Methuen.
- Ford, Boris. (1982) *The Age of Shakespeare.* Harmondsworth: Penguin Books.
- Knight, G W. (1951) *The Imperial Theme: Further Interpretations of Shakespeare's Tragedies, Including the Roman Plays.* London: Methuen.
- Stephen Greenblatt, ed., (1997) *The Norton Shakespeare, (Romances& Poems, Tragedies, Comedies),* W.W. Norton & Co., London.
- Arnold Kettle - *Shakespeare in a Changing World*- Published by Lawrence and Wishart.

E-learning resources:

- http://www.shakespeare.bham.ac.uk/resources

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom's Level
CO-1	List the literary techniques employed by Shakespeare in his plays and sonnets.	K1
CO-2	Discuss the significance of the socio-political and historical event in England.	K2
CO-3	Interpret thematic and structural implications in Shakespearean Plays.	K3
CO-4	Value different types of Drama	K5
CO-5	Formulate the plots and characters of the plays of Shakespeare.	K6

NORTH-EAST LITERATURE

PENM417

Semester : IV **Credits : 4**
Category : Core XVIII **Hours/Week : 5**
Class & Major : II MA ENGLISH **Total Hours :65**

CO No.	Course Objectives To enable the students
CO-1	Describe how the literature represents the plurality of the region.
CO-2	Understand the wide variety of communities and literary traditions in North – East India.
CO-3	Analyze the multi-ethnic and multilingual cultures of the region.
CO-4	Evaluate the Basic concepts and techniques of social science research.
CO-5	Develop the socio political articulations in the region in the context of the interfaces between people, nature and nation state.

Unit 1: Poetry **13 Hour**

TemsulaAo: "The Old Storyteller" (Nagaland)

Mamang Dai: "The Sorrow of Women" (Arunachal Pradesh)

NabakantaBarua "Measurements". (Assam)

Mona Zote: "What Poetry Means to Ernestina in Peril" (Mizoram)

SaratchandThiyam : "Sister" (Manipur)

Desmond Kharamawphlang: "The Conquest" (Meghalaya)

Unit 2: Prose **13 Hour**

Robin Ngangom : *Poetry in Time of Terror*(Manipur)

Easterine Iralu : *Should Writers Stay in Prisons?*(Nagaland)

Unit 3: Short Story **13 Hour**

Arnab Jan Deka: *Himalayan Mystic Meeting* (Assam)

Prajwal Parajuly: *The Gurkha's Daughter* (Sikkim)

Unit 4: Drama **13 Hour**

Gita ChandraTobgbra : *Ngabongkhao* (Manipur)

Arun Sarma: *Buranjipath* (Assam)

Unit 5: Fiction **13 Hour**

Indira Goswami , *The Moth Eaten Howdah of the Tusker* (Assam)

Malasawmi Jacob. Zorami: A Redemption Song (Mizoram)

Text Books:

- *Antholology of Contemporary Poetry from Northeast,* Ed. By Robin S. Ngangom and KYnpham Sing Nongkynrih. Shillong, NEHU, 2003
- *The Peripheral Centre: Voices from India's Northeast*/ by Preeti Gill, Zubaan, 2010
- *Emerging Literatures from Northeast India: The Dynamics of Culture, Society and Identity*. Ed. Margaret Zama, Sage, 2013.

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom's Level
CO-1	Discuss the various trends and genre of literature of the sister states in the north east.	K1
CO-2	Understand the diversity of Indian literature and the similarities between them.	K2
CO-3	Apply the aesthetic experience of North East Indian literature	K3
CO-4	Judge the contemporary trans-cultural issues	K5
CO-5	Investigate the diversity of India there by fostering an accommodative attitude of fraternity.	K6

WOMEN NOBEL AND BOOKER PRIZE WINNERS:
MARGARET ATWOOD
PENM418

Semester : IV **Credits : 4**
Category : Core XIX **Hours/Week : 5**
Class &Major: II MA English **Total Hours : 65**

CO No.	Course Objectives To enable the students
CO-1	Describe women booker prize winners in literature.
CO-2	Recognize the knowledge and insight into the works studied on the course exercise skills
CO-3	Analyse the concepts and techniques of the writer.
CO-4	Assess feministic literature and produce their own.
CO-5	Develop the individual patterns and themes of the writer.

UNIT I INTRODUCTION **10Hour**

Biography: Works - Awards and Recognition –Literary Style and Technique – Contemporary Writers.

UNIT II POETRY **13Hour**

Siren Song
Journey to the Interior
The Animals in That Country Bored
This is a Photograph of Me

UNIT IIIPROSE **12Hour**

"Nature as Monster" (Survival: A Thematic Guide to Canadian Literature)
Negotiating with the Dead: A Writer on Writing

UNIT IV SHORT STORY **15Hour**

Rape Fantasies (Dancing Girls)
Happy Endings (Murder in the Dark)
Stone Mattress

UNIT V FICTION **15Hour**

The Robber Bride
The Handmaid's Tale

Reference Books

- Atwood, Margaret. (2002). *Negotiating with the Dead: A Writer on Writing*. Cambridge University Press. United Kingdom.
- … (1972). *Survival: A Thematic Guide to Canadian Literature*. House of Anansi Press.Toronto.
- ...(1998). *Dancing Girls.*Anchor Books. United States.
- ...(1999) *Murder in the Dark.* McClelland & Stewart. Toronto.
- ...(2014)*Stone Mattress: Nine Wicked Tales.* Nana.Talese. United States.
- ...(1993) *The Robber Bride.* McClelland & Stewart. Toronto.
- … (2017) The Handmaid's Tale.Random House. United Kingdom.

E -Resources

- https://www.poetryfoundation.org/poets/margaret-atwood
- https://www.newyorker.com/magazine/2017/04/17/margaret-atwood-the-prophet-of-dystopia

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	State the writing pattern of individual writers	K1
CO-2	Understand the unique features, symbols and themes of the prescribed writer	K2
CO-3	Apply theoretical approaches to the reading.	K3
CO-4	Analyse feministic literature	K4
CO-5	Construct their own literary texts to redefine the role of women in society.	K6

CULTURAL STUDIES

PENM419

Semester: IV **Credits: 4**
Category: Core XX **Hours/ Week: 6**
Class & Major: II MA English **Total Hours: 78**

CO No.	Course Objectives To enable the students
CO-1	Understand the concept of culture in Literature.
CO-2	Identify the specific structural location of cultural issues and debates.
CO-3	Demonstrate an understanding of the multiple methodologies used in cultural analysis.
CO-4	Analyse the theme of culture in literary texts.
CO-5	Create research papers in cultural studies.

UNIT- I INTRODUCTION **15 Hour**

Evolution, need and significance of cultural studies, Types of culture - (Ideal vs Real cultural, culture and globalization, mall culture, popular culture)
Key concept in cultural studies - (representation, materialism, non-reductionism, articulation, power, popular culture, text and readers, subjectivity and identity)

UNIT-II EASY THEORIST IN CULTURAL STUDIES **15 Hour**

Richard Hoggard, Raymond William, Stuart hall, Marshall McLuhan, Stephen Greenbalt, Antonio Granci, Althusser, Frederick Jameson.

UNIT-III THEORIES AND ITS RELEVANCE **16 Hour**

Diffusionism- Kroebar
Cultural Metirialism- Raymond Williams
Functionalism – Malinowki and R.Brown
Popular and mass cultural, circuit of cultural, coding and decoding – Stuard Hall
Cultural and industry- John Fiske

UNIT-IV CULTURAL TEXTS **15 Hour**

Homi Bhabaa's The Other Question
Fanon's Black Skin , White Mask

UNIT-V PRACTICING CULTURAL STUDIES **16 Hour**

Influential in culture Studies: Marxist Theory, Psychoanalytical Theory, Feminist Theory, Post Modern Theory, Critical Race Theory, Queer Theory

Text Book:

- Pramod K. Nayar , (2016). An Introduction to Cultural Studies , New Delhi : Viva Books.
- John Hartley, (2009).A Short History of Cultural Studies, United States: SAGE Publications Ltd.
- Rumina Rai , Kriswar Panna,(2015) Introduction to Cultural Studies, Himalaya Publishing house, Mumbai.
- Bhabha, Homi K., (2004), The Location of Culture. London ; New York : Routledge.

Reference books:

- Peter Barry, (2010). Beginning Theory: An Introduction to Theory and Cultural Theory, Viva Books: Chennai.

- Rachele Dini.(2017) An Analysis of Frantz Fanon's Black Skin, White Mask, Macat Library ,ISBN 9781912127528, United Kingdom.

E- Resources:

- Introduction: http://dx.doi.org/10.4135/9781446215449
- Post Modern Culture: http://jefferson.village.virginia.edu/pmc/
- International Cultural Studies: http://www.inst.at/studies/
- Cultural study and Europe: http://www.inst.at/ausstellung/

CO No.	**Course Outcomes** **On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Describe the theories, concepts, methods used in cultural studies framework.	K1
CO-2	Interpret different approaches, concepts, and theoretical legacies in the interdisciplinary field of cultural studies.	K2
CO-3	Apply the impact of the economic, social and political environment from a global, national and regional level.	K3
CO-4	Determine the concepts of cultural studies in different literatures.	K5
CO-5	Formulate the ideas of cultural diversity and socio-economic change at the local, national and global level.	K6

PG III AND IV EVALUATION AND COMPONENTS OF CIA

Semester	Category	Course code	Course Title	Component – III	Component – IV
I	Major Core/ DSC	PENM`316	Postcolonial Literature	Assignment	Seminar
	Major Core/ DSC	PENM317	Feminist Theories	Seminar	Paper presentation
	Major Core/ DSC	PENM318	Ecology and Literature	Case study	Paper presentation
	Interdisciplinary/GE	PENI302	Translation studies	Paper Presentation	Translation Activity
	Major Core/ AECC	PRMC301	Research Methodology	Power Point Presentation	Paper presentation
II	Major Core/ DSC	PENM415	Literary Theory and Practice	Assignment	Seminar
	Major Core/ DSC	PENM416	Shakespearean Studies	Paper Presentation	Seminar
	Major Core/ DSC	PENM417	North- East Literature	Assignment	Seminar
	Major Core/ DSC	PENM418	Women Nobel and Booker Prize Winners: Margaret Atwood	Assignment	Album making
	Major Core/ DSC	PENM419	Cultural Studies	Paper Presentation	Poster Presentation

DEPARTMENT OF BUSINESS ADMINISTRATION

PREAMBLE

UG: Programme Profile and Syllabi of courses offered in semester III and IV along with its Evaluation Components (With effect from 2021 – 2024 batches onwards).

PROGRAMME PROFILE BBA

PROGRAMME SPECIFIC OUTCOME (PSO)

Upon completion of the Programme, the students will be able to:

- Understand and Operative with Ethical and Professional Responsibility.
- Ability to Communicate Effectively and Function Efficiently on Multidisciplinary Teams.
- Ability to Use Modern Management Principles and Tools Needed in Contemporary Business within the Bounds of Practical Constraints Such as Economic, Environmental, Social, Political,Ethical, Health and Safety and Sustainability.
- Innovated and Developed Skills to be a Life-Long Learner for a Globalized Business for Future.

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hours/ Week	Credit Min/Max
I	I	Languages/ AECC-II	UTAL107/ UTAL108	Basic Tamil - I/Advanced Tamil – I/ French I /Hindi I	UTAL105/ UTAL106/ UHIL101/U FRL101	5	3/4
	II	Communicative English AECC-I	UCEL101/ UCEL102	Communicative English I/ Effective Communicative English I	UENL 107/UENL 108	5	3/4
	III	Major Core I/(DSC)	UBAM109	Business Communication	UBAM 311	5	4
		Major Core II/ (DSC)	UBAM108\ COM104\ UCCM102	Financial Accounting	-	6	4
		Allied – I/ (GE)	UCEA103	Business Economics	UCEA101	6	5
		PE	UPEM101	Professional English I		6	4
	IV	Value Education (SEC)		Family Life Education	-	2	1
					TOTAL	**35**	**24/26**
II	I	Language AECC –II	UTAL207/ UTAL208 UFRL202/ UHIL 202	Basic Tamil II/Advanced Tamil II/ French II /Hindi II	UTAL 205/ UTAL 206	5	3/4
	II	Communicative English / AECC – I	UCEL201/ UCEL 202	Communicative English – II/ Effective Communicative English II	UENL207/U ENL208	5	3/4
	III	Major Core IV /(DSC)	UBAM209	Advertising and Sales Promotion	UBAM 206	5	4

II	III	Major Core V /(DSC)	UBAM207	Principles of Management	UBAM107/ UBAM102	4	3
		Major Core VI(DSC)	UBAR201	Workshop on Decision Making	-	1	1
		Allied - II (GE)	UCOA203	Accounting Package Theory	-	3	2
		Allied - Practical I (GE)	UCOR 203	Accounting Package Practical	-	3	2
		PE	UPEM201	Professional English		6	4
		Internship	UBAI201	Internship/Field work/ Field Project (30 Hours)		-	-/1(Extra Credit)
	IV	Non Major Elective(SEC)			-	3	2
	V	Extension activity / Physical Education/ NCC				-	1/2
					TOTAL	**35**	**25/28**
III	III	Major Core VII(DSC)	UBAM308	Marketing Management	UBAM402	5	5
		Major Core VIII(DSC)	UBAM310/ UCOM305/ UCCM305	Cost Accounting	-	5	5
		Major Core IX(DSC)	UBAM312	Creativity For Innovative Management	-	4	4
		Major Core X(DSC)	UBAM313	Organizational Behavior	UBAM401/ UBAM406	5	4
		Online Course	UMAV381	NPTEL / SPOKEN TUTORIAL	-	3	1/2
		Allied (GE)	UMAA301	Business Statistics	UMAA303	6	4
	IV	Value Education (SEC)		Environmental science		2	1
					TOTAL	**30**	**24/25**
IV	III	Major Core XI(DSC)	UBAM405	Production & Materials Management	-	5	4
		Major Core XII(DSC)	UBAM408	Micro, Small and Medium Enterprises	UBAM406	4	4
		Major Core XIII(DSC)	UBAM407	Human Resource Management	UBAM302	4	4
		Major Core XIIII(DSC)	UBAM409	Management Information System		4	5
		Major Core XIV (DSC)	UBAR401	Workshop On Creative Thinking Skill	-	1	1
		Allied IV	UMAA410	Quantitative Techniques In Business	UMAA505	6	4
	IV	Internship	UBAI401	Internship/Field work/ Field Project		-	-/1(Extra Credit)
		Non Major Elective (SEC)				3	2
		Soft Skill			-	2	1

	V	Extension activity / Physical Education / NCC				-	0/2
					TOTAL	**29**	**25/27**
V	III	Major Core XV(DSC)	UBAM507	Research Methodology in Business	UBAM403	3	2
		Major Core XVI(DSC)	UBAM508	Services Marketing	-	5	4
		Major	UBAM510	Stress Management	-	5	4
		Major Core XVIII (DSC)	UBAM504/ UCOM507/ UCCM507	Management Accounting	UBAM502	5	5
		Major Core XIX(DSC)	UBAP501	Project	UBAP601	5	5
	IV	Major Elective (DSE)	UBAO501	Total Quality Management		5	4
			UBAO502	Corporate Governance			
	IV	Value Education				2	1
					TOTAL	**30**	**25**
VI	III	Major Core XX(DSC)	UBAM608	Strategic Management	-	5	4
		Major Core XXI(DSC)	UBAM610/ UCOM614 UCCM614	Financial Management	-	6	4
	IV	Major Core XXII(DSC)	UBAM612	Entrepreneurial Development	-	6	6
		Major Core XXIII(DSC)	UBAR601	Workshop On Leadership Skills	-	1	1
		Major Core XXIV(DSC)	UBAM613	Global Business in Management	-	5	4
		Viva Voce	UBAM611	Comprehensive viva	-	-	1
		Internship	UBAI601	Internship/Field work/ Field Project	-	-	-/1(Extra Credit)
		Major Elective	UBAO609	Consumer Affairs	-	5	4
			UBAO604	Customer Relationship Management			
			UBAO606	Operation Management			
			UBAO607	Consumer Production			
		Soft Skill			-	2	1
	V	Extension activity / Physical Education/NCC				-	-/2
		Extension Programme	UROX601	Rural Outreach Programme (30 Hours)	-	-	-/1(Extra Credit)
					TOTAL	**30**	**25/28**
					GRAND TOTAL	**189**	**148/159**

COURSES OFFERED TO OTHER DEPARTMENTS

NON MAJOR ELECTIVES

Semester	Part	Category	Course Code	Course Title	Contact Hour/Week	Credit Min/ Max
II	IV	Non Major Elective-II	UBAE203	Team Building	3	2
IV	IV	Non Major Elective-IV	UBAE404	Rural Management	3	2

EXPERIENTIAL LEARNING (Only for Interested Students)

Course mapping				Collaborating agency- Grand technologies/ Ponlait		
Semester	Course Code	Course Title	Assessment	Course Title	Hour/Days/ Month	Mode of Evaluation
V	UBAM505	Service Marketing	Component III	Service Marketing	2 Days	Reflection
VI	UBAM608	Strategic Management	Component IV	Strategic Management	2 Days	Reflection

MARKETING MANAGEMENT

UBAM308

Semester : III **Credit : 5**
Category : Core VII **Hours/Week : 5**
Class & Major: II B. Com. & II BBA **Total Hours : 65**

Course Objectives

CO No.	To enable the students
CO-1	Understand the conceptual framework of marketing.
CO-2	Describe the product and pricing policies and sales promotion techniques in the Marketing.
CO-3	Apply marketing concepts and theories to realistic marketing situations.
CO-4	Use marketing research and apply the outcome for product development.
CO-5	Identify factors and processes essential for designing marketing strategy

UNIT - I FUNDAMENDALS OF MARKETING **13 Hour**

Marketing: Meaning - Classification - Functions- approaches- Relationship of marketing with other functional areas- Various Environmental factors affecting the marketing functions— Market Mix –Meaning of marketing management

UNIT - II PRODUCT AND PRICING **13 Hour**

Product – Characteristics – Classification- Product mix – process of New Product

development - Product life cycle – Branding – Packaging- Pricing strategies -Factors influencing pricing decisions – Kinds of pricing- Pricing objectives – Pricing policies.

UNIT - III PROMOTION **13 Hour**

Promotion mix- Advertising – Publicity – Public relations – Personal Selling – Sales Promotion Administration- Physical distribution – Importance of various kinds of distribution channels- Case studies

UNIT - IV BUYER BEHAVIOR AND SALES FORECASTING **14 Hour**

Buying motives – Buyer Behavior models – Buying Decision Process -Factors influencing Buyer behavior- Market segmentation – Need and basis of segmentation, targeting-positioning– Marketing strategy- Various methods of sales forecasting

UNIT - V MARKETING RESEARCH **12 Hour**

Meaning – Steps involved in Market Research –Marketing Information System-organization involved in marketing research in India –Case studies

Text Book

- Philip Kotler, "*Principles of Marketing"* , Prentice Hall of India, 2018

Reference Books

- Varshney .L and Gupta SL , "*Marketing Management",* 2015
- Saxena , "*Marketing Management",* Tata Mc Graw Hill Pub – 2019

E-Resources

- www.businessdictionary.com/definition/marketingmanagement.html

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Identify the scope and significance of marketing in domain industry.	K2
CO-2	Understand the fundamental concepts of marketing	K2
CO-3	Demonstrate the marketing communication skills relevant to the corporate world.	K3
CO-4	Execute the various elements of marketing to develop a marketing plan.	K3
CO-5	Analyze global business opportunities and its implications on a firm's marketing strategy.	K4

COST ACCOUNTING

UBAM310

Semester : III **Credit : 5**
Category : Major Core VIII(DSC) **Hours/Week : 5**
Class & Major: II BBA **Total Hours : 65**

Course Objectives:

CO No.	To enable the students
CO-1	Recognize and apply appropriate theories, principles and concepts relevant to cost accounting.
CO-2	Exercise appropriate judgment in selecting and presenting information using various methods relevant to cost accounting.
CO-3	Design, plan and execute practical activities using techniques and procedures appropriate to cost accounting.
CO-4	Develop appropriate effective written and oral communication skills relevant to cost accounting.
CO-5	Solve problems relevant to cost accounting systems using ideas and techniques some of which are at the forefront of the discipline.

UNIT- I INTRODUCTION **14 Hour**

Cost Accounting- Definition, Meaning and Objectives, Advantages and Importance – Distinction between Cost and Financial Accounting –Elements of Cost and Preparation of Cost Sheets, Tenders and Quotations. - Basic knowledge on Cost Accounting Standards.

UNIT- II MATERIALS **13 Hour**

Materials – Stores Records – Purchase Order – Goods Received Note – Bin Cards – Stores Ledger – Inventory Control – ABC Analysis – Economic Order Quantity – Maximum, Minimum and Reordering levels – Methods of Pricing Issues - Perpetual Inventory System.

UNIT - III LABOUR **13 Hour**

Labour – Importance of Labour Cost Control – Recording labour time - Treatment of "Over Time " and "Idle Time" – Labour Turn Over-Various Methods of Wage payments - Calculation of wages – Methods of Incentives (Bonus) Schemes.

UNIT-IV OVERHEADS **13 Hour**

Overheads (Factory, Administration, Selling and Distribution) – Definition and Meaning of Overheads – Classification – Apportionment of Overheads –Redistribution (Secondary Distribution) – Absorption of Overheads including Machine Hour Rate.

UNIT - V METHODS OF COST ACCCOUNTING **12 Hour**

Methods of Cost accounting – Job Costing – Process Costing – Calculation of Inter Process Profit – Operating Costing.

Text Books

- Reddy & Murthy, (2019) Cost Accounting, Margham Publications, Chennai.
- Jain &Narang,(2018)Cost Accounting, Kalyani Publications, Ludhiana

Reference Books

- Charles T.Horngren,(2018), Cost Accounting- A Managerial Emphasis (19th Edition)Prentice Hall Of India(P) Ltd, New Delhi.
- Maheshwari, S. N. (2019) Cost and Management Accounts, Sultan Chand & Sons, New Delhi.
- Iyengar, S.P. (2018) Cost and Management Accountancy, Sultan Chand & Sons, New Delhi.

E-Resources

- https://icmai.in/upload/Students/Syllabus-2012/Study_Material_New/Inter-Paper8-Revised.pdf
- https://resource.cdn.icai.org/66524bos53753-ip-m1.pdf

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand various costing systems.	K2
CO-2	Identify the specifics of different costing methods.	K2
CO-3	Apply cost accounting methods for both manufacturing and service industry.	K3
CO-4	Differentiate methods of schedule costs as per unit of production.	K4
CO-5	Evaluate and provide recommendations to improve the operations of organizations through the application of Cost and Management accounting techniques.	K4

CREATIVITY FOR INNOVATIVE MANAGEMENT

UBAM312

Semester : III **Credit : 4**
Category : Core X **Hours/Week : 4**
Class & Major: II BBA **Total Hours : 52**

Course Objectives:

CO No.	To enable the students
CO-1	Recognize your potential for thinking creatively and enabling innovation.
CO-2	Implement innovative solutions by discovering and testing creative ideas.
CO-3	Create an environment that continually fosters creativity and innovation.
CO-4	Develop a persuasive case for implementing an innovation.
CO-5	Solve a specific innovation challenge and apply their knowledge into actual action that creates value.

UNIT - I CREATIVE THINKING **10 Hour**

Creativity-Meaning - Definition – Characteristics -Types of Creativity-Components of Creativity-Various Methods of creativity - – Individual and Group Creativity – Convergent Thinking –Divergent Thinking – Reasoning Problem Solving.

UNIT - II TECHNIQUES OF CREATIVITY **10 Hour**

Creativity Exercises – Mental Gym – The Way the Mind Works – Lateral and Vertical Thinking - Difference between Lateral and Vertical Thinking – Attitudes Towards Lateral Thinking – Basic Nature of Lateral Thinking – Techniques – The Generation of Alternatives –Challenging Assumptions - Generation of Creative Ideas.

UNIT-III METHODS OF CREATIVITY **10 Hour**

Thinking Hats Methods –Benefits - Redefinition Techniques – Random Stimulus – Generation of Creative Ideas in Groups – Brainstorming – Process – Stages – Creative Problem Solving - Reverse Brainstorming –Synaptic – Morphological Method.

UNIT - IV INNOVATION **10 Hour**

Innovation – Sources of Innovation – Making sense of Innovation- Categories of Innovation - Types of innovation, Barriers to Innovation, Innovation process - Establishing criterion for assessment of creativity & innovation – difference between Innovation & Invention.

UNIT - V INNOVATION OF PROBLEM SOLVING **12 Hour**

Achieving Creativity –Introduction to TRIZ methodology of Inventive Problem Solving - the essential factors –Innovator's solution –creating and sustaining successful growth –Disruptive Innovation model –Segmentive Models –New market disruption - Managing the Strategy Development Process –Cases for Innovation.

Text Books

- Davis Gary , " *Training Creative Thinking* ", Scott New York Pub.
- Dr.P.Rizwan Ahmed ,"*Creativity and Innovation Management*" , Margham Publication.
- Peter Drucker, "Innovation and Entrepreneurship: Practice and Principles " ,Harper Business Publications

Reference Books

- Clayton M. Christensen and Michael E. Raynor, "*The Innovator's Solution: Creating and Sustaining Successful Growth*", Wall Street Journal and New York Times. Recorded Books LLC.

E-Resources

- https://www.open.edu/...management/creativity...innovation/al.
- www.trm.chu.edu.tw/.../LEC5-INNOVATIONANDENTREPR..

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define the factors that predict creativity of individuals, groups, and organizations.	K1
CO-2	Understand innovation and creativity management from the perspective of obtaining a sustainable competitive advantage and integrating innovation into the business strategy.	K2
CO-3	Recognize the role that ongoing innovation plays in the competitive dynamics of industries and how these innovations affect society both positively and negatively.	K2
CO-4	Analyse the factors and drivers that predict creativity and innovation of individuals, groups, and organizations.	K4
CO-5	Formulate the attributes of successful innovation strategies including an in-depth understanding of the dynamics of innovation.	K6

ORGANIZATIONAL BEHAVIOUR

UBAM313

Semester : III **Credit : 4**
Category : Core XI **Hours/Week : 5**
Class & Major : II BBA **Total Hours : 65**

Course Objectives:

CO No.	To enable the students to
CO-1	Develop cognizance of the importance of human behaviour.
CO-2	Describe how people behave under different business conditions and understand why people behave as they do.
CO-3	Understand group behavior in organizations, including communication, leadership, power and politics, conflict, and negotiations.
CO-4	Critical evaluation of organisational practices and their impact on work behaviours, attitudes and performance.
CO-5	Creatively and innovatively engage in solving organizational challenges.

UNIT - I INTRODUCTION **12 Hour**

Organization: Meaning - Importance- scope - Theories; Organizational Behaviour: Meaning – Importance- scope - Organizational Behaviour models.

UNIT - II INDIVIDUAL BEHAVIOUR **13 Hour**

Individual differences- Personality – concept- theories- Perception- attitudes - values – Beliefs – ethics- Power - Definition– Types – Case studies

UNIT - III MOTIVATION **13 Hour**

Definition - Financial and non financial motivational techniques –Theories of Motivation - job satisfaction – meaning – factors influencing techniques – measurement – morale –importance-case studies.

UNIT- IV GROUP DYNAMICS **13 Hour**

Group – meaning-Types – Size and status- Group dynamics- Concept –features- Group forms – Role position status-Group decision making- Process and Techniques

UNIT - V WORK ENVIRONMENT – TEAMS **14 Hour**

Work environment –meaning- impact of technology; Team - meaning – types- difference between team and group - Conflict –meaning - Resolution –process- Counseling - Mentoring– Importance - Types - Information need for counseling.

Text Book

- S.S.Khanka , "*Organizational Behaviour"* , Sulthan Chand and Sons - 2004

Reference Books

- B.S.Moshal, "*Organisational theory & Behaviour",* Ane Books Pvt ltd , 2015
- L.M.Prasad , "*Organizational Behaviour"* , Sulthan Chand and Sons - 2018
- K. Ashwathappa, "*Organisational Behaviour*", Himalaya Publishing house , 2018

E-Resources

- www.b-u.ac.in/sde_book/msc_organ.pdf

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Identify the characteristics of successful teams in order to function effectively as a team members and leaders.	K2
CO-2	Apply different motivational theories and methods to increase the productivity and job satisfaction of employees.	K3
CO-3	Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.	K3
CO-4	Appraise their ability to manage, lead and work with other people in an organizational setting.	K5
CO-5	Evaluate ethical issues as related to organizational behavior.	K5

PRODUCTION AND MATERIALS MANAGEMENT

UBAM405

Semester : IV **Credit : 4**
Category : Core XII **Hours/week : 5**
Class & Major: II BBA **Total Hours : 65**
Course Objectives:

CO No.	To enable the students
CO-1	Understand how the knowledge of materials management can be an advantage to logistics and supply chain operations
CO-2	Develop skills necessary to effectively analyze and synthesize the many inter-relationships inherent in complex socio-economic productive systems
CO-3	Relate the importance of materials both in product and service
CO-4	Apply advanced techniques and concepts to improve material requirements planning and production management
CO-5	Create the knowledge and skills needed to plan and control manufacturing of goods and services in an industrial setting.

UNIT - I INTRODUCTION **10 Hour**

Production system – Introduction – Production –Productivity – Production management –Objectives – Functions – Scope –Relationship with other functional areas.

UNIT - II PRODUCTION PLANNING AND CONTROL **15 Hour**

Production planning and control – Routing and scheduling – Dispatching – Maintenance management – Types of maintenance – Breakdown – Preventive – Routine – Maintenance scheduling.

UNIT - III WORK STUDY **10 Hour**

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.

UNIT - IV MATERIALS MANAGEMENT **15 Hour**

Materials management - Definition - function – Importance of materials management. Integrated materials management – The concept – Service function advantages – Inventory control – Function of inventory - Importance – Replenishment stock – Material demand forecasting – MRP – Basis tolls – Inventory Management – ABC – VED – FSN analysis – Inventory control of spares and slow moving items – EOQ – EBQ – Stores planning.

UNIT - V MATERIALS HANDLING **15 Hour**

Store keeping and materials handling – Objectives – Function – Store keeping – Stores responsibilities – Location of store house – Centralized store room – Equipment – Security measures – Protection and prevention of stores, Methods of store keeping.

Text Book

- P. Saravanavel and S. Sumathi , *Production and Materials Management*, Margam Publications, Chennai, 2015

Reference books

- Gopalakrishnan & Sundaresan , *Materials Management* , Margham Publication,Chennai.
- Varmam, *Materials Management* , S.Chand,New Delhi.
- Dutta, *Integrated Materials Management* , Vikhas Publications,Chennai.

E- Resources

- https://gurukpo.com/.../production_and_Material_Management
- https://www.slideshare.net/.../production-and-materials-management.

Course Outcomes:

CO No	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the scope for integrating materials management function over the logistics and supply chain operations.	K2
CO-2	Identify, study, compare, and evaluate alternatives, select and relate with a good supplier.	K2
CO-3	Apply the various purchasing method and inventory controlling techniques into practice.	K3
CO-4	Demonstrate the organization wide materials requirement to develop an overall plan (MRP).	K3
CO-5	Analyzing the materials in storage, handling, packaging, shipping distributing and standardizing	K4

MICRO, SMALL AND MEDIUM ENTERPRISES
UBAM408

Semester : IV **Credit : 4**
Category : Core XIII **Hours/week : 4**
Class & Major: II BBA **Total Hrs : 52**
Course Objectives:

CO No.	To enable the students to
CO-1	Understanding of the various concepts and factors of entrepreneurship and MSME.
CO-2	Distinguish small industries and institutional supports to entrepreneurs.
CO-3	Identify the government policies and incentives to the small enterprises
CO-4	Apply their knowledge to run their businesses professionally, and profitably.
CO-5	Assess the nature of the business environment and evaluate business opportunities and threats.

UNIT- I SETTING UP MSME **10 Hour**

Evolution, Definition of SME's – Characteristics Advantages of MSME and its Role and significance in economic development – Need of SMEs. Forms of Organizations – Establishing SMEs –Environmental scanning – market assessment – Technology –Selection of site – organizational structures – Rules and Regulations.

UNIT - II MSMEs AND CLUSTER DEVELOPMENT **10 Hour**

Policy – Regulatory and Legal & Policy frame work for SMEs – Policy sift – Regulatory frame work – Laws and Regulation for SMEs – LLP Act – Changing policy frame work - Types of Clusters – Advantages and Disadvantages – Role of Clusters – Approaches to develop Clusters Strategies – Policy Environment.

UNIT - III INSTITUTIONAL FRAME WORK AND MSME FINANCING **10 Hour**

Institutions – Central Government- SSI Board – SIBO – SISI – PPDCs – RTC – State Government –Directorate of Industries - DICs – SFCs – SIDC – SIIC – Financial Institution and Banks – Commercials Banks – RRBs – Co – Operatives Banks

UNIT - IV FINANCING OPTIONS & MODELS **11 Hour**

Sources of Finance - Methods of Financing – Relevance of Quasi Capital and own money in business – Ventures Capital – Hybrid capital – Assessment of Term Finance – Collaterals - Documentation – Inspection - Follow up and Monitoring Review – Credit Scoring Models - Mudra Bank – Structure Approach to Financing SMEs.

UNIT - V GLOBAL OPPORTUNITIES MSME **11 Hour**

Micro Finance Approach to SMEs - Linkages with Agriculture and industry - IT and SMEs - Relationship banking and its impact in SME development - WTO issues, impact on SMEs – globalization issues, impact, intermediation opportunities and Emerging issues affecting SMEs. Challenges & opportunities of MSME under current scenario-Case Sudies.

Text Book

- Dr. P.T. Vijayshree & Dr. M.Alagammai "*Entrepreneurship And Small Business Management*". Margham Publication, 2017.

References

- Barrow C, "*The Essence of Small Business*", Prentice Hall of India, New Delhi.
- Bedapatai Mohanty, "*Economics of Small Scale Industries*", Ashish, New Delhi.
- Charantimath P.M., "*Entrepreneurship Development and Small Business Enterprises*", Pearson Education, New Delhi.

E- Resources

- https://www.oecd.org/cfe/smes/2090740.pdf
- https://en.wikipedia.org/wiki/Small_business

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Identity the new entrepreneurial opportunities for Employability.	K2
CO-2	Understand the opportunities to Set-Up SSI/MSME Units and role of entrepreneurship.	K2
CO-3	Analyze the firm's internal environment, competitive environment, and firm's suitability/eligibility to tap the benefits of supports or fund available under different government schemes and initiatives.	K4
CO-4	Examine the required skills and competencies for starting new entrepreneurship.	K4
CO-5	Evaluate role of government in promoting entrepreneurship	K5

HUMAN RESOURCE MANAGEMENT

UBAM407

Semester : IV **Credit : 4**
Category : Core XIV **Hours/week : 4**
Class & Major : II BBA **Total Hours : 52**

Course Objectives:

CO No.	To enable the students
CO-1	Understand the HR Management and system at various levels in general and in certain specific industries or organizations
CO-2	Apply the principles and techniques of human resource management.
CO-3	Examine the various HR concepts along with the domain concept in order to take correct business decisions.
CO-4	Analyze the issues and strategies required to select and develop manpower resources.
CO-5	Develop relevant skills necessary for application in HR related issues

UNIT - I INTRODUCTION **10 Hour**

Definition – Objectives – Functions – evolution and growth of HRM – Qualities of a good HR manager – changing roles of a HR manager– problems and challenges of a HR manager.

UNIT - II HUMAN RESOURCE PLANNING **10 Hour**

Definitions of human resource planning –objectives – steps in human resources planning - job analysis – job description – job specification.

UNIT - III RECRUITMENT & SELECTION **10 Hour**

Concept, objectives of recruitment – sources- internal and external recruitment – Selection- application blank – testing – interviews – induction- Case studies.

UNIT - IV TRAINING AND DEVELOPMENT **12 Hour**

Concept, principles of training – assessment of training needs – on the job training methods – off the job training methods – evaluation of effectiveness of training programs-MDP - Career Planning.

UNIT - V PERFORMANCE APPRAISAL & COMPENSATION **10 Hour**

Concept, process – methods of performance appraisal –Compensation-Wages-Salaries-Fringe Benefits–Transfer, promotion Termination of service. Case studies.

Text Book

- K**.**Aswathappa and Sadhna Dash "*Human Resource Management"*, Tata Mc Graw Hill, Delhi,2021.

Reference Books

- Subba Rao., "*Human Resource Management",* Konark Publishers,2014.
- C.B.Gupta, "*Human Resource Management",* S. Chand Publishers, Delhi, 2018.
- S.S.Khanka, "*Human Resource Management",* S. Chand Publishers, Delhi, 2008.

E- Resources

- www.whatishumanresource.com/human-resource-management
- www.managementstudyguide.com/human-resource-management.html
- www.investopedia.com/.../HRM.asp

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the employment relationship, which is a shared responsibility between employers, management, human resources specialists, and employees.	K2
CO-2	Identify the human resources needs of an organization or department.	K2
CO-3	Apply a job analysis and produce a job description from the job analysis.	K3
CO-4	Analyze the procedures and practices used for recruiting and selecting suitable employees	K4
CO-5	Develop the knowledge, skills and concepts needed to resolve actual human resource management problems or issues	K6

MANAGEMENT INFORMATION SYSTEM
UBAM409

Semester : IV **Credit : 5**
Category : Major Core XIIII (DSC) **Hours/week : 4**
Class & Major : II BBA **Total Hours : 52**
Course Objectives

CO No.	To enable the students
CO-1	Describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
CO-2	Explain the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
CO-3	Understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
CO-4	Identify and evaluate hardware and software requirements for information systems.
CO-5	Investigate the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.

UNIT - I INTRODUCTION TO MIS **10 Hour**

Definition of Management Information System – MIS support for planning - organizing and controlling – Structure of MIS – Information for decision – making.

UNIT - II CATEGORIES OF INFORMATION SYSTEMS **10 Hour**

Concept of System – Characteristics of System – Systems classification – Categories of Information Systems – Strategic information system and competitive advantage.

UNIT - III COMPUTERS AND INFORMATION PROCESSING **12 Hour**

Computers and Information Processing – Classification of Computer – Input Devices – Output devices – Storage devices – Batch and online processing. Hardware - Software.- Database Management Systems.

UNIT - IV SYSTEM ANALYSIS AND DESIGN **10 Hour**

System Analysis and design – SDLC – Role of System Analyst – Functional Information system – Personnel, Production, Material, Marketing.

UNIT - V DECISION SUPPORT SYSTEMS **10 Hour**

Decision Support Systems – Definition. Group Decision Support Systems – Business Process Outsourcing – Definition and function.

Text Book:

- Dr. S. P Rajagopalan Management Information System,S.Chand & Sons,2012.

Reference Books:

- Mudrick & Ross, Management Information System, Prentice – Hall of India, 2010.
- Gordan B. Davis ,Management Information Systems, S.Chand & Sons,2009.
- Sadagopan ,Management Information Systems, Prentice – Hall of India, 2014.

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the role of the ethical, social, and security issues of information systems.	K2
CO-2	Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.	K3
CO-3	Relate the basic concepts and technologies used in the field of management information systems.	K4
CO-4	Compare the processes of developing and implementing information systems.	K4
CO-5	Evaluate the role of information systems in organizations, the strategic management processes, with the implications for the management.	K5

TEAM BUILDING

UBAE203

Semester : II **Credit : 2**
Category : Non Major Elective **Hours/week : 3**
Class & Major : I BBA **Total Hours : 39**
Course Objectives:

CO No.	To enable the students
CO-1	Understand the concepts and components of team building.
CO-2	Analyze the strategies required to develop personality.
CO-3	Develop relevant skills necessary for application in group dynamics.
CO-4	Examine the various concepts of pitfalls of groups and team training in organization.
CO-5	Analyze the strategies required to develop team and organizational culture.

UNIT - I INDIVIDUAL BEHAVIOUR **9 Hour**

Meaning - Foundation of Individual Behaviors - Models of Man's Personality - Determinants of Personality - Stages of Personality Development - Attitudes & Values.

UNIT - II GROUP BEHAVIOURS **6 Hour**

Meaning of Group - Reasons for Formation of Groups - Characteristics of Groups -Types of Groups - Group Cohesiveness - Group Decision Making Process - Small Group Behavior.

UNIT - III GROUP DYNAMICS **9 Hour**

Group Dynamics - Nature of Groups - Types of Group - Why do People Join Groups - Group Development - Usefulness of Groups in Organization - Pitfalls of Groups - Determinants of Group Behavior - External Conditions - Group Members' Resources - Group Structuring.

UNIT - IV TEAM DYNAMICS **6 Hour**

Team Dynamics - Nature of Teams - Teams Vs Groups - Benefits From Teams - Types Of Team - Implementing Teams in Organizations - Team Issues - Effective Teamwork.

UNIT - V TEAM BUILDING **9 Hour**

Team and Organizational Culture - Team Building - Process-Team Building and Team Training - Communication and Its role in Team Building- Case Study related to Topics.

Text books

- Blum ML - *Industrial Psychology and its social foundations.,S.Chand & Sons,2009.*

Reference books

- Hippo ,*Organizationl Behavior, S.Chand & Sons,2009.*
- Hersey Blanchard,*Introduction to Organsaitonal Behavior,* Tata Mc Graw Hill,2010.
- JayaShakar,*Organisation Behavious,*Margham publication,2009.

Course Outcomes:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the challenging activity that helps the team focus on the importance of everyone having input, being heard and being open and honest.	K2
CO-2	Identify the important team processes, where there can be improvements and what can be done to ensure the processes are working for the team rather than the other way round.	K2
CO-3	Apply team differences and learn how to make the most of the skills, abilities and styles.	K3
CO-4	Analyze the issue of leadership within the team and what can be done to improve this area.	K4
CO-5	Develop a clear understanding of what it is they are trying to achieve whilst focusing on further team improvements	K6

RURAL MANAGEMENT

UBAE 404

Semester : IV **Credit 2**
Category : Non Major Elective **Hours/week 3**
Class & Major: II UG **Total Hours 39**
Course Objectives:

CO No.	To enable the students
CO-1	Understand conceptual knowledge, logical reasoning and analytical skills in the domain of commerce in rural.
CO-2	Discuss the various aspects of rural marketing as an integral part of marketing management and develop an understanding of rural marketing.
CO-3	Examine the factors influencing the rural women empowerment.
CO-4	Analyze rural markets through marketing mix while applying the marketing concepts suitable to the rural markets.
CO-5	Evaluate pricing and distribution strategies for rural consumers.

UNIT - I INTRODUCTION TO RURAL MANAGEMENT 9 Hour

Rural Management- Nature - Scope and Challenges in Marketing Operations - Human Resources and Finance in Rural Areas - Social Economic Status of Rural Areas - Structure of Rural Areas. Entrepreneurship Opportunities in Rural Areas.

UNIT - II RURAL RESOURCE MANAGEMENT 6 Hour

Concepts – Interventions (SHG) - Chetanayalya & Women Empowerment - Gram Sabha - Self- Governece - Micro Entrepreneurship Development Programme(MEDP).

UNIT - III MARKETING OF AGRICULTURE PRODUCTS 9 Hour

Agricultural Marketing - Marketing Rural Non-Farm Products - Marketing Network - Different Marketing Agencies and Institutions - Various Types of Distributions Channels in Rural Marketing - Case Studies.

UNIT - IV RURAL HEALTH 6 Hour

Rural Health Care - Primary Health Care - Development of Health Care Services in Rural India – National Health Policy and Programmes - Pradhan Mantriswasthya Suraksha Yojana (PMSSY) – ICDS.

UNIT - V RURAL FINANCING 9 Hour

Introduction to Rural Financing - Sources of Finance - Requisites of a Good Finance System - National Level Credit Agency-NABARD - Functions of NABARD - Schemes and Patterns of NABARD.

Text Book

- Gopalaswamy, T.P. (2009). *Rural Marketing Environment,* Problems and Strategies. Vikas. (1st Ed). Chennai.
- Warran, M. (2008) . *Financial Management for Farmers and Rural Managers*. BlackwellPublishing. New Delhi.

References:

- Prag, PA.(2009). *Rural Diversification*. EG Books,Chennai.
- Thorner, Daniel, and Alice Morner, (2010) *Land and Labour In India*. Asia Publishing House.Delhi
- Deu, S. Mahendra and K.S. Basu, (2007.) *Economic and Social Development*. AcademicFoundation.

E-Resource

- https://www.slideshare.ne
- https://www.learnpick.in/prime/documents/ppts/details/1269/rural-development

Course Outcomes:

CO No.	Course Outcomes On completion of the course the student will be able to	Bloom's Level
CO-1	Discuss rural market Challenges & Opportunities in a dynamic market.	K2
CO-2	Explain and interpret Rural Marketing Evolution and Structure	K2
CO-3	Apply the concepts relating to Women Empowerment.	K3
CO-4	Differentiate and design marketing strategies for rural specific products.	K4
CO-5	Evaluate and interpret the relevance of pricing and distribution strategies.	K5

III & IV Evaluation Component OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
II	Non-Major Elective/SEC	UBAE203	Team Building	Album making	Assignment
IV	Non-Major Elective/SEC	UBAE404	Rural Management	Assignment	Poster Presentation

PG & RESEARCHDEPARTMENT OF COMMERCE

PREAMBLE

UG: Programme Profile and the Syllabi of Courses offered in Semester III and IV along with III and IV Evaluation Components (with effect from 2021-2024 Batch onwards)

PG: Programme Profile and the Syllabi of Courses offered in Semester III and IV along with III and IV Evaluation Components (with effect from 2021-2023 Batch onwards)

PROGRAMME PROFILE B.Com.

(Learning Outcome Based Curriculum Framework (LOCF)

Programme Specific Outcomes (PSO)

Upon completion of the programme, the students will be able to

- Understand the Accounting Concepts and Convention.
- Analyze the Practical Tools of Finance required in Decision Making.
- Apply Contextual Knowledge to assess Societal, Health, Safety and Legal Relevant to the Professional Accounting Practice.
- Develop Accounting and Entrepreneurial skills.

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hrs/ Week	Credits Min/ Max
I	I	Part I Languages/ AECC-1I	UTAL107/ UTAL108/ UHIL102/ UFRL102	Basic Tamil I/ Advanced Tamil I/ Hindi I / French I	UTAL103/ UTAL104/ UHIL101/ UFRL101	5	3 / 4
	II	Part II Languages/ AECC-1	UENL109/ UENL110	English for Communication I/ English for Communication II	UENL106	5	3 / 4
	III	Core II/ (DSC)	UCOM104/UCCM102	Financial Accounting	UCOM103/ UCCM101	6	5
		Allied I/(GE)	UCEA103	Business Economics	UCEA102	6	5
		Allied II/(GE)	UMAA112	Business Mathematics	UMAA214	6	4
		PE	UPEM101	Professional English I	--	6	4
	IV	Value Edu (SEC)		Family Life Education		2	1
TOTAL						**36**	**25/27**
II	I	Part I Languages/ AECC-1I	UTAL207/ UTAL208 UFRL202/ UHIL202	Basic Tamil – II/ Advanced Tamil –II/ French – II/ Hindi – II	UTAL203/ UTAL204/	5	3/ 4
	II	Part II Languages/ AECC-1	UENL209/ UENL210	English for Communication IEnglish for Communication II	UENL206	5	3/4
	III	Core III/(DSC)	UCOM204/ UCCM203	Business Correspondence	---	5	4
		Core IV/(DSC)	UCOM206/ UCCM206	Management Accounting	UCOM507/ UCCM507/ UBAM408	5	3
		Allied III/(GE)	UCEA202	Indian Economic Development	UCEA301	6	5

		Core V	UCOR206/ UCCR206/ UIAR203	Industry Interface Programme I – Banking and Insurance	UCOR205	1	1
		PE	UPEM201	Professional English II	--	6	4
	IV	NME /(SEC)				3	2
	IV	Internship	UCOI201/ UCCI201/ UIAI201	Internship / Field Work / Field Project			-/1
	V	Extension Activity/ Physical Education				-	1 / 2
					TOTAL	**36**	**26/30**
III	III	Core VI/(DSC)	UCOM309/ UCCM309/ UBAM310	Cost Accounting	UCOM501/ UCCM501	5	4
		Core VII/(DSC)	UCOM306/ UCCM306/ UBAM308	Marketing Management	UCOM606/ UCCM601	4	4
		Core VIII/(DSC)	UCOM307/ UBAM309	Financial Markets & Services	UCOM303	6	4
		Core IX/(DSC)	UCOM308/ UCCM308	Accounting for Non - Trading Concerns	---	4	4
	IV	Online Course	UONL301	NPTEL	---	3	1 / 2
	IV	Allied IV/(GE)	UMAA301	Business Statistics		6	4
	IV	VE/(SEC)		Environmental Science		2	1
					TOTAL	**30**	**22/23**
IV	III	Core X/(DSC)	UCOM413	Banking Law & Practice	UCOM201	4	4
		Core XI/(DSC)	UCOM414/ UCCM414	Corporate Accounting	UCOM304/ UCCM304	5	4
		Core XII/(DSC)	UCOM409/ UCCM409	Business Law	UCOM302/ UCCM302	5	4
		Core XIV/(DSC)	UCOR413/ UCCR411 UIAR404	Industry Interface Programme II – Stock Market & Mutual Fund	UCOR411	1	1
		Core XV/(DSC)	UCOM412 / UCCM412	Security Analysis & Portfolio Management	---	4	3
		Allied V/(GE)	UCSA409	Business Analytics and Intelligence	UCSA509	3	3
		Allied Practical I/(GE)	UCSR415	Business Analytics and Intelligence using SAS – Lab	UCSR512	3	2
	IV	Soft Skills/(SEC)		Personality Development		2	1
		NME/(SEC)				3	2
		Internship	UCOM401/ UCCM401/ UIAM401	Internship / Field Work / Field Project			-/1

	V	Extension Activity Physical Education				-	0 / 2
					TOTAL	**30**	**24/27**
V	III	Core XVII /(DSC)	UCOM511/ UCCM511	Company Law	UCOM503/ UCCM503	6	4
		Core XVIII/ (DSC)	UCO0501	Total Quality Management / Human Resource Management	--	6	5
		Core XIX/ (DSC)	UCOM509/ UCCM509 UIAM503	Income Tax Law & Practice I	UCOM502/ UCCM502	5	4
		Core XX/(DSC)	UCOM510/ UCCM510 UIAM504	Accounting Package	UCOM604/ UCCM604	3	2
		Core Practical I	UCOR501/ UCCR501/ UIAR501	Accounting Package – Lab	UCOR605/ UCCR605	3	3
		Core XXI/(DSC)	UCOP501/ UCCP501/ UIAP501/ UCOM511/ UCCM511 UIAM511	Project/Principles and Practice of Insurance	---	5	5
	IV	VE/(SEC)				2	1
					TOTAL	**30**	**24/24**
VI	III	Core XXII/(DSC)	UCOM612/ UBAM609/ UIAM601	Women Entrepreneurship	---	5	5
		Core XXIII/ (DSC)	UCOM614/ UCCM614/ UBAM610	Financial Management	UCOM613/ UCCM613/ UBAM610	6	5
		Core XXIV/(DSC)	UCOR618/ UCCR618/ UIAR603	Industry Interface Programme III - GST Practical	UCOR615/ UCCR615	1	1
		Core XXV/(DSC)	UCCM616/ UCOM616/ UIAM604	Goods and Services Tax	---	6	5
		Core XXVI/ (DSC)	UCOM617/ UCCM617/ UIAM605	Service Marketing	---	5	5
		Viva Voce	UCOM607/ UCCM607/ UIAM606	Comprehensive Viva	---	-	1
		Major Elective/(DSE)	UCOO606/ UCCO606/ UIAO608	1.Logistics Management	---	5	4
			UCOO606/ UCCO606/ UIAO608	2. Income Tax Law & Practice II	UCOM602/ UCCM602		

			UCOO607/ UCCO607/ UIAO609	3. Consumer Protection	---		
	IV	SS/(SEC)				2	1
		Internship	UCOI601/ UCCI601/ UIAI601	Internship / Field Work / Field Project			-/1
		Extension Activity	UROX601	Rural Outreach Programme			-/1
	V	Extension Activity				-	0/2
					TOTAL	**30**	**27/31**
					GRAND TOTAL	**192**	**148/162**

DEPARTMENT OF COMMERCE WITH CA

PREAMBLE:

UG : Programme Profile and Syllabi of Courses Offered in Semester III and IV along with III and IV Evaluation Components (With effect from 2021 – 2024 Batch onwards).

PROGRAMME PROFILE: B.Com. (CA)

(Learning Outcome Based Curriculum Framework (LOCF)

Programme Specific Outcomes (PSO)

Upon completion of the programme, the students will be able to

- Understand the Concept of Accounting and Computer Application in Business
- Analyze latest Technologies to Solve Problems in the areas of Computer Application.
- Apply the Knowledge of Accounting Fundamentals and Accounting Specialization in Business.
- Develop Accounting and e- Entrepreneurial skills.

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hrs/Week	Credit Min/Max
I	I	Part I Languages/ AECC-1I	UTAL107/ UTAL108 UHIL102/ UFRL102	Basic Tamil – I/ Advanced Tamil – I/ Hindi –I/ French – I/	UTAL103/ UTAL104	5	3 / 4
	II	Part II Languages/ AECC-1	UENL109/ UENL110	English for Communication IEnglish for Communication II	UENL106	5	3 / 4
	III	Core II/(DSC)	UCCM102/ UCOM104	Financial Accounting	UCOM103/ UCCM101	6	5
		Allied I/(DSC)	UCSA105	Multimedia	UCSA303	3	3
		Allied Practical I/(GE)	UCSR111	Multimedia Lab	UCSR306	3	2
		Allied II/(GE)	UMAA112	Business Mathematics		6	4
		PE	UPEM101	Professional English I	--	6	4
	IV	Value Education/(SEC)		Family Life Education		2	1
				TOTAL		**36**	**25/27**

II	I	Part I Languages/ AECC-1I	UTAL207/ UTAL208/ UFRL202/ UHIL202	Basic Tamil – II/ Advanced Tamil –II/ French – II/Hindi –II	UTAL205/ UTAL206	5	3 / 4
	II	Part II Languages/ AECC-1	UENL209/ UENL210	English for Communication I English for Communication II	UENL206	5	3 / 4
	III	Core III/(DSC)	UCCM203/ UCOM204	Business Correspondence	---	5	4
		Allied III/(GE)	UCSA205	C Programming	UCSA104	3	3
		Allied Practical II/(GE)	UCSR208	C Programming – Lab	UCSR110	3	2
		Core IV/(DSC)	UCCM206/ UCOM206/ UCCM407/ UCOM407	Management Accounting	UCOM507/ UCCM507/ UBAM408	5	3
		Core V/(DSC)	UCCR206/ UCOR206/ UIAR203	Industry Interface Programme I – Banking and Insurance	UCCR205	1	1
		PE	UPEM201	Professional English II	---	6	4
	IV	NME/(SEC)				3	2
	IV	Internship	UCOM201/ UCCM201/ UIAM201	Internship / Field Work / Field Project			-/1
	V	Extension Activity/ Physical Education				-	1 / 2
					TOTAL	**36**	**26 /30**
III	III	Core VI/(DSC)	UCCM309/ UCOM309	Cost Accounting	UCCM501	5	4
		Core VII/(DSC)	UCCM306/ UCOM306/ UBAM308	Marketing Management	UCCM606	4	4
		Core VIII/(DSC)	UCCM308/ UCOM308	Accounting for Non - Trading Concerns	---	4	4
		Online	UONL301	NPTEL	---	3	1 / 2
		Allied IV/(GE)	UCSA306	Object Oriented Programming	UCSA204	3	3
		Allied Practical III/(GE)	UCSR310	Object Oriented Programming – Lab	UCSR207	3	2
		Allied /(GE)	UMAA309	Business Statistics	UMAA403	6	4
	IV	Value Education/(SEC)		Environmental Science		2	1
				TOTAL		**30**	**23/24**
IV	III	Core IX/(DSC)	UCCM413	e-Banking	---	4	4
		Core X/(DSC)	UCCM414/ UCOM414	Corporate Accounting	UCCM304	5	4
		Core XI/(DSC)	UCOM409/ UCCM409	Business Law	UCCM302	5	4
		Core XII/(DSC)	UCCR411/ UCOR413/ UIAR404	Industry Interface Programme II – Stock Market and Mutual Fund	UCCR410	1	1

		Core XIII/(DSC)	UCOM412 / UCCM412	Security Analysis & Portfolio Management	---	4	3
		Allied V/(GE)	UCSA408	Fundamentals of Block Chain Technology	UCSA305	3	3
		Allied Practical IV/(GE)	UCSR414	Block Chain Technology using Solidity – Lab	UCSR309	3	2
	IV	NME/(SEC)				3	2
		Soft skills/(SEC)		Personality Development		2	1
	IV	Internship	UCOM401/ UCCM401/ UIAM401	Internship / Field Work / Field Project			-/1
	V	Extension Activity/ Physical Education				-	0 /2
				TOTAL		**30**	**24/27**
V	III	Core XV/(DSC)	UCOM511/ UCCM511	Company Law	UCOM503/ UCCM503	6	4
		Core XVI/(DSC)	UCCM509/ UCOM509 UIAM503	Income Tax Law & Practice I	UCCM502	5	4
		Core XVII/(DSC)	UCCM510/ UCOM510/ UIAM504	Accounting Package	UCCM604	3	2
		Core Practical I	UCOR501/ UCCR501/ UIAR501	Accounting Package – Lab	UCCR605	3	3
		Allied VI/(GE)	UCSA510	Digital MarketingAnalytics	UCSA406	3	3
		Allied Practical V/(GE)	UCSR513	Web Design using Microsoft Expression web– Lab	UCSR412	3	2
		Core XVIII/(DSC)	UCOP501 UCCP501/ UIAP501/ UCOM511 UCCM511 UIAM511	Project / Research Methodology	---	5	5
	IV	ValueEducation/(SEC)				2	1
				TOTAL		**30**	**24/24**
VI	III	Core XIX/(DSC)	UCCM615	E- Entrepreneurship	---	5	4
		Core XX/(DSC)	UCCM614/ UCOM614 UBAM610	Financial Management	UCOM613/ UCCM613/ UBAM610	6	5
		Core XII/(DSC)	UCCR618/ UCOR618/ UIAR603	Industry Interface Programme III – GST Practical	UCCR615/ UCOR615	1	1
		Core XIII/(DSC)	UCCM616/ UCOM616/ UIAM604	Goods and Services Tax	---	6	5
		Core XXI/(DSC)	UCCM617/ UCOM617/ UIAM605	Service Marketing	---	5	5

VI	III	Viva Voce	UCCM607/ U COM607/ UIAM606	Comprehensive Viva	---	-	1
		Major Elective/ (DSE)	UCOO606/ UCCO606/ UIAO608	1. Logistics Management	---	5	4
			UCCO606/ UCOO606/ UIAO608	2.Income Tax Law & Practice II	UCCM602		
			UCCO607/ UCOO607/ UIAO609	3. Consumer Protection	---		
	IV	Soft skills/(SEC)				2	1
		Internship	UCOI601/ UCCI601/ UIAI601	Internship / Field Work / Field Project			-/1
		Extension Activity	UROX601	Rural Outreach Programme			-/1
	V	Extension Activity/ Physical Education				-	0/2
					TOTAL	**30**	**26/30**
					GRAND TOTAL	**192**	**148/162**

UG COURSES OFFERED TO OTHER DEPARTMENTS

Semester	Category	Course Code	Department	Course Title	Contact / Week	Credit	
						Min	Max
III	Allied III/(GE)	UCOA303	BCA	Financial Accounting	6	5	5
IV	Allied IV/(GE)	UCOA403/ UCOR403	BCA	Accounting Package Accounting Package – Lab	2 3	2 3	2 3

NON MAJOR ELECTIVE
(These courses are offered to all major except B.Com. B.Com. CA,BBA and BCA

Semester	Category	Course Code	Course Title	Contact/ Week	Credit	
					Min	Max
II	Non Major Elective – I /(SEC)	UCOE204	Internet Banking	4	2	2
IV	Non Major Elective – II /(SEC)	UCCE402/ UCOE402 UIAE402	Individual Tax Planning	4	2	2

EXTRA CREDIT EARNING PROVISIONS

Semester	Category	Course Code	Course Title	Contact/ Week	Credit	
					Min	Max
IV	Core XXVII/ XXV	UCOI401/ PCOI401	Summer Internship	-	-	2

UCOM309 / UCCM309 / UBAM310 - COST ACCOUNTING

Semester: III **Credit : 4**
Category: Core VI **Hours/Week: 5**
Class :II B.Com & II B Com CA **Total Hours:65**

Course Objectives

CO No.	To enable the students
CO-1	Identify the various elements of costs.
CO-2	Understand basic concepts of Cost Accounting.
CO-3	Evaluate the various methods of ascertainment of costs.
CO-4	Apply knowledge in cost control
CO-5	Develop cost accounting skills

UNIT-I INTRODUCTION **14 Hour**

Cost Accounting- Definition, Meaning and Objectives, Advantages and Importance – Distinction between Cost and Financial Accounting –Elements of Cost and Preparation of Cost Sheets, Tenders and Quotations.- Basic knowledge on Cost Accounting Standards.

UNIT-II MATERIALS **13 Hour**

Materials – Stores Records – Purchase Order – Goods Received Note – Bin Cards – Stores Ledger – Inventory Control – ABC Analysis – Economic Order Quantity – Maximum, Minimum and Reordering levels – Methods of Pricing Issues - Perpetual Inventory System

UNIT –III LABOUR **13 Hour**

Labour – Importance of Labour Cost Control – Recording labour time - Treatment of "Over Time " and "Idle Time" – Labour Turn Over-Various Methods of Wage payments - Calculation of wages – Methods of Incentives (Bonus) Schemes.

UNIT-IV OVERHEADS **13 Hour**

Overheads (Factory, Administration, Selling and Distribution) – Definition and Meaning of Overheads – Classification – Apportionment of Overheads –Redistribution (Secondary Distribution) – Absorption of Overheads including Machine Hour Rate.

UNIT-V METHODS OF COST ACCCOUNTING **12Hour**

Methods of Cost accounting – Job Costing – Process Costing – Calculation of Inter Process Profit – Operating Costing.

Text Books

- Reddy & Murthy, (2019) *Cost Accounting*, Margham Publications, Chennai.
- Jain &Narang,(2018)*Cost Accounting*, Kalyani Publications, Ludhiana.

Reference Books

- Charles T.Horngren,(2018), *Cost Accounting- A Managerial Emphasis (19th Edition)*Prentice Hall Of India(P) Ltd, New Delhi.
- Maheshwari, S. N. (2019) *Cost and Management Accounts*, Sultan Chand & Sons, New Delhi.
- Iyengar, S.P. (2018) *Cost and Management Accountancy*, Sultan Chand & Sons, New Delhi.

E-Resources:

- https://icmai.in/upload/Students/Syllabus-2012/Study_Material_New/Inter-Paper8-Revised.pdf
- https://resource.cdn.icai.org/66524bos53753-ip-m1.pdf

Course Outcomes

CO No.	The student will be able to	CognitiveLevel
CO 1	Compute various elements of costs	K1
CO 2	Apply costing techniques to control costs	K2
CO 3	Examine various methods of pricing issues	K3
CO 4	Acquire the ability to determine price of goods and service	K4
CO 5	Develop industry specific costs accounting skills	K5

UCOM306 / UCCM306 / UBAM308 - MARKETING MANAGEMENT

Semester : III **Credit : 4**
Category : Core VII **Hours/Week : 5**
Class &Major : II B.Com., II B.Com CA & II BBA **Total Hours : 65**

Course Objectives

CO No.	To enable the students
CO-1	Understand the conceptual framework of Marketing.
CO-2	Apply the product and pricing policies and sales promotion techniques in the emerging Marketing scenario
CO-3	Identify factors and processes essential for designing marketing strategy
CO-4	Undertake marketing research and apply the outcome for product development.
CO-5	Develop marketing skills

UNIT - I FUNDAMENTALS OF MARKETING **13Hour**

Marketing: Meaning — Classification –Functions- approaches- Relationship of marketing with other functional areas- Various Environmental factors affecting the marketing functions— Market Mix –Meaning of marketing management

UNIT - II PRODUCT AND PRICING **13 Hour**

Product – Characteristics – Classification- Product mix – process of New Product development - Product life cycle – Branding – Packaging- Pricing strategies -Factors influencing pricing decisions – Kinds of pricing- Pricing objectives – Pricing policies.

UNIT - III PROMOTION **14 Hou**

Promotion mix- Advertising – Publicity – Public relations – Personal Selling – Sales Promotion Administration- Physical distribution – Importance of various kinds of distribution channels- Case studies –An overview of e-promotion.

UNIT - IV BUYER BEHAVIOR AND SALES FORECASTING **13 Hour**

Buying motives – Buyer Behavior models – Buying Decision Process -Factors influencing Buyer behavior- Market segmentation – Need and basis of segmentation, targeting- positioning– Marketing strategy- Various methods of sales forecasting.

UNIT - V MARKETING RESEARCH & RECENT TRENDS IN MARKETING **12 Hour**

Meaning – Steps involved in Market Research –Marketing Information System- organization involved in marketing research in India-Case studies - Recent Trends in Marketing: Tele Marketing Initiatives and requirements - e-marketing – benefits, types and developments.

Text Book

- Philip Kotler, *Marketing Management* , Prentice Hall of India, New Delhi, 2015

Reference Books

- Varshney .L and Gupta SL , *Marketing Management,* Jain Book Agency, New Delhi, 2015
- Saxena , *Marketing Management,* Tata McGraw Hill Publication, New Delhi, 2015

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Identify the scope and significance of Marketing in Industry	K1
CO 2	Practice marketing communication skills relevant to the corporate world.	K2
CO 3	Demonstrate an understanding of fundamental concepts of marketing	K3
CO 4	Analyze global business opportunities and its implications on a firm's marketing strategy.	K3
CO 5	Integrate various elements of marketing to develop a marketing plan.	K4

UCOM308/UCCM308 ACCOUNTING FOR NON - TRADING CONCERNS

Semester : III **Credit :4**
Category :Core IX/VIII **Hours/Week : 4**
Class&Major: IIB.Com& IIB.ComCA **Total Hours : 52**

Course Objectives

CO No.	To enable the students
CO 1	Understand the basic Concepts of Accounting
CO 2	Analyze Income and Expenditure of Non- trading concerns
CO 3	Develop accounting skills
CO 4	Prepare income and expenditure accountant
CO 5	Apply the knowledge of the accounting for prepare accounts non trading concerns .

UNIT- IINTRODUCTION **11 Hour**

Meaning and characteristics of Non-profit organization – main sources of income – difference between NGO and Non-profit organizations – Receipts and Payments A/c- meaning – need – preparation – advantages – limitations – differences between receipts and payments A/c and cash book.

UNIT- II RECEIPTS AND PAYMENTS ACCOUNTS **10 Hour**

Income and expenditure account – need and preparation –differences between Receipts and Payments A/C and Income and Expenditure A/C – adjustments: outstanding, prepaid, accrual, unearned incomes, depreciation on asset – Preparation of balance sheet.

UNIT- III ACCOUNTS FOR TRUST **9Hour**

Treatment of peculiar items – legacy-donations –subscription – entrance fees- life membership fees – entrance fees – sale of news paper – sale of sports material- honorarium –special fund – capital fund

UNIT- IV ACCOUNTS FOR EDUCATIONAL INSTITUTIONS **10Hour**

Educational Institutions – registration – organization pattern – features- source of finance for running the educational Institutions – sponsorship from public – admission fees – use of term fees – recurring grants – use of grant-in-aid.

UNIT- V ACCOUNTING FOR OTHER INSTITUTIONS **12 Hour**

Accounting treatments for self help group – cricket association – nursing association – football federation of India – trust – charitable institutions – welfare association.

Text Books

- Grewall, *T.S Accountancy,* S. Chand Publications, Delhi, 9th Edition, 2016.
- John H.McCarthy, Nancy E. Shelmon, John Mattie, *Financial and Accounting Guide For Non-Profit Organizations*, John Wiley and Sons Publishers ,8th Edition.
- Jain S P Narang K L, *Accounting Principles*, Kalyani Publishers, 8th Edition, 2015

Reference Books

- Arulanandham, M. A.& Raman K.S, *Financial Accounting*, Himalaya publishing house, New Delhi,2016
- Gupta R.L., & Gupta V.K.,*Financial Accounting*, Sultan Chand & Sons, New Delhi,2014

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Prepare receipt and payment accountant	K1
CO 2	Differentiate receipt & payment accountant and income expenditure account	K2
CO 3	Explain advantage and limitations of receipts and payment account	K3
CO 4	Evaluate sources of income for non trading concerns	K3
CO 5	Acquire the accounting knowledge for charitable institutional	K4

UCOM413 BANKING LAW AND PRACTICE

Semester : IV **Credit : 4**
Category:Core X **Hours/ Week: 4**
Class : II B.Com **Total Hours : 52**

Course Objectives

CO No.	To enable the students
CO-1	Understand legal aspects of banking business
CO-2	Obtain knowledge on banking functions and services
CO-3	Understand the features of negotiable instruments
CO-4	Evaluate recent trends in banking
CO-5	Develop E- Banking skills

UNIT-I BANKER AND CUSTOMER **11Hour**

Banker and Customer relationship – Meaning – Definition – Relationship – General and Special – Obligation to honor cheque – Obligation to maintain secrecy of customer's account – Right to charge Compound Interest.

UNIT-II TYPES OF DEPOSIT **10Hour**

Opening of an account – Types of deposit accounts – Types of Customers (Individual, Firms, Trusts and Companies) – Customer Relations – Customer Grievances and Redressal – Ombudsman Schemes.

UNIT-III NEGOTIABLE INSTRUMENTS **11Hour**

Negotiable Instruments – Promissory Note – Bills of exchange, Cheque, Draft – Definitions, Features – Crossing – Endorsements – Material Alteration – Paying banker – Rights and Duties – Statutory Protection – Dishonor of Cheques – Role of Collecting Banker.

UNIT-IV PRINCIPLES OF LENDING **10 Hour**

Principles of lending – Types of Borrowings – Precautions to be taken by a banker

UNIT-V E-BANKING **10 Hour**

E- Banking – ATM Cards, Debit Cards, Personal Identification, Number – On Line Enquiry and Update Facility – Electronic Fund Transfer – Electronic Clearing System.

Text Books

- Nirmala Prasad & Paul Doss, (2020) *Banking and Financial System* Himalayan Publishing, Chennai.
- Santhanam, B, (2020) *Banking And Financial System*,Margham Publishing, Chennai

Reference Books

- Balu.V.,(2021)*Banking & Financial System*,SriVenkanteswara Publishing , Chennai.
- Maheswari. *S.N.*,(2021)*Banking Law Theory & Practice*, Kalayani PublishingHouse Chennai
- Sundaram and Varshney,(2021) Banking Theory, Law And Practice,Sultan Chand Company, New Delhi,

Web References:

- https://en.wikipedia.org/wiki/Online_banking
- https://www.sbi.co.in/portal/web/services/internet-banking
- https://www.hdfcbank.com/assets/popuppages/netbanking.htm
- https://www.investopedia.com/terms/m/mobile-banking.asp
- https://www.rbi.org.in/, http://www.iibf.org.in/

Course Outcomes

CO No.	The student will be able to	CognitiveLevel
CO 1	Explain the relationship between banker and customers	K1
CO 2	Examine the role of paying and collecting bankers	K2
CO 3	Appraise electronic payment system	K3
CO 4	Apply the knowledge to solve customer grievances	K4
CO 5	Develop E- Banking skills	K5

UCCM413 E-BANKING

Semester : IV **Credit : 4**
Category : Core IX **Hours/Week: 4**
Class&Major: II B. Com CA **Total Hours : 52**

Course Objectives

CO No.	To enable the students
CO-1	Understand electronic settlement and clearance system
CO-2	Identify the latest development in the field of Banking and Financial System.
CO-3	Analyze Strengths, Weaknesses, Opportunities and Threats of e-banking.
CO-4	Apply the concept of electronic banking in electronic commerce.
CO-5	Evaluate the features of bank cards

UNIT- I DIGITAL BANKING **13 Hour**

e-Banking – Meaning - Benefits – Internet Banking Services – Drawbacks – Mobile Banking – Features – Drawbacks – Call Centre Banking – Features – Challenges. Core Banking Solutions (CBS) – Benefits – Single Window Concepts – Features.

UNIT- II ELECTRONIC PAYMENT SYSTEM **13 Hour**

Electronic Payment System: Automatic Teller Machine -Types - Features – Benefits – Challenges - MICR Cheques – Benefits MICR Equipment – Precautions in handling MICR Instrument – Benefits and Limitations - Payment Wallets

UNIT- III E-CASH & ELECTORNIC CLEARING **13 Hour**

e-Cash: Features – Benefits of e-cash – Limitations of Electronic Data Interchange – Electronic Fund Transfer – RBI Guidelines - NEFT and RTGS – Benefits to Banker and Customer.

UNIT- IV BANK CARDS **13 Hour**

Benefits of Debit and Credit Cards – Smart Card, Waving Card, Contactless Card, DIP Card, RFID Card– Features – Biometric Cards – Features – Payment through Bank Network – Electronic Pass Book – Home Banking.

UNIT- V CHALLENGES AND OPPORTUNITIES **13 Hour**

e-Banking Challenges and Opportunities – Services Offered through e-Banking – Strengths of e-Banking – Weaknesses of e-Banking – Opportunities and Threats of e-Banking.

Text Books

- M.K.Sharma (2020) *E-Banking and Development of Banks*, Deep and Deep Publications, New Delhi.
- Gurusamy, S.(2021) *Banking Theory Law and Practice*, Vijai Nicole Publications, Chennai.

Reference Books

- Jessica Keyes(2021) Financial Services Information Systems,Auerbach publications, USA
- Kaptan SS (2013), E-Indian Banking In Electronic Era, Sarup&Sons New Delhi
- Vasudeva,(2010) E–Banking, Common Wealth Publishers, New Delhi,
- Digital Banking,(2019), Indian Institute of Banking and Finance, Taxman Publications, New Delhi.

Web References:

- https://en.wikipedia.org/wiki/Online_banking
- https://www.sbi.co.in/portal/web/services/internet-banking
- https://www.hdfcbank.com/assets/popuppages/netbanking.html
- https://www.investopedia.com/terms/m/mobile-banking.asp
- https://www.rbi.org.in/,
- http://www.iibf.org.in/

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Explain the relationship between banker and customers	K1
CO 2	Acquire knowledge on modern banking service like E-banking, M- banking, etc.,	K2
CO 3	Apply cash management techniques in an electronic interface.	K3
CO 4	Evaluate performance of digital banking	K3
CO 5	Develop e -banking skills	K4

UCOM409/UCCM409 BUSINESS LAW

Semester : IV **Credit : 4**
Category: Core XII/ XI **Hours/Week : 5**
Class : II B. Com & B.Com CA **Total hours : 65**

Course Objectives

CO No.	To enable the students
CO-1	Acquire basic and expert knowledge in business laws in management. Ability to apply concepts, principles and theories to understand simple business laws.
CO-2	Understand the basic rules of Agreements and Contracts
CO-3	Gain the knowledge the formation of a contract
CO-4	Analyze legal environment in which a consumer and businesses operates.
CO-5	Evaluate ever changing procedures & practices in the field of Business Law

UNIT-I INTRODUCTION TO NATURE OF CONTRACT 13Hour

Nature and Kinds of Contract – Offer and Acceptance – Consideration – Capacity of parties – Free Consent – Legality of object and Consideration, Void agreement – Contingent Contracts.

UNIT IIPERFORMANCE OF CONTRACTS 12Hour

Performance of Contracts – Discharge of contracts – Remedies for breach including specific performance – Quasi Contracts.

UNIT III SPECIAL CONTRACTS 13 Hour

Indemnity & Guarantee –Features and distinctions-Extent of Surety's Liability-Rights and Discharge of Surety- Bailment & Pledge –features-difference-Rights and Duties of Bailor and Bailee Pawnee-Pledge by non-owners.

UNIT IV SALE OF GOODS ACT 13 Hour

Sale of Goods Act 1930-Formation of Contract-Conditions and Warranties-Transfer of Property-Performance of Contract-Rights of an unpaid seller.

UNIT V CONTRACT OF AGENCY 14 Hour

Contract of Agency-Definition and meaning-Creation-Ratification and Requisites-Rights of Principal and Agent-Relation of Principal with third parties-Personal liability of Agent-Termination of Agency-Irrevocable Agency.

Text Books

- Kapoor. N. D.,*Business Laws,* New Delhi, Sultan Chand & Son.
- Sreenivasan. M. R.,*Business Law, Chennai*, Margam Publication.

Reference Books

- Kuchhal. M. C, *Mercantile Law*, New Delhi, Vikas Publication.
- Pillai R. S. N, *Business Laws*, New Delhi, S.Chand.
- Shukla. M. C, *Mercantile Law*, New Delhi ,S.Chand Co.
- Edwin J. Elton and Martin J. Gruber, "*Modern Portfolio Theory and Investment"*, John Wiley and Sons, Singapore, 2015.

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Understand the legal and fiscal structure of different forms of business organizations and their responsibilities as an employer.	K1
CO 2	Apply the global business laws to current business environment	K2
CO 3	Analyze the principle of international business and strategies adopted by firms to expand globally	K3
CO 4	Identify the fundamental legal principles behind contractual agreements	K3
CO 5	Explain the basic elements of forming enforceable contract and agreement	K4

UCOR413/UCCR411 UIAR404
INDUSTRY INTERFACE PROGRAMME II – STOCK MARKET & MUTUAL FUND

Semester : IV **Credit : 1**
Category : Core XIV/(DSC) **Hours/Week : 1**
Class : II B.Com., B.Com CA, B.Com. IAT **Total hours : 13**

Course Objectives

CO No.	To enable the students
CO-1	Identify the various forms used in bank and Insurance companies
CO-2	Acquire Knowledge on Documentation Procedure.
CO-3	Obtain knowledge on Filling up of Bank Challans s and forms
CO-4	Develop online processing skills relating to Banking and Insurance
CO-5	Explain the procedure for availing e banking service

During II Semester Training will be given to fill up the following forms used in Stock Market & Mutual Fund:

1) Application form for Equity / Preference Share
2) Share Certificate
3) Share Warrant

4) Application form for Bond / Debentures
5) Debenture Certificate
6) Scheme Information Document
7) Statement of Additional Information
8) Key Information Memorandum (KIM)
9) Mutual Fund Applications
10) Dematerialization Request Form – CSDL/NSDL
11) Rematerialisation Request Form
12) Securities Transfer Form
13) Form for Transmission of Mutual Fund Units

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Identify appropriate Banking and insurance schemes	K1
CO 2	Apply the knowledge to Deposit, and avail loan from banks and insurance Companies	K2
CO 3	Explain the procedure for Electronic fund transfer	K3
CO 4	Discuss the functions of Banks, NBFC's and Insurance Companies	K3
CO 5	Develop documentation Skills	K4
CO 6	Acquire practical Exposure on Banking and insurance	K5

Evaluation Pattern for Industry Interface programme

CIA **60**

Marks

Daily Practical Assessment : 30 Marks
Test I : 10 Marks
Viva I : 05 Marks
Test II : 10 Marks
Viva II : 05 Marks

ESE **40**

Marks

Record : 10 Marks
Practical Exam : 20 Marks
Viva voce : 10 Marks

(Students will be given blank forms to fill-up)

Total **100 Marks**

UCOM412 / UCCM412 SECURITY ANALYSIS & PORTFOLIOMANAGEMENT

Semester : IV **Credit : 4**
Category : Core XII / XIII **Hours/Week : 4**
Class & Major: II B. Com & II B.Com CA **Total Hours : 52**

Course Objectives

CO No.	To enable the students
CO 1	Identify financial instruments traded in stock market
CO 2	Understand the characteristics of security market
CO 3	Analyze risk and return of securities
CO 4	Manage portfolio of investments.
CO 5	Apply the knowledge of security analysis for making investment decisions

UNIT- I INTRODUCTION TO SECURITIES 10Hour

Meaning, Definition,Types of securities – equity based and debt based – derivatives –mutual funds – Concepts of risk and return – valuation of securities – bond and equity valuation – different approaches to valuation – Estimation of net asset value of mutual funds – valuation of option.

UNIT- II SECURITY MARKETS 11 Hour

Security market –legal framework of security markets – organized stock exchanges – listing of securities – trading and operational mechanism of stock exchanges – settlement and clearing – online trading – Dematerialization – Depositories and Depository participants –Internet trading and WAP enabled trading online surveillance – Trading practices on NSE and BSE.

UNIT- III FUNDAMENTAL ANALYSIS 9 Hour

Security Market Analysis – Fundamental Analysis – Economy Analysis - Industry Analysis and Company Analysis.

UNIT- IV TECHNICAL ANALYSIS 10 Hour

Technical analysis – Methods of technical analysis – trends – indicators and patterns – advance decline line – market indices and moving averages – Dow Theory.

UNIT- V PORTFOLIO ANALYSIS, SELECTION AND MANAGEMENT 12 Hour

Portfolio Management – selection of portfolio – Markowitz portfolio selection model – Sharpe's single Index Model and optimal portfolio construction – Capital Asset Pricing Model (CAPM) – Portfolio performance evaluation: Measures of Returns, Formula Plans, Sharpe and Treynor Measures – Portfolio revision

Proportion: 80% Theory; 20% Problem

Text Books

- Preeti Singh, *Investment Management,* Himalaya Publications, Mumbai, 9th Edition, 2015.
- Bhalla V.K., *Investment Management: Security Analysis and Portfolio Management*, Sultan Chand and Sons, New Delhi, sixth edition 2014.

Reference Books

- Fischer, Donald E. and Ronald J. Jordan, *Securities Analysis and Portfolio Management*, Prentice Hall of India, New Delhi, 2015
- Edwin J. Elton and Martin J. Gruber, *Modern Portfolio Theory and Investment*, John Wiley and Sons, Singapore, 2015, Margham publication Reddy and Murthy.
- Dr.Ranganatham, *Securities Analysis and Portfolio Management*, pretence hall of India Newdelhi

Course Outcomes

CO No.	Course Outcomes The student will be able to	Cognitive Level
CO 1	Compute risk and return of securities	K1
CO 2	Apply the knowledge of fundamental analysis for making investment decisions	K2
CO 3	Apply the knowledge of technical analysis for making investment decisions	K3
CO 4	Explain trading and operational mechanism of stock exchanges	K3
CO 5	Evaluate portfolio performance	K4

UCOM414/UCCM414 CORPORATE ACCOUNTING

Semester: IV **Credit :4**
Category: Core X IX **Hours/Week:5**
Class : II B. Com & B.Com CA **Total hours:65**

Course Objectives

CONo.	To enable the students
CO-1	Obtain knowledge on issue of shares and debentures.
CO-2	Develop skills in the preparation of company accounting statements
CO-3	Apply the knowledge in the preparation of Bank and Insurance Company Accounts.
CO-4	Acquire knowledge and skills in accounting for changes in corporate structure.
CO-5	Develop corporate accounting skills.

UNIT- I ACCOUNING FOR SHARE CAPITAL & DEBENTURES 13 Hour

Issue of Shares; Forfeiture and Reissue of Shares, Redemption of Preference Shares; Issue of Debentures, Redemption of Debentures and Conversion of Debentures into Shares .

UNIT –II FINAL ACCOUNTS, VALUATION OF SHARES & GOODWILL 12 Hour

Preparation of Companies Final Accounts – Computation of Managerial Remuneration- Basic Knowledge on Accounting Standards; Valuation of Goodwill and Valuation of Shares – Methods.

UNIT- III CONSOLIDATION OF ACCOUNTS ASPER COMPANIESACT 12Hour

Accounts of Holding Companies – Minority Interest – Cost of Control – Unrealized Profits – Revaluation of Assets and Liabilities – Consolidated Balance Sheet.

UNIT-IV BANK ACCOUNTS AND LIQUIDATIONS 15 Hour

Bank Accounts – Preparation of Profit and Loss Account and Balance Sheet With Relevant Schedule – Liquidation Accounting – Order of Payments Banking – Preferential Payments – Liquidators Final Statements of Account – Remuneration – Statements of Affairs &Deficiency Accounts.

UNIT-V INSURANCE COMPANIES ACCOUNT 13Hour

Insurance Company Accounts: Life Insurance & Fire Insurance only.

Proportion: Theory : 20 Problems: 80

Text Books

- Shukla, M.C. &Grewal, T.S. (2019) Corporate Accounting, S.Chand& Co. Publications, New Delhi.
- Jain, P &Narang, K.L. (2019) *Advanced Accountancy*-Kalyani Publishers,Ludhiana.

Reference Books.

- Gupta, R.L. &Radhaswamay,M. (2021) *Advanced Accounts*-Sultan Chand &Sons,New Delhi.
- Iyengar, S.P (2020) *Advanced Accounting*- Sultan Chand&Sons, New Delhi.
- Reddy, T.S.& Murthy, A. (2021) *CorporateAccounting,*Margham Publications.

E-Resources:

- https://icmai.in/upload/Students/Syllabus-2012/Study_Material_New/Inter-Paper12-Revised.pdf
- https://www.icsi.edu/media/webmodules/02122021_Final_CMA.pdf.

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Explain the accounting aspects of Redemption of Preference shares	K1
CO 2	Examine the Restructuring of capital structure of Public Company	K2
CO 3	Discuss the procedure involved in Amalgamation of companies	K3
CO 4	Develop corporate accounting skills	K4
CO 5	Evaluate financial statements of company within the frame work of Ind AS	K3

UCOA303 FINANCIAL ACCOUNTING

Semester : III **Credit : 5**
Category : Allied III **Hours/Week : 5**
Class & Major: II BCA & II ISM **Total Hours : 65**

Course Objectives

CO No.	To enable the students
CO 1	Understand the basic rules of accounting and accounting principles.
CO 2	Convert single entry system into systematic accounting.
CO 3	Maintain accounts for different types of organizations, branch and departments
CO 4	Analyze the defects of single entry system.
CO 5	Apply the knowledge of accounting concepts and conversion in maintaining in the books of accounts.

UNIT- I INTRODUCTION TO ACCOUNTING 12 Hour

Meaning and scope of accounting, Basic Accounting concepts and conventions – objectives of Accounting - Accounting Transactions - Double Entry System of Book Keeping - Journal, Ledger an Trail Balance.

UNIT- II SUBSIDIARY BOOKS OF ACCOUNTS 11 Hour

Subsidiary Books - Preparation of Individual Subsidiary Books- Purchase Book- Sales Book- Purchase Return Book – Sales Return Book- Cash Book- Simple Cash Book – Petty Cash Book

UNIT- III FINAL ACCOUNTS 13 Hour

Introduction- Manufacturing Account- Trading Account- Profit and Loss Account- Balance sheet- Adjustments

UNIT- IV BRANCH & DEPARTMENTAL ACCOUNTS 15 Hour

Branch Accounts – Dependent Branches – Debtors system – stock & Debtors systems – Independent branch (Excluding Foreign Branch) Departmental Accounting – Basis for allocation of Expenses – inter-departmental transfer at cost or selling price – Treatment of Expenses which cannot be allocated.

UNIT- V FINANCIAL STATEMENTS ANALYSIS 14 Hour

Comparative Statements, Common Size Statements, Trend analysis – Ratio analysis: Liquidity, Operating and Turnover ratios

Proportion: Problem: 80%, Theory: 20%

Text Books

- Gupta R.L.& Gupta.V.K., *Financial Accounting,* Sultan Chand Publication, New Delhi, 2015.
- Reddy T.S. & Murthy.A, *Financial Accounting*, Margham Publication, Chennai, 2015.

Reference Books

- Gupta R.L & Radhaswamy, *Advanced Accounting,* Volume – I, Sultan Chand, New Delhi, 2015.
- Jain &Narang, *Financial Accounting*, Kalyani Publishers, Chennai, 2015
- Shukla & Grewal, *Advanced Accounting*, S.Chand Publications, New Delhi, 2015.

CO No.	Course Outcomes The student will be able to	Cognitive Level
CO 1	Prepare Trading, Profit & Loss Account and Balance Sheet.	K1
CO 2	Compute Branch Accounts, Departmental Accounts and Partnership Accounts	K2
CO 3	Apply the knowledge of accounting concepts and conversion in preparation of final accounts.	K3
CO 4	Explain the differences between single and Double entry system	K3
CO 5	Examine hire purchase system	K4

UCOA403 ACCOUNTING PACKAGE - THEORY

Semester : IV **Credit : 2**
Category : Allied IV **Hours/Week : 2**
Class & Major : II BCA **Total hours : 26**

Course Objectives:

CO No.	To enable the students
CO 1	Identify various vouchers used in Tally
CO 2	Understand the basic knowledge in computerized accounting
CO 3	Apply knowledge to prepare Final Accounts
CO 4	Analyze various cost categories and cost centre
CO 5	Develop knowledge on Accounting Package

UNIT-I INTRODUCTION TO COMPUTERIZED ACCOUNTING 5 Hour

Meaning of Computerized Accounting – Meaning of Computers – Importance of Computerized Accounting – Computerized Accounting Vs Manual Accounting- Introduction to Architecture of Tally – Creation of Company – Creation of Groups – Various Kinds of Groups – Multiple & Single – Creation of Ledgers – Various Kinds of Ledgers.

UNIT-II CREATION OF VOUCHERS 5 Hour

Entering Vouchers – Journal Voucher, Purchase Voucher, Sales Voucher, Receipt Voucher, Payment Voucher – Role and the importance of Function Keys.

UNIT-III PREPARATION OF FINAL ACCOUNTS 5 Hour

Extraction of Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet – Simple Sums with and without Adjustments – Alter-Select –Edit - Delete –Selection of Company.

UNIT-IV CREATION OF INVENTORY 5 Hour

Introduction to Inventories – Creation of Stock Category – Stock Groups – Stock Items – Editing and Deletion of Stock items – Usage of Stock in Voucher Entry – Stock Voucher or Purchase Orders – Sales Orders - Customer and Supply Analysis – Extracting simple Reports and Graphs.

UNIT- V CREATION OF COST CENTRE **6 Hour**

Introduction to Cost – Creation of Cost Category – Cost Center Category – Editing and Deleting Cost Centre –Usage of Cost Category and Cost Centers in Voucher Entry –Budget Control – Creation of Budgets – Editing and Deleting Budgets – Reports.

Proportion: Problem: 80%, Theory: 20%

Text Books

- Nadhani A.K. and Nadhani K.K , *Implementing Tally*, BPB Publications, New Delhi, 2015.
- Palanivel. S, *Tally Accounting Software*, Margham Publications, Chennai, 2015.

Reference Books

- Vishnu Priya Singh , *Quick Learn Tally*, Computech Publication Pvt., New Delhi, 2015.
- Srinivasa Valaban, *Computer applications in Business*, Sultan Chand & Sons, 2015.

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Explain the various kinds of stock groups in Tally	K1
CO 2	Apply the knowledge in creating vouchers	K2
CO 3	Examine the ability to prepare final accounts .	K3
CO 4	Discuss the importance of computerized accounting.	K5
CO 5	Acquire knowledge on the creation of cost centre	K4

UCOR403 ACCOUNTING PACKAGE– PRACTICAL

Semester : IV **Credit : 3**
Category : Allied IV - Practical **Hours/Week : 3**
Class & Major : II BCA **Total hours : 39**

Course Objectives:

CO No.	To enable the students
CO 1	Identify various vouchers used in Tally
CO 2	Understand basic concepts in computerized accounting
CO 3	Apply knowledge to prepare Final Accounts
CO 4	Analyze various cost categories and cost centre
CO 5	Develop knowledge on Accounting Package

Practical

1. Creation of Company, alteration and deletion
2. Creation of groups, single and multiple
3. Vouchers and Journals

4. Entering values and preparation of Trial balance, Trading account and Balance Sheet
5. Use of function keys and entering various journals to understand adjustments
6. Preparation of final accounts with adjustments
7. Creation of stock groups, stock category and stock store
8. Entering data in stock groups of a departmental store
9. Multiple stock group
10. Cost Centre

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Explain the various kinds of stock groups in Tally	K1
CO 2	Apply the knowledge in creating vouchers	K2
CO 3	Examine the ability to prepare final accounts .	K3
CO 4	Discuss the importance of computerized accounting.	K5
CO 5	Acquire knowledge on the creation of cost centre	K4

UCOE204 INTERNET BANKING

Semester: III **Credit : 2**
Category: Non Major Elective II **Hours/Week : 4**
Class & Major : I UG **Total Hours : 52**

Course Objectives

CO No.	To enable the students
CO-1	Understand legal aspects of banking business
CO-2	Obtain knowledge on banking functions and services
CO-3	Understand the features of negotiable instruments
CO-4	Evaluate recent trends in banking
CO-5	Develop E- Banking skills

UNIT – I INTRODUCTION **9 Hour**

Introduction – Definition - History of Banking-Kinds of Bank

UNIT – II FUNCTIONS OF A BANKING **8 Hour**

Functions – Structure - Importance of Banking

UNIT – III E-BANKING **14 Hour**

E-Banking-ATM Cards- Debit Cards- Personal Identification- Gold Card, Smart Card, Petro Cards, Kissan Card

UNIT – IV ELECTRONIC FUND TRANSFER **9 Hour**

Electronic Fund Transfer- On line Enquiry & update facility- Electronic Clearing System

UNIT – V E-BANKING FACILTITIES **12 Hour**

Facilities - Booking of Tickets - Account Statement–Mails – Mobile Banking - Home Banking, Tele Banking.

Text Books

- Nirmala Prasad & Chandradass ,*Banking and Financial System*, Himalaya Publications, Chennai, 2007

Course Objectives:

- Natarajan and Gordon, *Banking And Financial System*, Margham Publications, Chennai, 2002

Reference Books

- Balu.V.,*Banking& Financial System*, Sri VenkanteswaraPublication,Chennai, 2003
- Maheswari. *S.N., Banking Law Theory & Practice*, Kalayani Publications,Ludhiana, 2003
- Sundaram And Varshney, *Banking Theory, Law And Practice*,SultanChand Company, New Delhi, 2005
- Tandon., *Banking Law Theory & Practice*, S.Chand Publications, New Delhi, 2002

Course Outcomes

CO No.	The student will be able to	CognitiveLevel
CO 1	Explain the relationship between banker and customers	K1
CO 2	Examine the role of paying and collecting bankers	K2
CO 3	Appraise electronic payment system	K3
CO 4	Apply the knowledge to solve customer grievances	K4
CO 5	Develop E- Banking skills	K5

INDIVIDUAL TAX PLANNING

UCOE402

Semester: IV **Credit : 2**
Category: Non-Major Elective I/(SEC) **Hours/Week : 4**
Class : II UG **Total Hours : 52**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Identify the various sources of Income of a person
CO 2	Understand the Principles and Practice of Income Tax Act
CO 3	Analyze the various residential status of a person
CO 4	Compute Income from all the five heads of income
CO 5	Evaluate head wise deductions

UNIT-I INTRODUCTION TO INCOME TAX **10 Hour**

Basic Concepts – Person-Assessment Year – Previous Year – Permanent Account Number – Basis of Charge – Schedules of rates of Tax – Exempted Incomes.

UNIT –II INCOME FROM SALARY, INCOME FROM HOUSE PROPERTY **10 Hour**

Computation of Salary – Types of Allowances – Types of Perquisites – Profit in lien of Salary – Deductions. - Computation of Income from House Property.

UNIT –III PROFITS & GAINS OF BUSINESS OR PROFESSION, CAPITAL GAINS **11 Hour**

Computation of Profits and Gains of Business or Profession - Computation of Short Term Capital Gains – Long Term Capital Gains – Deductions.

UNIT –IV INCOME FROM OTHER SOURCES, TAX DEDUCTIONS **11 Hour**

Computation of Income from Other Sources -Tax Saving – Deduction u/s 80- Computation of Taxable Income and Tax Liability.

UNIT -V TAX PLANNING **10 Hour**

Tax Planning – Tax Evasion – Tax Avoidance – Types of Assessment – Filing of Income Tax- Returns– Penalty – Appeal.

Note: Theory 20% and Problem 80%

Text Books

- Gaur, V.P. and Narang, D.B. (2020).*Income Tax Law & Practice.* Kalyani Publishers. Ludhiana.
- Hariharan, T.(2020). *Income Tax.* Vijay Nichole Imprint Pvt. Ltd. Chennai.

Reference Books

- Singhania, V.K. (2020)*Students Guide to Income Tax.* Taxmann Publication Pvt. Ltd. New Delhi.
- Dinkar and Pagre.(2020).*Income Tax Law & Practice.* Sultan Chand & Sons. New Delhi.

E-Resources:

- https://incometaxindia.gov.in
- https://www.taxmann.com › research › direct-tax-laws

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Identify the head-wise taxable income	K1
CO 2	Apply income tax provisions for tax planning.	K2
CO 3	Acquire knowledge on canons of taxation.	K3
CO 4	Explain the head-wise deductions allowed.	K3
CO 5	Examine the allowed and disallowed business expenses.	K4

DEPARTMENT OF COMMERCE

PREAMBLE

UG: Programme Profile and Syllabi of Courses Offered in Semester V and VI along with III and IV Evaluation Components (With effect from 2021 – 2024 batches onwards)are presented in this Booklet.

PROGRAMME PROFILE: B.Com. International Accounting and Taxation (Learning Outcome Based Curriculum Framework (LOCF)

Programme Specific Outcomes (PSO)

Upon completion of the programme, the students will be able to

- Understand the prevailing International Accounting and Taxation Systems.
- Analyze the practical tools of finance required in decision making.
- Discuss International Financial Reporting Standards, why there is a need for convergence and the Status of these Standards Worldwide.
- Develop Accounting, Taxation, Entrepreneurial and Financial Management Skills.

Semester	Part	Category	Course Code	Course Title	Contact Hours/ Week	Credits Min/ Max
I	I	Part I Languages/ AECC-1I	UTAL107/ UTAL108 UHIL102/ UFRL102	Basic Tamil – I/ Advanced Tamil – I/ French – I/ Hindi – I	5	3 / 4
	II	Part II Languages/ AECC-1	UENL109/ UENL110	English for Communication I English for Communication II	5	3 / 4
	III	Core I/(DSC)	UIAM101	Organization Management/F1 – I	4	4
		Core II/(DSC)	UIAM102	Basics of Financial Accounting – F3	4	4
		Core III/(DSC)	UIAM103	International Accounting	4	4
		Allied/(GE)	UMAA112	Business Mathematics	6	4
		PE	UPEM101	Professional English I	6	4
	IV	Value Education/(SEC)		Family Life Education	2	0/1
				TOTAL	**36**	**26/29**
II	I	Part I Languages/ AECC-1I	UTAL207/ UTAL208/ UFRL202/ UHIL202	Basic Tamil – II/ Advanced Tamil –II/ French – II/Hindi – II	5	3 / 4
	II	Part II Languages/ AECC-1	UENL209/ UENL210	English for Communication IEnglish for Communication II	5	3 / 4
	III	Core IV/(DSC)	UIAM201	Principles of Management–F1-II	5	4
		Core V/(DSC)	UIAM202	Basics of Cost Accounting/F2	5	3
		Allied/(GE)	UCEA202	Indian Economic Development	6	4
		Core VI/(DSC)	UIAR203/ UCOR206 UCCR206	Industry Interface Programme I-Banking andInsurance	1	1
		PE	UPEM201	Professional English II	6	4

II	IV	Non-Major Elective/(SEC)			3	2
		Internship	UCOI201/ UCCI201/ UIAI201	Internship / Field Work / Field Project		-/1
	V	Extension Activity/ Physical Education			-	1 / 2
				TOTAL	**36**	**25/29**
III	III	Core VII/(DSC)	UIAM301	Management Accounting – I/F5I	5	4
		Core VIII/(DSC)	UIAM302	International Marketing	5	4
		Core IX/(DSC)	UIAM303	International Banking and Global Financial Markets	5	4
		Core X/(DSC)	UIAM304	International Taxation	4	4
		Online course	UONL301	NPTEL	3	1
		Allied/(GE)	UMAA301	Business Statistics	6	4
		VE /(SEC)		Environmental Science	2	1
				TOTAL	**30**	**22/22**
IV	III	Core XI/(DSC)	UIAM401	Financial Reporting – I/F7- I	5	4
		Core XII/(DSC)	UIAM402	Management Accounting –II / F5 – II	5	4
		Core XIII/(DSC)	UIAM403	Business Law/F4	4	4
		Core XIV/(DSC)	UIAR404/ UCOR413 /UCCR411	Industry Interface Programme II – Stock Market & Mutual Fund	1	1
		Core XV/(DSC)	UIAM405	Financial Management – I/F9 I	4	3
		Allied/(GE)	UCSA409	Business Analytics and Intelligence	3	3
		Allied/(GE)	UCSR415	Business Analytics and Intelligence using SAS –Lab	3	2
	IV	Non Major Elective/(SEC)			3	2
		Soft Skills/(SEC)		Personality Development	2	1
		Internship	UCOI401/ UCCI401/ UIAI401	Internship / Field Work / Field Project		-/1
	V	Extension Activity Physical Education			-	-/2
				TOTAL	**30**	**24/27**
V	III	Core XVII/(DSC)	UCOP501 UCCP501/ UIAP501/ UCOM511 UCCM511/ UIAM501	Project / Company Law	6	4
		Core XVIII/(DSC)	UIAM502	Financial Management –II/ F9 II	6	5
		Core XIX/(DSC)	UIAM503/ UCOM509/ UCCM509	Income Tax Law & Practice - I/F6	5	4
		Core XX/(DSC)	UIAM504/ UCOM510/	Accounting Package	3	2

V			UCCM510			
		Core XXI/(DSC)	UIAR501/ UCOR501/ UCCR501	Accounting Package – Lab	3	3
		Core XXII/(DSC)	UIAM505	Financial Reporting - II / F7 II	5	5
	V	Value Education/(SEC)			2	1
				TOTAL	**30**	**24/24**
VI	III	Core XXIII/(DSC)	UIAM601/ UCOM612 UBAM609	Women Entrepreneurship	5	5
		Core XXIV/(DSC)	UIAM602	Audit & Assurance/ F8	6	5
		Core XXV/(DSC)	UIAR603/ UCOR618/ UCCR618	Industry Interface Programme III – GST practical	1	1
		Core XXVI/(DSC)	UIAM604/ UCCM616/ UCOM616	Goods and Services Tax//F6	6	5
		Core XXVII/(DSC)	UIAM605/ UCOM617/ UCCM617	Service Marketing	5	5
		Viva Voce	UIAM606/ UCCM607/ UCOM607	Comprehensive Viva	-	1
		Major Elective/(DSE)	UCOO606/ UCCO606/ UIAO608	1. Logistics Management	5	4
			UIAO608/ UCOO606/ UCCO606	2. Income Tax Law & Practice II//F6		
			UIAO609/ UCOO607/ UCCO607	3. Consumer Protection		
	IV	Soft skills/(SEC)			2	1
		Internship	UCOI601/ UCCI601/ UIAI601	Internship / Field Work / Field Project		-/1
		Extension Activity	UROX601	Rural Outreach Programme		-/1
	V	Extension Activity/ PhysicalEducation			-	0/2
				TOTAL	**30**	**27/31**
				GRAND TOTAL	**192**	**148/162**

EXTRA CREDIT EARNING PROVISIONS

Semester	Category	Course Code	Course Title	Contact/ Week	Credit	
					Min	Max
IV	Core XXVII/ XXV/(DSC)	UCOI401/ PCOI401	Summer Internship	-	-	2

Experiential Learning (only for Interested Students)

Semester	Category	Course Title	Contact Hours	Credit	
				Min	Max
II/IV/V	Core XXVIII/ XXVI/(DSC)	Accounting Package	-	1	1

Related Paper / Course Code	Work Experience			Collaborating Agency	Mode of Evaluation
	Nature of Institution	Proposed Duration of Training	Proposed Period		
Accounting Package UCOM203/ UCCM202/ UCOA403/UCOM510/ UCCM510	Tally Training Institution	5 Days	February	ICAT Tally Training Institute, Puducherry	Written Test

SELF STUDY

Semester	Course code	Course Title	Contact / hours	Credit	
				Min	Max
V	UCOS501/ UCCS501	Business Ethics and Corporate Governance			
	UCOS502/ UCCS502	Business Analysis	-		1

PROJECT

UCOP501/UCCP501/UIAP501

Semester : IV&V **Credit :4**
Category : Core XXI/XVIII **Hours/Week : 4**
Class & Major: III B.Com. & III &B.Com.CA **Total Hours : 52**

Guidelines

- This course is offered as group project.
- No of students is limited to 5 to 6 in a group.

Research Area

- Finance
- Marketing and
- Banking

Evaluation Pattern for the project (Internal -60, External -40)

S. No.	Components	CIA	ESE
1	Title of the Topic & Research Design	10	
2	Review of Literature	10	
3	Collection of Data	10	
4	Analysis and Interpretation	10	
5	Viva voce	10	10
6	Project Report	10	30
	Total	**60**	**40**

UIAM501 / UCOM511/ UCCM511 - COMPANY LAW

Semester : V **Credit :4**

Category : Core XVII/XV **Hours/Week :6**

Class &Major: III B.Com. (IAT) **Total hours : 78**

Course Objectives

CO No.	To enable the students
CO 1	Understand the Provisions of Company law.
CO 2	Develop the knowledge on incorporation of a Company.
CO 3	Obtain knowledge on procedure for issue and transfer of shares
CO 4	Analyze various company registration documents
CO 5	Apply the knowledge of company law in company Management

UNIT- I COMPANY FORMATION & CONVERSION 16 Hour

Incorporation of a Company – Definition –Characteristics-Corporate Veil- Kinds of Companies (including OPC)– Incorporation – Memorandum of Association – Ultra Vires – Alteration of Memorandum – Conversion/ Re-conversion of One Form of Business Entity into another.

UNIT- II REGISTRATION DOCUMENTS 15 Hour

Articles of Association – Contents – Alteration – Doctrine of Constructive Notice – Indoor Management – Prospectus-Contents-Consequences for Misstatement in Prospectus.

UNIT- III ISSUEOFSHARES 15 Hour

Shares – Kinds of Shares-Equity-Preference Shares-Allotment of Shares-Minimum Subscription-Share Certificate –Share Warrant – Issue of Shares at par/premium – Rights Issue, Bonus issue and ESOP – Redemption of Preference Shares- Forfeiture of Shares.

UNIT-IV TRANSFER OF SHARES 16 Hour

Membership of Companies – Transfer, Transmission and Transposition– Dematerialization/ Rematerialisation of Shares – Blank Transfer – Forged Transfer.

UNIT-VMANAGEMENTOFCOMPANIES 16 Hour

Management of Companies – Board of Directors –DIN/DSC – Appointment-Duties and Powers of the Board- Managing Director –Manager-Appointment-Duties and Powers-Company Meetings – Notice, Quorum ,Proxy, Minutes, Resolution.

Text Books

- Kapoor, N.D. (2019) *Company Law*, Sultan Chand, NewDelhi.
- Avatar Singh. (2019) *Company Law*, Book Well Publishers, NewDelhi.

Reference Books

- Kathiresan, and Radha. (2020) *Company Law*, Prasanna Publishers, Chennai.
- Balanchandran, B.Boose P.K. (2019) *Company Law*, Sultan Chand, New Delhi.

E – Resources

- www.indianlawjournal.org
- www.icsi.edu.
- www.clioindia.com.

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Identify different kinds of companies	K1
CO 2	Apply the knowledge of company law for preparing registration documents.	K2
CO 3	Explain the procedure for dematerialization	K3
CO 4	Discuss the agenda of the company meetings	K4
CO 5	Appraise the performance of the companies	K5

UIAM502 FINANCIAL MANAGEMENT II

(This course is offered by ACCA, UK)

Semester: V **Credit :5**
Category: Core XVIII/(DSC) **Hours/Weeks : 6**
Class &Major:II B.COM IAT **Total Hours : 78**

Course Objectives

CO No.	To enable the students
CO-1	Identify appropriate source of finance for an organisation.
CO-2	Understand the function of financial management in the context of financing and distribution decisions, business valuation and financial risk management
CO-3	Evaluate various theories of capital structure
CO-4	Analyze capital Budgeting Techniques
CO-5	Apply the knowledge of Financial Management to hedge risk

UNIT-I BUSINESS FINANCE AND SOURCES OF FUNDS 16 Hour

Understand & Evaluate Various Short & Long Term Sources of Finance such as Equity and Debt – Methods of Raising Equity such as Rights Issue, Initial Public Offer (IPO) – Sources of Islamic Financing such as Murabaha, Musharaka, Mudaraba, Sukuk, Ijara – Sources of Finance for SME Sector Including Venture Capital, Crowd Funding and Angel Financing.

UNIT-II CAPITAL STRUCTURE THEORIES AND COST OF CAPITAL 16Hour

Estimating Cost of Equity Using Dividend Growth Model (DGM), Capital Asset Pricing Model (CAPM), Concept of Systematic & Unsystematic Risk – Estimating Cost of Debt (irredeemable & redeemable), Convertible Debt – Estimating Weighted Average Cost of Capital (WACC) Using Book Value and Market Value Weightages – Capital Structure Theories Including Traditional View and Modigliani-Millar View (without & with tax) – Pecking Order Theory.

UNIT-III BUSINESS VALUATIONS 15Hour

Purpose of Business Valuation – Various Situations which Demand Business Valuation – Models for Valuation of Equity using Dividend Model, Net Asset Method, Cash Flow Approach, Earning Method (using PE ratio), Earnings Yield Method – Valuation of Debt.

UNIT-IVFINANCIAL RISK MANAGEMENT **15Hour**

Sources of & Factors Influencing Foreign Currency Risks – Types of Currency Risks such as Transaction Risk, Translation Risk, &Economic Risks – Causes of Currency Rate Fluctuations Including Balance of Payments, Purchasing Power Parity (PPP), Interest Rate Parity (IRP), Fischer Equation – Centralised & Decentralised Treasury Function.

UNIT-VRISK MANAGEMENT TOOLS– CURRENCY & INTEREST RATE RISKS 15 Hour

Tools of Managing Currency Risks such as Internal Tools (Currency of Invoice, Netting, Leading & Lagging) and External Tools (Forwards, Futures, Options & Swaps, Money Market Hedging) – Causes of Interest Rate Fluctuations – Managing Interest Rate Risks through Internal Tools (Matching and Smoothing, Asset & Liability Management, Forward Rate Agreements (FRA).

Text Books

- Pondey ,I.M. (2020), *Financial Management,*Vikas Publications, New Delhi.
- Prasanna Chandra. (2020) *Financial Management*, Tata McGraw Hill publications.

Reference Books

- Khan, M. Y, and Jain, M.K, (2021) Financial Management ,Kalyani Publications, Chennai.
- Ravikishore, M, (2020) Financial Management, Taxman Publisher, New Delhi.
- Rochard,A.Pradyand Stewart, C. Mrges.(2020) Principles of corporate Finance, Tata McGraw Hill.

E-Resources:

- https://icmai.in/upload/Students/Syllabus-2012/Study_Material_New/Inter-Paper12-Revised.pdf
- https://resource.cdn.icai.org/66683bos53808-mod1-ip.pdf

Course Outcomes

CO No.	The student will be able to	CognitiveLevel
CO 1	Understand the sources of business finance with their relative merits & demerits	K1
CO 2	Evaluatethe tools & techniques of financial risk management in the context of foreign currency risks & interest rate risks.	K3
CO 3	Apply the concepts of business evaluation for financial Management.	K3
CO 4	Examine various risk management tools	K4
CO 5	Explain the various treasury functions	K5

INCOME TAX LAW AND PRACTICE – I

UIAM503/UCOM509/UCCM509

Semester	**: V**	**Credit**	**: 4**
Category	**: Core XIX/ XVI**	**Hours/Week**	**: 5**
Class &Major	**: III** B.Com.(IA&T**)**	**Total Hours**	**:78**

Course Objectives

CO No.	To enable the students
CO 1	Identify the various sources of income of a person.
CO 2	Understand the Principles and Practice of Income Tax Act.
CO 3	Analyze the various residential status of a person.
CO 4	Compute income from salary and house property income.
CO 5	Examine the allowed and disallowed business expenses.

UNIT-I INTRODUCTION **15 Hour**

Meaning of Income – Canons of Taxation – Important Definitions Under the Income Tax Act –Scope of Total Income – Residential Status – Incomes Exempt from Tax.

UNIT- II COMPUTATION OF INCOME FROM SALARIES **16 Hour**

Income from Salaries – Scope of Salary Income – Deductions from Salary Income.

UNIT-III COMPUTATION OF INCOME FROM HOUSE PROPERTY **16 Hour**

Income from House Property – Deductions- Profit and Gains of Business or Profession – Deemed Business Profits – Allowed and Disallowed Expenses.

UNIT- IV COMPUTATION OFCAPITAL GAIN **15 Hour**

Capital Gain – Short Term and Long Term Capital Gain – Exempted Capital Gain.

UNIT- V COMPUTATION OF INCOME FROM OTHER SOURCES **16 Hour**

Income from Other Sources – Deductions.

Note: Theory 20% and Problem 80%

Text Books

- Gaur, V.P. &Narang, D.B., (2022-23), *Income Tax Law & Practice*, KalyaniPublishers, Ludhiana.
- Hariharan. (2022-23), *Income Tax*, Vijay Nichole Imprint Pvt. Ltd,Chennai.

Reference Books

- Vinod Singhania, (2022-23), *Students Guide to Income Tax*, Taxman Publication Pvt. Ltd., NewDelhi.
- DinkarPagare, (2022-23), *Income Tax Law & Practice*, Sultan Chand & Sons, NewDelhi.

E-Resources:

- www.taxmann.com
- https://www.incometax.gov.in
- https://resource.cdn.icai.org/65958bos53217mod1ip.pd

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Identify the head-wise taxable income and exempted incomes	K1
CO 2	Apply income tax provisions for tax planning.	K2
CO 3	Acquire knowledge on canons of taxation.	K3
CO 4	Explain the head-wise deductions allowed.	K3
CO 5	Examine allowed and disallowed business expenses.	K4
CO 6	Compute the head wise taxable income	K5

ACCOUNTING PACKAGE-THEORY
UIAM504/UCOM510/UCCM510

Semester : V **Credit : 2**
Category : Core XX/XVII **Hours/Week : 3**
Class &Major : III B.Com.(IAT) **Total hours :39**

Course Objectives

CO No.	To enable the students
CO 1	Identify various vouchers used in Tally
CO 2	Understand basic concepts in computerized accounting
CO 3	Apply knowledge to prepare final accounts
CO 4	Analyze various cost categories and cost centres
CO 5	Develop knowledge on accounting package and GST

UNIT-I INTRODUCTION TOCOMPUTERIZEDACCOUNTING 8 Hour

Meaning of Computerized Accounting – Meaning of Computers – Importance of Computerized Accounting – Computerized Accounting Vs Manual Accounting- Introduction to Architecture of Tally – Creation of Company – Creation of Groups – Various Kinds of Groups – Multiple & Single – Creation of Ledgers – Various Kinds of Ledgers.

UNIT-II CREATIONOFVOUCHERS 8 Hour

Entering Vouchers – Journal Voucher, Purchase Voucher, Sales Voucher, Receipt Voucher, Payment Voucher – Role and the importance of Function Keys.

UNIT-III PREPARATION OF FINALACCOUNTS 8 Hour

Extraction of Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet – Simple Sums with and without Adjustments.

UNIT-IV CREATIONOFINVENTORY 8 Hour

Introduction to Inventories – Creation of Stock Category – Stock Groups – Stock Items– Editing and Deletion of Stock items – Usage of Stock in Voucher Entry – Stock Voucher or Purchase Orders – Sales Orders – Customer and Supply Analysis – Extracting simple Reports and Graphs.

UNIT- V CREATION OFCOSTCENTRE **7 Hour**

Introduction to Cost – Creation of Cost Category – Cost Center Category – Editing and Deleting Cost Centre –Usage of Cost Category and Cost Centers in Voucher Entry–Budget Control – Creation of Budgets – Editing and Deleting Budgets – Reports.

Proportion: Problem: 80%, Theory: 20%

Text Books

- Nadhani, A.K. (2020), *Implementing Tally*, BPB Publications, New Delhi.
- Palanivel, S. (2020), *Tally Accounting Software*, Margham Publications, Chennai.

Reference Books

- Vishnu Priya Singh , (2019) *Quick Learn Tally*, Computech Publication Pvt.,New Delhi
- SrinivasaValaban. (2019) *Computer Applications in Business*, Sultan Chand & Sons

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Explain the various kinds of stock groups in Tally	K1
CO 2	Apply the knowledge in creating vouchers	K2
CO 3	Discuss the importance of computerized accounting.	K3
CO 4	Acquire knowledge on the creation of cost centre	K4
CO 5	Compute GST Liability and prepare GST Return in Tally	K5

ACCOUNTING PACKAGE-LAB
UIAR501

Semester :V **Credit : 3**
Category : Core Practical lI **Hours/Week : 3**
Class & Major: III B.Com.(IAT) **Total hours : 39**

Course Objectives

CO No.	To enable the students
CO 1	Identify various vouchers used in Tally
CO 2	Understand basic concepts in computerized accounting
CO 3	Apply knowledge to prepare Final Accounts
CO 4	Analyze various cost categories and cost centre
CO 5	Develop knowledge on Accounting Package and GST

List of the Practical's

1. Creation of Company, Alteration and Deletion
2. Creation of Groups, Single and Multiple
3. Vouchers and Journals
4. Entering Values and Preparation of Trial Balance, Trading Account and Balance Sheet
5. Use of Function Keys and Entering Various Journals to Understand Adjustments
6. Preparation of Final Accounts with Adjustments

7. Creation of Stock Groups, Stock Category and Stock Store
8. Entering Data in Stock Groups of a Departmental Store
9. Multiple Stock Group
10. Cost Centre
11. Tax Invoice
12. GSTR -1
13. GSTR -2

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Explain the various kinds of stock groups in Tally	K1
CO 2	Apply the knowledge in creating vouchers	K2
CO 3	Examine the ability to prepare final accounts.	K3
CO 4	Discuss the importance of computerized accounting.	K3
CO 5	Acquire knowledge on the creation of cost centre	K4
CO 6	Compute GST Liability and prepare GST Return in Tally	K5

FINANCIAL REPORTING II
UIAM505
(This course is offered by ACCA, UK)

Semester : V **Credit : 05**
Category :Core XXII/(DSC) **Hours/Week : 05**
Class & Major : III B.Com.(IAT) **Total hours : 65**

Course Objectives

CO No.	To enable the students
CO 1	Understand various accounting standards and the conceptual framework (based on IFRS and Ind AS) that are applicable to corporate entities.
CO 2	Analyse financial statements for individual entities for the use of shareholders.
CO 3	Identify the procedure for preparation of Consolidated financial statements
CO 4	Examine cash flows of an organization
CO 5	Apply current development in financial accounting

UNIT I : APPLICATION OF ACCOUNTING STANDARDS 10Hour

Standards related to Incomes Taxes, Cash Flows, Government Grants, Effects of Changes in Foreign Exchange Rates, Investments in Associates & Joint Ventures, Leases, Financial Instruments (Excluding Hedge Accounting & Impairment of Financial Assets), Earnings Per Share, Investment Property, Non-Current Assets held for Sale and Fair Value Measurement

UNIT II : PREPARATION OF SINGLE ENTITY FINANCIAL STATEMENTS 13Hour

Preparation of Statement of Changes to Equity and Cash Flow Statements for a Single Entity, Statement of Profit or Loss and Balance Sheet with Adjustments Pertaining to the Standards Covered in Unit 1)

UNIT III : GROUP ACCOUNTS – BASICS 14 Hour

Concept of Group – Concepts of Parent, Subsidiary & Associate – Concept of Control of Parent Over Subsidiary – Concept of Non-Controlling Interest – Basics of Consolidation – Identify which Entity Should Prepare Consolidated Financial Statements.

UNIT IV: PREPARATION OF CONSOLIDATED FINANCIAL STATEMENTS 14Hour

Consolidated Financial Statements (excluding group cash flow statement) for a Simple Group With One Subsidiary and/or One Associate – Computation of Fair Value of Net Assets, Goodwill and Non-Controlling Interest (NCI) on Date of Acquisition –Computation of Group Reserves on Date of Consolidation – Fair Value Adjustments on Consolidation – Effects of Intra-Group Trading on Consolidation – Effect of Disposal of Parent's Investment in Subsidiary in Parent's Individual Financial Statements and in Consolidated Financial Statements.

UNIT V : CURRENT DEVELOPMENTS IN FINANCIAL ACCOUNTING 14 Hour

Concept of Integrated Reporting – Use of Integrated Reporting by Companies – Types of Capital Used in Integrated Reporting – Principles of Integrated Reporting.

Text Books

1. Jawaharlal. (2018) Financial Reporting and Analysis, Himalaya Publishing House, New Delhi.
2. Parveen Sharma, (2020) Financial Reporting, Taxmann Publication, New Delhi.

Reference Books

1. Ravi KanthMiriyala, (2021) Financial Reporting, Commercial Law Publishers, New Delhi.
2. Agarwal M.R, (2020) Financial Reporting, Garima publications, Rajasthan.

E-Resources

- https://icmai.in/upload/Students/Syllabus2016/Final/Paper-17-21082019.pdf
- https://img.gaodun.cn/uploads/201301/2012%20ACCA%20f7.pdf
- https://resource.cdn.icai.org/67240bos54140init-mod1.pdf

Course Outcomes

CO No.	The student will be able to	CognitiveLevel
CO 1	Apply the knowledge of the IFRS (and Ind AS in India) to various business contexts	K1
CO 2	Prepare of single entity financial statement and simple group financial statements	K2
CO 3	Acquire knowledge on group accounts	K3
CO 4	Compute fair value of Net Assets, Goodwill and Reserves	K3
CO 5	Explain the steps involved in preparation of consolidated financial Statements	K4

WOMEN ENTREPRENEURSHIP
UIAM601/UCOM612

Semester:VI **Credit : 05**
Category :Core XXII/XIX **Hours/Week : 05**
Class/Major : III B.Com(IAT) **Total hours : 65**

Course Objectives

CO No.	To enable the students
CO 1	Understand the role of women entrepreneurship in different facets of society.
CO 2	Identify the appropriate Project and financial assistance offered by various financial Institutions
CO 3	Analyze the of various developmental schemes supporting women entrepreneurship
CO 4	Develop a small business
CO 5	Evaluate project finance by banks and other financial institutions

UNIT – I INTRODUCTION TO ENTREPRENEURSHIP 10 Hour

Entrepreneur and Entrepreneurship – Concept- Characteristics, Functions and Types of Entrepreneur; Intrapreneurship, Homepreneur ship. Growth of Entrepreneurship in India - Theories of Entrepreneurship

UNIT – II PROJECT IDENTIFICATION 13Hour

Search for a Business Idea- Product, Process identification – Sources and Selection – Project Classification and Identification – Constraints – Project Life Cycle-Project Formulation–Need, Concept, Significance and Elements of Project Formulation – Feasibility Analysis – Project Report – Methods of Project Appraisal – Plant Layout- Business Ideas, Plan, Layout Presentation.

UNIT – III GOVERNMENT POLICIES 14Hour

Concept and Growth of Women Entrepreneur-Problems and Prospects of Women Entrepreneurship-Government Policies-Financial Assistance – Government Schemes for Women Entrepreneurship-Tamil Nādu Industrial Corporation for Development –Women Entrepreneurship in India-Successful Women Entrepreneurs.

UNIT – IV PROJECT FINANCE 14Hour

Need and Importance **–** Institutional Finance to Entrepreneurs – Commercial Banks and Development Banks – SIDBI, TIIC, IDBI–Institutional Support to Entrepreneurs.

UNIT – V ESTABLISHMENT OF SMALL BUSINESS 14Hour

Steps for Starting a Small Industries – Selection of Organizations – Preparation of Project Proposal- Procedure and Formalities for Registration- Government Policy for Small and Medium Scale Enterprises – Taxation Benefits to Small-scale industry.

Text Books

- Gupta, C.B.& Srinivasan N.P, (2019), *Entrepreneurial Development*, Sultan Chand &Co, New Delhi.
- Charan S, (2020), *Entrepreneurial Development* & Small BusinessEnterprise, Pearson Education., NewDelhi.

Reference Books

- Jayshree Suresh. (2019), *Entrepreneurial Development*, Margham Publications,Chennai.
- Sujata ,V.(2019), *Entrepreneurial Development*, Cauvery Publications,Trichy.
- Prasanna Chandra. (2020), *Entrepreneurship Development*, Tata McGraw Hill,NewDelhi.

E-Resources

- https://www.wegate.eu/list-e-learning-materials-tools
- www.adam-europe.eu/prj/6726/project_6726_en.pdf
- www.uwcc.wisc.edu/info/women/escap2468.pdf
- https://www.startupindia.gov.in/

Course Outcomes

CO No.	The student will be able to	CognitiveLevel
CO 1	Explain the importance, functions and types of Entrepreneurship.	K1
CO 2	Identify appropriate product and process	K2
CO 3	Evaluate Institutional Finance to entrepreneurs	K3
CO 4	Draft a business proposal	K4
CO 5	Develop a small business unit.	K5

AUDIT & ASSURANCE
UIAM602
(This course is offered by ACCA, UK)

Semester :VI **Credit : 05**
Category :Core XXIV/(DSC) **Hours/Week: 06**
Class/Major : III B.Com.(IAT) **Total hours :65**

Course Objectives

CO No.	To enable the students
CO 1	Understand the concept of audit & assurance and the functions of audit
CO 2	Develop the knowledge and skills required to carry out an audit and assurance assignment.
CO 3	Acquire Knowledge of the audit process and standards of auditing.
CO 4	Evaluate internal control techniques
CO 5	Analyze data using appropriate automated tools and techniques

UNIT I: AUDIT FRAMEWORK & REGULATION 10 Hour

Concept of Audit & Assurance – Professional Ethics of an Auditor – Scope of Internal & External Audit – Governance & Audit. Ethical Threats & Safeguards – Discuss the Importance and Purpose of Engagement Letters and their Contents.

UNIT II: AUDIT PLANNING & RISK ASSESSMENT 13 Hour

Obtaining & Planning for Audit Assignments –Identify and Explain the Need for, Benefits of and Importance of Planning an Audit Understanding the Entity & its Environment – Assessing Audit Risk – Fraud Risk – Interim Audit and Impact of Work Performed – Audit Planning & Documentation – Audit Evidence, Documentation, Working Papers.

UNIT III: INTERNAL CONTROL & AUDIT TESTS **14 Hour**

Internal Control System Assessment – Control Environment, Risk Assessment Procedures, Monitoring of Controls – Evaluation of Internal Control System by Auditor – Test of Control – Communication on Internal Controls.

UNIT IV: AUDIT EVIDENCE & REPORTING **14 Hour**

Techniques of Collecting Audit Evidence such as Inspection, Observation, External Confirmation, Recalculation, Analytical Procedures, and Enquiry – Quality & Quantity of Audit Evidence – Audit Sampling – Computer Assisted Auditing Techniques–Explain the Use of Automated Tools and Techniques in the Context of an Audit Including the Use of Audit Software, Test Data and Other Data Analytics Tools – Discuss and Provide Relevant Examples of the Use of Automated Tools and Techniques – Review Procedures Including Subsequent Events, Going Concern, Written Representations – Auditor's Report Contents & Opinion.

UNIT V: AUDIT OF SPECIFIC ITEMS **14 Hour**

Audit of Receivables, Inventory, Payables & Accruals, Bank & Cash, Tangible & Intangible Assets ,Share Capital & Reserves, Directors' Remuneration – Details of Audit Checks for these items and Reporting thereof – Use of Management Representation.

Text Books

- Tandon,B.N, Sudharsanam, S. and Sundharabahu, S. (2020) *Handbook of Practical Auditing*, S.Chand& Co.Ltd.NewDelhi.
- DinkarPagare. (2021) *Principles and Practice of Auditing*, Sultan Chand &Sons. New Delhi.

Reference Books

- Tandon, B.N. (2020) Auditing, S.Chand& Co., NewDelhi.
- Spicer &Pegler. (2021) Auditing, Macmillan Publishers, NewDelhi.
- Ghatalaia, Spicer, and Peglers's, (2021) Practical Auditing, S.Chand& Co. NewDelhi.

E-Resources:

- https://icmai.in/upload/Students/Syllabus-2012/Study_Material_New/Inter-Paper12-Revised.pdf
- https://resource.cdn.icai.org/66595bos53774-ip-mod1.pdf
- https://www.icsi.edu/media/webmodules

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Examine audit assignments and audit risks	K1
CO 2	Evaluate internal controls techniques & audit tests	K2
CO 3	Appraise audit evidence, review and reporting	K3
CO 4	Examine audit of specific item	K4
CO 5	Develop auditing skills	K5

UIAR603 INDUSTRY INTERFACE PROGRAMME III – GST PRACTICAL

Semester :VI **Credit : 1**
Category :Core XXIV/XXII **Hours/Week: 1**
Class/Major : III B.Com.(IAT) **Total hours :13**

Course Objectives

CO No.	To enable the students
CO 1	Identify appropriate GST Return to be submitted
CO 2	Understand the concept of GST Policy and Procedure
CO 3	Apply principles for practicing GST in the firm.
CO 4	Develop knowledge on filing monthly, quarterly and annual GST returns.
CO 5	Apply Knowledge on GST for Tax planning

List of the GST Practical

1. GSTR – I
2. GSTR – 2A
3. GSTR – 2
4. GSTR -3
5. GSTR- 3 B
6. GSTR – 4/CMP - 08
7. GSTR-5
8. GSTR-6
9. GSTR-7
10. GSTR-8
11. GSTR9
12. E way Bill
13. Tax Invoice

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Acquire working knowledge on GST and application of the same in the organizations.	K1
CO 2	Apply the knowledge of GST rules in Tax planning.	K2
CO 3	Compute GST liability and File monthly, quarterly and annual GST returns.	K3
CO 4	Explain the features of GST Returns	K3
CO 5	Develop taxation skills	K4
CO 6	Identify and file appropriate GST Return	K5

Evaluation Pattern for Industry Interface Programme

CIA **60Marks**

Daily Practical Assessment : 30 Marks Test I : 10Marks
Viva I : 05Marks
Test II : 10Marks
Viva II : 05Marks

ESE **40Marks**

Record : 10 Marks
Exam : 20 Marks
(Students will be given blank Challans and forms to fill-up)
Viva voce :10Marks
100Marks

GOODS AND SERVICES TAX (GST)

UIAM604

Semester :VI **Credit : 5**
Category: CoreXXV/XXIII **Hours/Week: 6**
Class & Major: III B.Com.(IAT) **Total Hours:78**

Course Objectives

CO No.	To enable the students
CO 1	Understand the concept of GST Policy and Procedure
CO 2	Apply principles for practicing GST in the firm.
CO 3	Obtain knowledge on registration procedure, levy and collection of GST
CO 4	Identify appropriate GST payable
CO 5	Develop taxation skills

UNIT – I INTRODUCTION TO GST **16Hour**

GST – scope – Benefits – Salient Features – GST Council – Important Terms – Minimal Interface– Input Tax Credit – Refund – Demands – Alternate Dispute Resolution Mechanism.

UNIT – II GST ACT **16Hour**

GST Act – CGST Act – SGST Act – IGST Act – UTGST Act.

UNIT – III COMPUTATION PROCEDURESFOR GST **16Hour**

GST – Levy & Collection of Tax – Time and Value of Supply – Input Tax Credit – Registration-Tax Invoice – Debit and Credit Notes.

UNIT – IV AUDIT AND ACCOUNTS RELATEDTO GST **14Hour**

Administration – GST Accounts and Records – Returns – Payment of Tax – Refunds-Assessment – Audit – Inspection.

UNIT – V APPEALS AND PENALTYINGST **16Hour**

Demand and Recovery – Liability to Pay Tax – Advance Ruling- Seizure and Arrest –

Appeals and Revisions – Offences and Penalties.

Text Books

- Datey, V.S. (2022), *All About GST, Taxmann Publications, NewDelhi.*
- *Balachandran v, (2022), texte book of GST &Customs law Sultan Chand& Sons, New Delhi.*
- Vinod K Singania, (2022), *.GST& Custom Law, Taxman Publications*, NewDelhi.

Reference Books

- Bimal Jain, &Isha Bansal, (2022), *GST Law and Analysis with Conceptual Procedures,* Young Global Publications, New Delhi.
- ArpitHaldia, C.A, (2022), *GST Made Easy-Answers to All Your Queries on GST,* Taxman Publications, New Delhi.

E-Resources

- www.legalserviceindia.com
- www.indiacorporateadvisor.com
- https://resource.cdn.icai.org/67617bos54308.pdf
- www.cbit.gov.in
- www.aces.gov.in

Course Outcomes

CO No.	The student will be able to	Bloom`sLevel
CO 1	Acquire working knowledge on GST and application of the same in the organizations.	K1
CO 2	Apply GST rules in Tax planning.	K2
CO 3	Compute CGST, SGST, IGST and UTGST liability and Filing of returns	K3
CO 4	Explain the benefits of GST	K3
CO 5	Examine accounts & records related to GST	K4

SERVICE MARKETING

UIAM605

Semester :VI **Credits :5**
Category :CoreXXVI/XXI **Hours/Week: 5**
Class & Major: III B.Com.(IAT) **Total Hours :65**

Course Objectives

CO No.	To enable the students
CO 1	Understand the nature and concepts of service.
CO 2	Analyze the different types of marketing of services
CO 3	Apply the concept of CRM in Service Marketing
CO 4	Evaluate elements of marketing mix in service marketing
CO 5	Develop service marketing skills

UNIT-I INTRODUCTION **13 Hour**

Growth of the Service Sector – Nature and Concept of Service – Classification of Services – Characteristics of Services and their Marketing Implications.

UNIT-II SERVICE MARKETING PROCESS **13 Hour**

Marketing Strategies for Service Firms with Special Reference to Information, Communication, Consultancy, Advertising, Professional Services, After Sales Service, Recruitment Training and Tourism. Essential Elements of Marketing Mix in Service Marketing.

UNIT-III SERVICE MARKETING MIX **13 Hour**

Product Support Services – Pricing of Services – Problems of Service Quality Management – Customer Expectations – Innovation in Services.

UNIT-IV – EXTENDED SERVICE MARKETING MIX **13 Hour**

People, Process, and Physical Evidence – Nature – Types – Marketing of Insurance – Mutual Fund – Marketing for Non – Profit Firms – Growth of Financial Services in India.

UNIT-V - CRM INSERVICEMARKETING **13 Hour**

CRM – Identifying and Satisfying Customer Needs – Relationship Marketing – Customer Satisfaction – Managing Service Brands.

Text Books

- Helen Wood Ruffe, (2020), *Services Marketing*, Macmillan India, NewDelhi.
- Balaji B, (2019), *Services Marketing and Management*, S.Chand & Co., NewDelhi.

Reference Books

- Christopher Lovelock, (2018)*Services Marketing*, Pearson Education. NewDelhi.
- Bateson E.G. (2018)*Managing Service Marketing – Text and Readings*, Dryden press, Hinsdale, NewYork.
- Philip Kotler. (2019), *Marketing Professional Services*, Prentice Hall, New Jersey, USA.
- Payne. (2019), *The Essence of Service Marketing*, Prentice Hall, NewDelhi.

Course Outcomes

CO No.	The student will be able to	CognitiveLevel
CO 1	Acquire knowledge with regard to management of service marketing,	K1
CO 2	Analyze the different types of marketing of services	K2
CO 3	Apply the knowledge with regard to CRM in service marketing	K3
CO 4	Explain extended service marketing mix	K3
CO 5	Examine Marketing of Insurance and Mutual Fund	K4
CO 6	Develop Service Marketing Skills	K5

LOGISTICS MANAGEMENT
UIAO608

Semester : VI **Credit : 4**
Category : CoreXXVI/XXI **Hours/Week: 5**
Class & Major: III B.Com.(IAT) **Total Hours:65**

Course Objectives

CO No.	To enable the students
CO 1	Understand the basic Knowledge of Logistics.
CO 2	Apply the knowledge of Supply Chain Management in Logistics.
CO 3	Examine thecomprehensive nature of logistics management.
CO 4	Evaluate different types of Logistics
CO 5	Analyze role of supply change in E -Business

UNIT – I Logistics Management and Supply Chain Management 13Hour
Definition, Evolution, Importance. The Concepts of Logistics. Logistics Relationships. Functional applications – HR, Marketing, Operations, Finance, IT. Logistics Organization – Logistics in different industries

UNIT – I ILogistics Activities 13Hour
Functions, Objectives, Solution. Customer Service, Warehousing and Material Storage, Material Handling, Order Processing, Information Handling and Procurement Transportation and Packaging. Third Party and Fourth Party Logistics – Reverse Logistics – Global Logistics

Unit – III Fundamentals of Supply Chain 13Hour
Importance, Development of SCM Concepts and Definitions Supply Chain Strategy, Strategic Supply Chain Management and Key Components. Drivers of Supply Chain Performance – Key Decision Areas – External Drivers of Change.

Unit – IV Modeling Logistics Systems 13Hour
Modeling Logistics Systems-Simulation of Logistic Systems – Dimensions of Logistics & SCM – The Macro Perspective and the Macro Dimension – Logistic System Analysis Strategy, Logistical Operations Integration and Customer Service – Supply Chain Relationships.

Unit – V Framework and Role of Supply Chain 13 Hour
Framework and Role of Supply Chain in e-Business and B2B Practices. Value of Information in Logistics & SCM – E-Logistics, E-Supply Chains – International and Global Issues in Logistics – Role of Government in International Logistics and Principal Characteristics of Logistics in Various Countries and Regions.

Test Books:

- Altekar Rahul V, (2021) Supply Chain Management-Concept and Cases, Prentice Hall India.
- Bowersox Donald, J. (2021) Logistical Management – The Integrated Supply Chain Process" Tata McGraw Hill.
- 3. Donald, J. Bowersox, David J. Closs and M. Bixby Cooper, (2021) "Supply Chain Logistics Management", Tata McGraw Hill.

Reference Books:

- NarayaRangarj, G. Raghuram, Mandyam M. Srinivasan, (2009) "Supply Chain Management for Competitive Advantage – Concepts and Cases", Tata McGraw Hill.
- Sunil Chopra and Peter Meindl, (2021) Supply Chain Management-Strategy Planning and Operation, Prentice Hall.
- Reguram, G, Rangaraj, N. (2020). Logistics and Supply Chain Management Cases and Concepts: Macmillan India Ltd., New Delhi.
- Sahay, B. S, (2021). Supply Chain Management for Global Competitiveness: Macmillan India Ltd., New Delhi.

Course Outcomes

CO No.	The student will be able to	CognitiveLevel
CO 1	Explain logistics and reverse logistics concepts and basic activities	K1
CO 2	Appraise logistics activities with other business activities	K2
CO 3	Evaluate the role of Supply Chain in e-business and b2b practices	K3
CO 4	Examine dimensions of logistics and SCM	K3
CO 5	Discuss global issues in Logistics	K4
CO 6	Develop logistics management Skills	K5

INCOME TAX LAW & PRACTICE II

UIAO608

Semester : VI **Credit : 4**
Category :Major Elective **Hours/Week: 5**
Class & Major: III B.Com.(IAT) **Total Hours:65**

Course Objectives

CO No.	To enable the students
CO 1	Identify the assessment procedures to be followed.
CO 2	Evaluate tax savings schemes
CO 3	Apply set off and carry forward provisions to determine taxable income &tax liability
CO 4	Understand the structure of IT Department
CO 5	Analyze consequences of non-filing of returns

UNIT- I COMPUTATION OF GROSS TOTAL INCOME 14 Hour

Clubbing of Income – Set Off – Carry Forward & Set Off – Permissible Deductions from Gross Total Income (Sec 80C to 80U).

UNIT- II COMPUTATION OF TAX LIABILITY 13 Hour

Schedule of Rates of Tax – Computation of Tax Liability – Assessment of Individuals-Assessment of Agricultural Income

UNIT-III ASSESSMENT OF FIRMS **13 Hour**

Assessment of Firms – Assessment of Companies

UNIT –IV STRUCTURE OF INCOME **13 Hour**

Income Tax Authorities – Structure of Income-Tax Department-CBDT- Powers of Tax Authorities

UNIT-V PROCDEURE FOR FILLING OF INCOME TAX RETURNS **12Hour**

Filing of Income Tax Returns-PAN- Assessment-Types of Assessment-Self Assessment- Best Judgments Assessment- Income Escaping Assessment – E-filing of Returns-Consequences of Non – Filing of returns- Procedure for Assessment.

Note: Theory 20% and Problem 80%

Text Books

- Gaur and Narang. (2022-23), *Income Tax Law & Practice*, Kalyani Publication, Chennai.
- Reddy & Murthy.(2022-23), *Income Tax Law & Practice,* Margham Publication,Chennai.

Reference Books

- Vinod K. Singhania&KapilSinghania, (2022-23), *Direct Taxes Law & Practice*,Taxmann, New Delhi.
- Vinod K. Singhania& Monica Singhania, (2022-23), *Corporate Tax Planning & Business Tax Procedures*, Taxmann Publications, NewDelhi.

E-Resources

- www.incometaxindia.gov.in
- www.incometaxindiaefiling.gov.in
- www.onlineservices.tin.egov-nsdl.com

Course Outcomes

CO No.	The student will be able to	Bloom`s Level
CO 1	Compute the total income and tax liability of individual, firms& company	K1
CO 2	Explain permissible deductions from gross total income	K2
CO 3	Apply the knowledge for Filing return of income tax	K3
CO 4	Acquire provisions of clubbing of income	K3
CO 5	Discuss the various powers of Income Tax Authorities	K4
CO 6	Develop taxation skills.	K5

UIAO609 CONSUMER PROTECTION

Semester : VI **Credit : 4**
Category :Major Elective **Hours/Week: 5**
Class & Major: III B.Com.(IAT) **Total Hours :65**
Course Objectives

CO No.	To enable the students
CO 1	Understand the rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.
CO 2	Obtain knowledge about organizational setup under the Consumer Protection Act.
CO 3	Evaluate Indian Consumer Markets
CO 4	Analyze the concept of price in retail markets
CO 5	Apply the knowledge for filing a complaint and making appeal

UNIT – I CONSUMER AND MARKETS 13 Hour

Concept of Consumer, Nature of Markets: Liberalization and Globalization of Markets with Special Reference to Indian Consumer Markets, E Commerce with Reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, Labeling and Packaging along with Relevant Laws, Legal Metrology.

UNIT – II CONSUMER PROTECTION LAW IN INDIA 13 Hour

Consumer Rights and UN Guidelines on Consumer Protection, Consumer Goods, Defect in Goods, Spurious Goods and Services, Service, Deficiency in Service, Unfair Trade Practice, and Restrictive Trade Practice.

UNIT – III ORGANIZATIONAL SET UP UNDER THE CONSUMER PROTECTION ACT 13 Hour

Advisory Bodies: Consumer Protection Councils at the Central, State, and District levels: Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA.

UNIT – IV GRIEVANCE REDRESSAL MECHANISM UNDER THE INDIAN CONSUMER PROTECTIONLAW 15 Hour

Grounds of Filing a Complaint: Limitation Period: Procedure for Filing and Hearing of a Complaint: Disposal of Cases, Relief/Remedy Available: Temporary Injunction, Enforcement of Order, Appeal, Frivolous and Vexatious Complaints; Offences and Penalties.

Role of Industry Regulators in Consumer Protection

Banking: RBI and Banking Ombudsman – IRDA and Insurance Ombudsman – Telecommunication: TRAI – Food Products: FSSAI – Electricity Supply, Electricity Regulatory Commission – Real Estate Regulatory Authority

UNIT – V CONTEMPORARY ISSUES IN CONSUMER AFFAIRS 13 Hour

Evolution of Consumer Movement in India, Formation of Consumer Organization and their Role in Consumer Protections, Misleading Advertisements and Sustainable Consumption, National Consumer Helping, Comparative Product Testing Sustainable Consumption and Energy Ratings.Quality and Standardization: Voluntary and Mandatory Standards: Role of BIS, Indian Standards Mark (ISI), Agemark, Hallmarking, Licensing and Surveillance: Role of International Standards : ISO an Overview.

Text Books

- Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and Aswathi, (2019), *ConsumerAffairs,*Universities Press, New Delhi.
- Choudhary, Ram Naresh Prasad, (2019), *Consumer Protection Law Provisionsand Procedure,* Deep and Deep Publications Pvt, Ltd., NewDelhi.
- Ganesan and Sumathy, (2020), *Consumer Protection in India: Issues and Challenges,*Regal Publications, New Delhi.

Reference Books

- Suresh Misra and SapnaChadah, (2019) *Consumer Protection in India: Issuesand Concern, S.Chand,* NewDelhi.
- Rajalaxmi Rao, (2018) *Consumer is King*, Universal Law Publishing Company, NewDelhi.
- Grimaji and Pushpa, (2019) *Consumer Rights for Everyone,* Penguin Books,UK.

E-Resources

- www.Consumereducation.in
- www.consumeraffairs.nic.in
- www.bis.org

Course Outcomes

CO No.	The student will be able to	Bloom`s Level
CO 1	Explain the procedure of redressal of consumer complaints and the role of different agencies establishing product and service standards.	K1
CO 2	Examine the business firms' interface with consumers and the consumer related regulatory and business environment.	K2
CO 3	Acquire knowledge on Consumer protection law in India	K3
CO 4	Discuss contemporary issues in Consumers Affairs	K3
CO 5	Evaluate role of BIS, ISI in Consumer Protections	K4
CO 6	Appraise the role of industry regulators in Consumer Protection	K5

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
V	XVII/XV	UCOM506/ UCCM506/ UIAM501	Company Law	Case study	Seminar
VI	XXV/ XXIII	UCOM616/ UCCM616/ UIAM604	Goods and Service Tax	Hands on training to fill ITR	Problem solving
VI	XXVI/ XXI	UCOM617/ UCCM617/ UIAM605	Service Marketing	Case Study	Seminar
VI	XXIV/DSC	UIAM602	Audit &Assurance	Poster Presentation	Seminar
V	XXII/DSC	UIAM505	Financial Reporting II	Assignment	Seminar
V	XVII/DSC	UIAM502	Financial Management -II	Assignment	Seminar
VI	Major Elective	UCOO607/ UCCO607/ UIAO609	Consumer Protection	Poster Presentation	Seminar

PROGRAMME PROFILE: M.Com.

(Learning Outcome Based Curriculum Framework (LOCF)

PREAMBLE

PG : Programme profile and the syllabi of Courses Offered in Semester 1 and II along with III and IV Evaluation Components (with effect from 2021-2023 Batch onwards)

Programme Specific Outcomes (PSO)

Upon completion of the programme, the students will be able to

- Identify and use of practical tools of Finance required in Decision Making.
- Assess Global Opportunities and Challenges for Business Growth.
- Analyzes Ethical Implications of Business Practices using Advanced levels of Ethical Reasoning and Legal Implications
- Investigate effectively the Research Tools, Apply appropriate Tools and draw Conclusion.

Semester	Category	Course Code	Course Title	Contact/ Week	Credit	
					Min	Max
I	Core I/(DSC)	PCOM102	Business Environment & Policy	6	4	4
	Core II/(DSC)	PCOM104	Financial Policies and Decision Making	6	4	4
	Core III/(DSC)	PCOM105	Strategic Management	6	4	4
	Core IV/(DSC)	PCOM308	Computerized Accounting	2	2	2
	Core V/(DSC)	PCOR309	Computerized Accounting – Lab	3	2	2
	Core VI/(DSC)	PCOM107	Corporate Governance & Business Ethics	6	4	4
	Library			1	-	-
			TOTAL	**30**	**20**	**20**
II	Core VII/(DSC)	PCOM202	Global Marketing	6	4	4
	Core VIII/(DSC)	PCOM207	Operation Research Methods	6	4	4
	Core IX/(DSC)	PCOM208	Advanced Accounting	6	4	4
	Core X/(DSC)	PCOM210	Derivatives and Risk Management	6	4	4
	NME– II/SEC			5	4	4
	Library			1	-	-
	Service Learning	PCOX201	Service Learning – Banking Practices	-	1	1
IV		PCOM201	Internship		-	1
			TOTAL	30	21	22
III	Core XI/(DSC)	PCOM309	Service Marketing	6	5	5
	Core XII/(DSC)	PCOM305	Income Tax & International Taxation	6	6	6
	Core XIII/(DSC)	PCOM306	Contemporary Business Legislations	6	5	5
	Core XIV/AECC	PRMC301	Research Methodology in Commerce	5	4	4
	Core XV/GE	PCID302	E- Commerce	5	4	4
	Project		Project	2		
			TOTAL	30	24	24
IV	Core XVI/(DSC)	PCOM411	Human Resource Development	6	4	4

	Core XVII/(DSC)	PCOM410	Logistics Management	6	4	4
	Core XVIII/(DSC)	PCOM408	Goods and Service Tax (GST)	5	5	5
	Core XIX/(DSC)	PCOM409	Advanced Cost & Management Accounting	6	5	5
	Core XX/(DSC)	PCOR409	Accounting Package in GST	2	1	1
	Project	PCOP401	Project	4	6	6
	Library			1		
IV	Internship	PCOI401	Internship Field Work		-	1
	Extension	PROX601	Rural Outreach Programme		-	1
	TOTAL			30	25	27
	GRAND TOTAL			120	90	93

Minimum one MOOCs (Compulsory Audit Course) to be completed during first semester

PCOM309 SERVICE MARKETING

Semester : III **Credit : 5**
Category : Core X **Hours/Week : 6**
Class & Major: II M.Com **Total Hours : 78**

Course Objectives

CO No.	On completion of the course the student will be able to
CO-1	Identify the differences between goods and services
CO-2	Understand the importance of service marketing
CO-3	Analyze seven P's of service marketing
CO-4	Evaluate consumer behavior in service marketing
CO-5	Apply the knowledge in marketing of financial services

UNIT I-INTRODUCTION **16 Hour**

Service Marketing - Introduction to Services – Meaning, Need, Services and Technology, Differences between Goods and Services.

UNIT II - SERVICE MARKETING MIX **16 Hour**

Product – Product Concept –Price – Pricing Objectives – Promotion – Promotion Mix – Physical Distribution, People, Process, and Physical Evidence.

UNIT III- CONSUMER BEHAVIOUR **15 Hour**

Consumer Behavior – Meaning - features – Consumer Benefits and Market Segmentation - Customer Perception – Customer Expectation.

UNIT IV- CUSTOMER RELATIONSHIP MANAGEMENT **15 Hour**

Customer Relationship Management – Identifying Customer Needs – Relationship Marketing – Customer – Customer Satisfaction.

UNIT V- TYPES OF SERVICE MARKETING **16 Hour**

Marketing of Financial Services – Nature-Types – Marketing of Insurance – Mutual Fund Growth of Financial Services.

Text Books:

- Jay D. Lindquist, (2020) CosumerBehaviour, Atomic Dog Publishing, USA.
- Natarajan . L, (2020) Service Marketing, Chennai Margham Publishing House.

Reference Books:

- David,L. Kurdz Kenneth, C. Clow, (2021) Services Marketing, John wiley& son Christopher love lock , Services Marketing People, Technology, strategy, pearson Education Asia.
- Reddy, P.N Appamaiah. H.R. S, Anil Kumar, Nirmala, (2020) Service Marketing, Himalaya Publishing House.
- Philip Kotler, &Powl, M. Bloom ,(2020) Marketing Professional services, Prentice Hall

.

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom`s Level
CO-1	Examine the nature of services, and distinguish between products and services.	K1
CO-2	Identify the major elements needed to improve the marketing of services	K2
CO-3	Develop an understanding of the roles of relationship marketing and customer service in adding value to the customer's perception of a service.	K3
CO-4	Explain the different types of service marketing.	K4
CO-5	Evaluate marketing of financial services.	K4

PCOM305 INCOME TAX & INTERNATIONAL TAXATION

Semester : III **Credit : 5**
Category : Core XI **Hours/Week : 6**
Class & Major : II M.Com **Total Hours : 78**

Course Objectives

CO No.	To enable the students
CO 1	Identify the various sources of Income of a person
CO 2	Understand the Principles and Practice of Income Tax Act
CO 3	Analyze the various residential status of a person
CO 4	Compute Income from Salary and House Property
CO 5	Evaluate head wise deductions

UNIT -I BASIC CONCEPTS **15 Hour**

Basic concepts – Definitions – Assesses – Assessment Year – Previous Year – Income – Residential Status – Scope of Total Income – Capital income and expenditure – Revenue income and expenditure.

UNIT- II COMPUTATION OF INCOME FROM SALARIES, HOUSE PROPERTY, BUSINESS OR PROFESSION **16 Hour**

Heads of income – Income from salaries – Income from House Property – Income from Business or Profession.

UNIT- III COMPUTATION OF CAPITAL GAINS AND OTHER SOURCES **16 Hour**

Income under the head Capital Gains – Income from other sources – Deductions from Total Income – Set off and carry forward of losses.

UNIT- IV COMPUTATION OF TOTAL INCOME **15 Hour**

Computation of total income – Individual – Firm – Companies – MAT – Tax Deducted at source – Advance tax – PAN – Rates of Tax. - Assessment Procedure – Income Tax Authorities – Penalties – e-filling.

UNIT –V INTERNATIONAL TAXATION AND TRANSFER PRICING **16 Hour**

Basic concepts: Residency issues, source of income, tax heavens, withholding tax, unilateral relief, double taxation avoidance agreements - Transfer Pricing- concepts, meaning of International transactions and specified domestic transactions - Computation of Arm's length Price – methods - Reference to Companies (Cost Records and Audit) Rules, 2014 in assessment of arm's length price.

Proportion: Problem: 60%, Theory: 40%

Text Books

- Vinod K. Singania, Direct Taxes, Taxmann Publication, New Delhi.
- Guar V.P. and Narang K.L., Income Tax Law & Practice, Kalyani Publishers, Chennai.

Reference Books:

- Dinkar Pagare, Income Tax Law & Practice, Sultan Chand, New Delhi.
- Mehrotra H.C. and Goyal S.P., Income Tax Law & Practice, Sahitya Bhawan Publications, Agra

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Identify the head-wise taxable income	K1
CO 2	Apply income tax provisions for tax planning.	K2
CO 3	Acquire knowledge on canons of taxation.	K3
CO 4	Explain the head-wise deductions allowed.	K3
CO 5	Examine the allowed and disallowed business expenses.	K4

PCOM306 CONTEMPORARY BUSINESS LEGISLATIONS

Semester : III **Credit : 5**
Category : Core XII **Hours/Week : 6**
Class & Major : II M.Com **Total Hours : 78**

Course Objectives

CO No.	On completion of the course the student will be able to
CO-1	Understand the commercial and economic laws
CO-2	Develop foreign exchange management skills
CO-3	Acquire knowledge on consumer production
CO-4	Analyze the environmental issues
CO-5	Apply the knowledge of IPR in business

UNIT- I INTRODUCTION TO ECONOMIC LAWS 16 Hour

Objectives – Economic development- Industrial policy – Industrial policy 1991 – Policy measures for Small, Tiny, Handloom and Village industries. –SME sector – initiatives by Government.

UNIT- II FOREIGN EXCHANGE MANAGEMENT ACT, 1999 15 Hour

Objectives of FEMA – scope and coverage of FEMA – Key definitions – Management of foreign exchange - current and capital account transactions – Authorized person – Export of goods and services – Directorate of Enforcement – penal provisions – Adjudication and appeals.

UNIT - III COMPETITION ACT, 2002 15 Hour

Objectives of the Act – scope and coverage – Key definitions under Competition Law – Prohibition of Agreements – Anti –competitive agreements – prohibition of abuse of dominant position – combination – regulation of combination – Competition Commission of India (CCI) – composition, powers and duties – Enquiries and proceedings of CCI.

UNIT -IV ENVIRONMENT AND CONSUMER PROTECTION 16 Hour

Objects of the Environment (Protection) Act, 1986 – Key definitions used in the Act – General powers of the Central Government – prevention, control and abatement of Environmental pollution – Environmental Labs – penalty provisions - Environment Audit (ii) Consumer Protection Act, 1986 – objects of the Act – rights of consumers – Key definitions used in the Act – consumer protection councils – Redressal machinery under the Act – Nature and scope of remedies under the CPA – Right to Information Act 2005.

UNIT- V INTELLECTUAL PROPERTY RIGHTS 16 Hour

Intellectual property – features – Need for IPR - Types of IPR – Designs, Trademarks – Copyright – Geographical indications – Trade secrets – Patents – Layout designs of integrated circuits

Text Books

- Kapoor, *G.K, Economic and other legislations,* Sultan Chand & Sons, New Delhi. 2015.
- Balachandran V, *Economic and other legislations,* Vijay Nicole Imprints, Chennai, 2015.
- Singh, Avtar, The Principles of Mercantile Law, Eastern Book Company, Lucknow, 2015

Reference Books

- Datey V.S., *Economic Laws,* Taxmann Publications, New Delhi, 2015.
- Kapoor N.D., *Mercantile Law*, Sultan Chand, New Delhi. 2015
- Sharma J. P and Sunaina Kanojia, *Business Laws,* Ane Books Pvt. Ltd, New Delhi, 2015

Course Outcomes

CO No.	On completion of the course the student will be able to	Cognitive Level
CO-1	Identify factors influencing economic development	K1
CO-2	Apply the knowledge of FEMA in the Management foreign exchange	K2
CO-3	Examine powers and duties of CCI	K3
CO-4	Explain the importance of environment and consumer production	K3
CO-5	Discuss various types of IPR	K4

E- COMMERCE
PCID302

Semester : III **Credit : 4**
Category :Core XV **Hours/Week : 5**
Class & Major: II M.Com **Total Hours : 65**

Course Objectives

CO No.	The student will be able to
CO-1	Understand the theories and concepts underlying e-Commerce
CO-2	Obtain knowledge about e -commerce and its various components.
CO-3	Evaluate challenges of E- Commerce
CO-4	Analyze web marketing strategies
CO-5	Apply knowledge of cyber law in E- Commerce

UNIT- I INTRODUCTION **14 Hour**

Introduction to e – Commerce – Meaning – Working of e – Commerce – Electronic Business – Categories of e – Commerce Application – Global Trading Environment and Adoption of e – Commerce – Product suitability – Comparison between Traditional and Electronic Commerce – Advantages and Disadvantages of e– Commerce.

UNIT - II BUSINESS MODELS **14 Hour**

Business Models of e – Commerce – Major challenges of B2C e Commerce – Meaning of B2B Exchanges – Development of B2B e – Commerce – Types of B2B Markets – Difference between B2C and B2B Commerce.

UNIT- III WEB MARKETING STRATEGIES **13 Hour**

Different Types of Marketing Strategies (Product Based and Customer Based) – Communicating with Different Market Segments–Advertising on the Web.

UNIT - IV ELECTRONIC DATA INTERCHANGE **12 Hour**

Introduction on EDI, EDI on Internet Supply Chain Management– its software– online payment– Payment Cards– Advantages and Disadvantages of Payment Cards.

UNIT - V INTERNET SECURITY **12 Hour**

Computer Security its Types–Threats– Hackers–Classification of Computer

Text Books:

- SrinivasaVallabhan. S.V ,(2021) *E-Commerce,*Vijay Nicole Imprints Private Ltd.
- Gary P. Schnider,(2021) *Electronics Commerce,* fourth annual edition, California state university.

Reference Book :

- Marily n Greenstein and ToddM Feinman, (2021) *Electronic Commerce,*Mc – Graw Hill Europe
- Kamlesh K. Bajaj and Debjani nag ,(2021)*E-Commerce,* Tata Mc – Graw Hill Europe

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom`s Level
CO-1	Evaluate the major types of E-commerce.	K1
CO-2	Explain the process that should be followed in building an E-commerce presence	K2
CO-3	Identify the key security threats in the E-commerce environment.	K3
CO-4	Examine how procurement and supply chains relate to B2B E-commerce	K3
CO-5	Appraise different types of marketing strategies	K4
CO-6	Develop E- Commerce Business	K4

RESEARCH METHODOLOGY IN COMMERCE
PRMC301

Semester : III **Credit : 4**
Category : Core XIV **Hours/Week : 5**
Class &Major : IIM.COM **Total Hours : 65**

Course Objectives

CO.No.	To enable the students
CO-1	Understand the Basic Concepts of Research using various Methodologies
CO-2	Identify Appropriate Research Topics
CO-3	Select appropriate Research Problem and Parameters
CO-4	Prepare a Project Proposal (To Undertake a Project)
CO-5	Organize and Conduct Research (Advanced Project) in a more appropriate Manner and write a Research Report.

UNIT I INTRODUCTION TO RESEARCH METHODOLOGY 7 Hour

Meaning of research – Objective of Research – Motivation in Research – Types of Research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical – Research Approaches – Significance of Research – Research Methods versus Methodology – Research and Scientific Methods – Importance of Knowing How Research is Done – Research Process – Criteria for Good Research.

UNIT II RESEARCH PROBLEM AND RESEARCH DESIGN 15 Hour

Research Problem – Selecting Research Problem – Necessity of Defining A Problem – Techniques of Defining Problem – Formulation of Research Problem, Objectives of Research Problem. Meaning of Research Design – Need for Research Design – Important Concept Related to Research Design – Different Research Designs – Basic Principles of Experimental Design; Important Experimental Design.

UNIT III SAMPLING DESIGN, DATA COLLECTION AND ANALYSIS 18 Hour

Census And Sample Surveys – Characteristics of Good Sample Design – Different Types of Sample Designs – Techniques of Selecting a Random Sample-Accepts of Method Validation – Observation and Collection of Data – Methods of Data Collection – Sampling Methods – Data Processing and Analysis Strategies and Tools – Data Analysis with Statically Package (Sigma STAT,SPSS For Student T-Test, ANOVA, Etc.), Hypothesis Testing.

UNIT IV INTERPRETAION, REPORT WRITING, RESEARCH ETHICS AND IPR 15Hour

Interpretation and Report Writing – Meaning of Interpretation; Techniques of Interpretation; Precautions in Interpretation; Significance of Report Writing, Layout of Research Report, Types of Reports; Presentation of Research Work-Oral, Poster and Writing Research Paper; Precautions for Writing Research Report, Conclusion.

Ethics-Ethical Issues, Related to Research, IPR-Intellectual Property Rights in Research and Development-Patents and Patent Laws: Objectives of the Patent System - Basic, Principles and General Requirements of Patent Law.

UNIT V TOOLS FOR ANALYSIS 10 Hour

Statistical Tools- Descriptive Statistics- Mean, Medium, Mode and Standard Deviation – Chi- Square , T-Test, ANOVA (One way), Correlation, Simple regression(Simple Problems).

Text books

- Kothari, C. R. (1980). Research Methodology: Research and techniques, New Delhi: New Age International Publishers
- Carlos,C.M.,2000.Intellectual property rights. the WTO and developing countries: the TRIPS agreement and policy options. ZedBooks, New York.
- Beier F.K, Crespi R.S and Straus T. Biotechnology and Patent protection, Oxford and IBH Publishing Co. New Delhi.
- Darren George and Paul Mallery – SPSS for Windows, Pearson Education

References

- Singh, Y. K. (2006). Fundamental of Research Methodology and Statistics. New Delhi. New International (P) Limited, Publishers.
- Wallinman, N. (2006). Your Research Project: A step-by-step guide for the first-time researcher. London: Sage Publications
- Senthil Kumar Sadasivam and Mohammed Jaabir M. S. (2008). IPR, Biosafety andBiotechnology Management, Jasen Publications, India.
- Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

E-Books

- http:// www.ptt.ed/-super7/430114401/4391.ptt/.
- https://www.heacademy.ac.uk/system/files/msor.3.Is.pdf
- 164.100.133.129.81/econtent/uploads/research-methods.pdf

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Discuss research articles and papers.	K1
CO 2	Sketch a literature review.	K2
CO 3	Organize research questions to do better research.	K3
CO 4	Appraise a research proposal or industry project plan.	K4
CO 5	Design the collection methods and ethics proposals.	K4

HUMAN RESOURCE DEVELOPMENT

PCOM411

Semester : IV **Credit : 4**
Category : Core XVI/(DSC) **Hours/Week: 6**
Class & Major: II M.Com **Total Hours : 78**

Course Objectives

CO No.	The student will be able to
CO-1	Understand the interface of the Human Resources function with Operations, Marketing, and Finance functions.
CO-2	Evaluate the Human Resources function as a potential career option,
CO-3	Analyze training and development programes
CO-4	Apply Appropriate training method for HRD
CO-5	Develop HRD Skills

UNIT – I HRD-MACRO PERSPECTIVE : 15 Hour

HRD Concept, Origin and Need, HRD as a Total System; Approaches to HRD; Human Development and HRD; HRD at Macro and Micro Climate.

UNIT -II HRD–MICRO PERSPECTIVE: 15 Hour

Areas of HRD; HRD Interventions Performance Appraisal, Potential Appraisal, Feedback and Performance Coaching, Training, Career Planning, OD or Systems Development, Rewards, Employee Welfare and Quality of Work Life and Human Resource Information; Staffing for HRD: Roles of HR Developer; Physical and Financial Resources for HRD; HR Accounting; HRD Audit, Strategic HRD

UNIT –III INSTRUCTIONAL TECHNOLOGY FOR HRD : 16 Hour

Learning and HRD; Models and Curriculum; Principles of Learning; Group and Individual Learning; Transactional Analysis; Assessment Centre; Behavior Modeling and Self Directed Learning; Evaluating the HRD

UNIT – IV HUMAN RESOURCE TRAINING AND DEVELOPMENT: 16 Hour

Concept and Importance; Assessing Training Needs; Designing and Evaluating T&D Programmes; Role, Responsibilities and Challenges to Training Managers.

UNIT – V TRAINING METHODS: 16 Hour

Training with in Industry (TWI): On the Job & Off the Job Training; Management Development: Lecture Method; Role Play; In-basket Exercise; Simulation; Vestibule Training; Management Games; Case Study; Programmed Instruction; Team Development; Sensitivity Training; Globalization challenges and Strategies of Training Program, Review on T&D Programmes in India.

Text Books :

- Nadler, Leonard. Corporate Human Resource Development, Van Nostrand Reinhold, ASTD, New York
- Rao, T.V and Pareek, Udai, (2021) Designing and Managing Human Resource Systems, Oxford IBH Pub.
- Rao, T.V.(2020) Readings in HRD, Oxford IBH Pub. Pvt. Ltd., New Delhi.
- Viramani, B.R and Seth, Parmila (2021) Evaluating Management Development, Vision Books, New Delhi .

Reference Books:

- Rao, T.V.(et.al) (2021) HRD in the New Economic Environment, Tata McGraw-Hill Pub.Pvt, Ltd., New Delhi
- Rao, T.V: (2021) HRD Audit, Sage Publications, New Delhi .
- ILO, Teaching and Training Methods for Management Development Hand Book, McGraw-Hill, New York .
- Rao, T.V(2021) Human Resource Development, Sage Publications, New Delhi .
- Kapur, Sashi(2021) Human Resource Development and Training in Practice, Beacon Books, New Delhi

Course Outcomes .

CO No.	On completion of the course the student will be able to	CognitiveLevel
CO-1	Appraise the performance of employees	K1
CO-2	Develop Ability to handle employee issues	K2
CO-3	Evaluate the new trends in HRD	K3
CO-4	Explain HRD from micro and macro perspectives	K4
CO-5	Discuss importance of HR Training and Development	K5

LOGISTICS MANAGEMENT
PCOM410

Semester : IV **Credit : 4**
Category : Core XVII **Hours/Week : 6**
Class & Major : II M.Com **Total Hours : 78**

Course Objectives

CO No.	The student will be able to
CO-1	Understand the comprehensive nature of logistics management.
CO-2	Obtain knowledge on Scope and functions of Logistics.
CO-3	Evaluate the role of Logistics in Supply Chain Management
CO-4	Analyze the legal provisions applicable under Motor Vehicle Act.
CO-5	Develop Logistics and supply chain management skills

UNIT –I INTRODUCTION TO LOGISTICS **15 Hour**

Logistics: Definition – Scope – Functions – Objectives of Logistics Management – Customer Service and Logistics.

UNIT -II SUPPLY CHAIN MANAGEMENT **15 Hour**

Supply Chain: Supply Chain - Components – Role of Logistics in Supply Chain – Warehousing – Functions – Types – Warehouse Layout – Material Handling and Logistics – Inventory Management.

UNIT- III TRANSPORTATION **16 Hour**

Transportation – Infrastructure – Freight Management – Transportation Network – Route Planning – Containerization

UNIT- IV LOGISTICS OUTSOURCING **16 Hour**

Logistics Packaging – Logistics Information Needs – Logistics Design for Distribution channels – Logistics outsourcing.

UNIT- V GOVERNMENT POLICIES AND REGULATIONS **16 Hour**

Government policies and regulations – Motor Vehicles Act, Carriage by Air, Sea Multimodal Transportation etc. Documentation – Air way Bill Railway Receipt, Lorry Receipt, Bill of Lading etc. – E-Logistics: Benefits and Challenges.

Test Books:

- SatisC.Ailawadi, Rakesh Singh ,(2021) Logistics Management, Prentice Hall of India.
- Vinod V.Spole, (2021), Logistics Management, Pearson Education.

Reference Books:

- Ronal H.Ballou, (2021) Business Logistics/Supply Chain Management, , Pearson Education Prentice Hall, New Delhi
- Sunil Choper& Peter Meindi,(2020), Supply Chain Management / Strategy planning and operation, Pearson Education Asia, New Delhi.

Course Outcomes

CO No.	On completion of the course the student will be able to	Cognitive Level
CO-1	Explain the role of logistics in supply chain management	K1
CO-2	Examine the different types warehouses and transportations	K2
CO-3	Analyze benefits and challenges of E- Logistics	K3
CO-4	Evaluate government policies for logistics	K4
CO-5	Develop Logistics and supply chain management skills	K5

GOODS AND SERVICES TAX (GST)
PCOM408

Semester : IV **Credit : 5**
Category : Core XVIII **Hours/Week : 5**
Class & Major: II M.Com. **Total Hours : 65**

Course Objectives

CO No.	The student will be able to
CO-1	Understand the concept of Goods and Services Tax
CO-2	Determine GST Liability
CO-3	Analyze advantages and disadvantages of GST
CO-4	Apply the knowledge of GST for ax planning
CO-5	Develop taxation skills

UNIT - I INTRODUCTION **14 Hour**

Constitutional framework of Indirect Taxes before GST (Taxation Powers of Union & State Government); Concept of VAT: Meaning, Variants and Methods; Major Defects in the structure of Indirect Taxes prior to GST; Rationale for GST; Structure of GST (SGST, CGST, UTGST & IGST); GST Council, GST Network, State Compensation Mechanism, Registration.

UNIT - II LEVY AND COLLECTION OF GST **13 Hour**

Taxable event- "Supply" of Goods and Services; Place of Supply: Within state, Interstate, Import and Export; Time of supply; Valuation for GST- Valuation rules, taxability of reimbursement of expenses; Exemption from GST: Small supplies and Composition Scheme; Classification of Goods and Services: Composite and Mixed Supplies.

UNIT - III INPUT TAX CREDIT **14 Hour**

Eligible and Ineligible Input Tax Credit; Apportionments of Credit and Blocked Credits; Tax Credit in respect of Capital Goods; Recovery of Excess Tax Credit; Availability of Tax Credit in special circumstances; Transfer of Input Credit (Input Service Distribution); Payment of Taxes; Refund; Doctrine of unjust enrichment; TDS, TCS. Reverse Charge Mechanism, Job work.

UNIT- IV PROCEDURES **12 Hour**

Tax Invoice, Credit and Debit Notes, Returns, Audit in GST, Assessment: Self-Assessment, Summary and Scrutiny.

UNIT- V SPECIAL PROVISIONS **12 Hour**

Taxability of E-Commerce, Anti-Profiteering, Avoidance of dual control, E-way bills, zero-rated supply, Offences and Penalties, Appeals

Text Book:

- Mehrotra HC and Agarval Vp, *Goods and Services Tax GST*,4th edition,Sahitya bhawan Publication,Agara 2019.
- Viond K Singhania,*Students Guide to GST & customs Law*,3rd Edition,Taxman Publications,New Delhi,2019

Reference Books:

- Halakandhi, S., *G.S.T (Vastu and Sevakar) (Hindi) Vol-1,* 2017
- Gupta, S.S., *Vastu and Sevakar,* Taxmann Publications, 2017

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Cognitive Level
CO-1	Acquire knowledge on GST	K1
CO-2	Develop taxation skills	K2
CO-3	Evaluate various types of GST	K3
CO-4	Explain advantages and disadvantages of GST	K3
CO-5	Discuss the procedures under GST Act	K4
CO-6	Examine Special Provisions under GST	K4

ADVANCED COST & MANAGEMENT ACCOUNTING
PCOM409

Semester : IV **Credit : 5**
Category : Core XIX **Hours/Week : 6**
Class & Major : II M.Com **Total Hours : 78**

Course Objectives

CO No.	On completion of the course the student will be able to
CO-1	Understand cost accounting techniques
CO-2	Develop cost and management accounting skills
CO-3	Acquire the knowledge various methods of costing
CO-4	Analyze financial performance using financial ratio
CO-5	Apply marginal costing for cost control

UNIT- I INTRODUCTION TO COST & MANAGEMENT ACCOUNTING 15 Hour

Concepts of cost and Management Accounting, Relevant and irrelevant costs for decision making – Cost sheet – Methods of costing Unit costing.

UNIT- II COSTING METHODS 16 Hour

Process Costing – Joint Products- Treatment of Equivalent Units – Inter-Process Profit. Overheads – Collection, classification, allocation, apportionment- absorption – Over and under absorption- machine hour rate.

UNIT -III BUDGETARY CONTROL & COST REDUCTION & COST CONTROL 16 Hour

Budgetary Control – Functional Budgets – Production, Sales, Cash, Flexible Budgets– Master Budget - ZBB– Cost reduction and cost control – Various Techniques of cost reduction - work study, Time study & Motion study.

UNIT- IV MARGINAL COSTING 15 Hour

Marginal Costing – Break-Even Analysis – Cost– Volume – Profit Analysis – Break-Even Charts – Application of Marginal Costing – Differential costing– Direct Costing– Standard Costing.

UNIT-V INTRODUCTION TO ADVANCED MANAGEMENT ACCOUNTING 16 Hour

Introduction – Meaning of ratios – Advantages of ratio – Classification of ratio – Profitability ratio – turnover ratio - Solvency Ratio – re arrangement of Financial statements – concept of fund flow statement – changes in working capital – applications and sources of funds – Meaning and importance of cash flow statements – Difference between fund flow and cash flow statement.

(Proportion: 40% Theory and 60% Problems)

Text Book

- Jain S.P. and Narang K.L., *Advanced Cost Accounting,* Kalyani Publishers, Chennai, 2015.
- Reddy T.S. and Reddy Y.H., *Cost & Management Accounting,* Margam Publications, Chennai, 2015.

Reference Books

- Horngren C.T, *Cost Accounting,* Pearson Education, New Delhi, 2015.
- Saxena V. K. and Vashist C. D., *Cost Management,* Sultan Chand & Sons, New Delhi, 2015.

Course Outcomes

CO No.	On completion of the course the student will be able to	Cognitive Level
CO-1	Identify relevant and irrelevant cost for decision making	K1
CO-2	Apply appropriate methods of costing for cost reduction	K2
CO-3	Examine various methods of budgetary control	K3
CO-4	Explain the breakeven analysis	K3
CO-5	Discuss the importance of fund flow and cash flow statement	K4

ACCOUNTING PACKAGE IN GST
PCOR409

Semester : IV **Credit : 1**
Category : Core XX **Hours/Week : 2**
Class & Major : II M.Com **Total Hours : 26**

Course Objectives

CO No.	To enable the students
CO 1	Identify various vouchers used in Tally
CO 2	Understand basic concepts in computerized accounting
CO 3	Apply knowledge to prepare Final Accounts
CO 4	Analyze various cost categories and cost centre
CO 5	Develop knowledge on Accounting Package and GST

Exercises

1. Creation of company, Create Company and Activate GST in Company Level
2. Creating Master and Set GST – Rates .

3. Creating Tax Ledgers -Transferring.
4. Creating GST Taxes & Invoices
5. Creating GST Number for Suppliers
6. Creating GST Number for Customers
7. Creating Intra -State Purchase Entry in GST (SGST + CGST)
8. Creating Inter-State Purchase Entry in GST (IGST)
9. Creating Intra- State Sales Entry in GST (SGST + CGST)
10. Creating Inter-State Sales Entry in GST (IGST)
11. Applications for Registration for GST
12. GST - Return Filing
13. GST Computation Report

Text Book:

- Mehrotra HC and Agarval Vp, *Goods and Services Tax GST*,4th edition,Sahitya bhawan Publication,Agara 2019.
- Dr.Rajescheda , *Learn tally ERP-9 with GST,* Ahc's students Edition.

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Explain the various kinds of stock groups in Tally	K1
CO 2	Apply the knowledge in creating vouchers	K2
CO 3	Examine the ability to prepare final accounts.	K3
CO 4	Discuss the importance of computerized accounting.	K4
CO 5	Compute GST Liability and prepare GST Return in Tally	K5

Evaluation Pattern for Project

Internal Assessment	
Component	**Maximum Marks**
CIA I	10
CIA II	10
Daily Practical Assessment(DPA)	30
Viva Voce	10
Total	**60**
External Assessment	
Component	**Maximum Marks**
Record	20
Viva Voce	10
Result	10
Total	**40**

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core X	PCOM309	Service Marketing	Assignment	Seminar
	Core XI	PCOM305	Income Tax and International Taxation	Filling up of IT Forms	Seminar
	Core XII	PCOM306	Contemporary Business Legislations	Assignment	Open Book Quiz
	Core IV	PRMC301	Research Methodology	Assignment	Problem solving
	Core XV	PCID302	E- Commerce	Assignment	Seminar
IV	Core XVI	PCOM405	Export Import Financing	Case study	Seminar
	Core XVII	PCOM410	Logistics Management	Open Book Quiz	Seminar
	Core XVIII	PCOM408	Goods and Service Tax	Filling up of GST Forms	GST Return
	Core XIX	PCOM409	Advanced cost and Management Accounting	Assignment	Problem solving
	Core XX	PCOR409	Accounting Package in GST	Assignment	Problem solving

DEPARTMENT OF BIOCHEMISTRY

PREAMBLE

UG: Programme Profile & the Syllabi of Courses Offered in the Semester III and IV along with III &IV
Evaluation Components (With Effect from 2021 - 2024 Batch onwards).

PG: Programme Profile & the Syllabi of Courses Offered in the Semester III and IV along with III & IV Evaluation Components (With Effect from 2021 - 2023 Batch onwards) are Presented in this Booklet.

PROGRAMME PROFILE OF B.Sc., BIOCHEMISTRY

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	Upon completion of these courses the students would be able to
PSO-1	Recognize their Own Ability to improve their Competence in Using the Languagethrough Professional English for Life Science Course.
PSO-2	Understand the Various Biological Components Present in Living Cells, Functions and their Clinical Significance.
PSO-3	Inculcate the Basic Concepts of Biochemistry Including an Understanding of the Fundamental Biochemical Principles and their Applications in a Systematic, Methodical and Scientific, Evidence - Based Process.
PSO-4	Develop Problem Solving and Analytical Skills through Case Studies, ResearchProjects, Experimentation, Internship, Experiential Learning and Hands-on- Experience.
PSO-5	Analyze the Applications of Biochemistry in the Fields of Clinical Biochemistry, Biochemical Techniques, Molecular Biology, Biotechnology, Microbiology Etc.,
PSO-6	Relate the Biochemistry Oriented Theoretical and Practical Knowledge in securing a Successful Career and Pursue Higher Studies.

Semester	Part	Category	Course Code	Course Title	Previous course code	Hours per week	Credit Min / Max
I	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL107/ UTAL108/ UHIL102/ UFRL102	Basic Tamil I/ Advanced Tamil I/ Hindi I /French I	UTAL105/ UTAL106/ UHIL101/ UFRL101	5	3/4
	II	Communicative English I / AECC-I (2 Levels)	UCEL101/ UCEL102	Communicative English I/ Effective Communicative English I	--	5	3/4
	III	Major Core I / DSC - I	UBCM108	Basics of Biochemistry	UBCM106	3	2
		Major Core II / DSC - II	UBCM107	Cellular Biology	UBCM105	6	6
		Core Practical I	UBCR103	Cellular Biology Practical	UBCR102	3	3
		Allied I / GE I	UCHA102	Allied Chemistry	UCHA101	3	2
		Allied Practical	UCHR103 / UCHR403	Allied Chemistry Practical	--	3	2
		PE - I	UPEM101	Professional English I	--	6	4
	IV	Value Education / SEC			--	2	1
					TOTAL	**36**	**26/28**
II	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL207 / UTAL208 / UHIL202 / UFRL202	Basic Tamil II/ Advanced Tamil II/ Hindi II/ French II	UTAL205/ UTAL206/ UHIL201/ UFRL201	5	3/4
	II	Communicative English / AECC-II (2 Levels)	UCEL201 / UCEL202	Communicative English II/ Effective Communicative English II	--	5	3/4
	III	Major Core III/DSC - III	UBCM203	Biomolecules	UBCM202	6	6
		Core practical II	UBCR202	Qualitative analysis of Biomolecules Practical	--	5	5
		Allied II/ GE - II	UMBA202	Microbiology	UMBA201	3	2
		Allied II practical	UMBR202	Microbiology Practical	UMBR201	3	2
		PE - II	UPEM201	Professional English II	--	6	4
		Internship	UBCI201	Internship / Field Work / Field Project	-	30	- / 1
	IV	Non Major elective /SEC	--	--	--	3	2
	V	Extension activity/ Physical Education/NCC	--	--	--	-	1/2
					TOTAL	**36**	**28/32**

III	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL307/ UTAL308/ UHIL302/ UFRL302	Basic Tamil III/ Advanced Tamil III/ Hindi III/ French III	UTAL305/ UTAL306/ UHIL301/ UFRL301	5	3/4
	II	Communicative English / AECC-I (2 Levels)	UENL309/ UENL310	General English I / Advanced English I	UENL307/ UENL308	5	3/4
	III	Major Core IV / DSC - IV	UBCM305	Biochemical Techniques	UBCM304	6	6
		Core Practical III	UBCR302	Biochemical Techniques practical I	UBCR301	3	3
		Allied III/ GE - III	UMAA305	Biostatistics	UMAA405	6	4
	IV	Online Course		NPTEL/Spoken Tutorial		3	1/2
		Value Education/ SEC				2	1
					TOTAL	**30**	**21/24**
IV	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL407/ UTAL408/ UHIL402/ UFRL402	Basic Tamil IV/ Advanced Tamil IV/ Hindi IV/ French IV	UTAL405/ UTAL406/ UHIL401/ UFRL401	5	3/4
	II	English / AECC-I (2 Levels)	UENL409/ UENL410	General English II / Advanced English II	UENL407/ UENL408	5	3/4
	III	Major Core V / DSC - V	UBCM404	Immunology	UBCO603 / UBCM403	5	4
		Major Core VI / DSC - VI	UIDM402	Pharmaceutical Chemistry	UIDM401	4	4
		Allied IV/ GE -IV	UBIA401	Basics of Bioinformatics	UBCM506	3	2
		Core practical IV	UBCR402	Biochemical Techniques Practical II	UBCR401	3	3
		Internship	UBCI401	Internship / Field Work / Field Project	-	30	- / 1
	IV	Non Major Elective			--	3	2
		Soft Skill/ SEC			--	2	1
	V	Extension Activity/ Physical Education/NCC			--	-	- /2
					TOTAL	**30**	**22/27**
V	III	Major Core VII /DSC - VII	UBCM507	Enzymology	--	5	5
		Major Core VIII/DSC - VIII	UBCM508	Intermediary metabolism	UBCM504	5	5
		Major Core IX / DSC - IX	UBCM505	Human Physiology	UBCM502	5	5
		Major Elective - I / DSE - I	UBCO501	Nutritional Biochemistry	--	5	4
			UBCO502	Stem cell Biology	UBCO604		
		Core practical V	UBCR501	Enzymology Practical	UBCM501	4	3

		Major Core X / DSC - X	UBCP501	Project	UBCP601	4	4
		Value Education/ SEC				2	1
					TOTAL	**30**	**27**
VI	III	Major Core XI / DSC - XI	UBCM605	Introduction to Biotechnology	UBCM601	5	5
		Major Core XII / DSC - XII	UBCM606	Clinical Biochemistry	UBCM602	5	4
		Major Core XIII / DSC - XIII	UBCM607	Molecular Biology	UBCM603	5	4
		Major Core XIV / DSC - XIV	UBCM604	Comprehensive Viva voce	--	-	1
		Core Practical VI	UBCR601	Clinical Biochemistry practical	--	5	3
		Core Practical VII	UBCR602	Hematology & Urine analysis	--	3	2
		Major Elective – II / DSE - II	UBCO607	Molecular Endocrinology	UBCO605	5	4
			UBCO606	Pathobiology of Human Diseases and Disorders	--		
			UIDM601	Nanotechnology in medicine	--		
		Internship	UBCI601	Internship / Field Work / Field Project	-	30	- / 1
	IV	Soft Skill/ SEC				2	1
	V	Extension activity/ Physical Education/NCC				-	-/2
		Extension Programme	UROX601	Rural Outreach Programme		30	- / 1
					TOTAL	**30**	**24/27**
					GRAND TOTAL	**192**	**148/166**

COURSES OFFERED TO OTHER DEPARTMENTS
NON MAJOR ELECTIVES (NME)

Semester	Part	Category	Course code	Course Title	Previous course code	Contact Hour/ Week	Credit Min/ Max
IV	IV	Non Major Elective	UBCE301/ UBCE403	Hormonal Biochemistry	--	4	2
			UBCE302/ UBCE404	Food Microbiology	--		
			UBCE402/ UBCE303	Clinical Nutrition	--		
			UBCE304 UBCE401	Mushroom Cultivation	--		

BIOCHEMICAL TECHNIQUES
UBCM305

Semester : III **Credit : 6**
Category : Core IV **Hours/ Week : 6**
Class & Major : II B.Sc Biochemistry **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Recall the principles and applications of bioinstrumentation.
CO-2	Describe the principle, Instrumentation of different types of bioanalytical techniques.
CO-3	Acquire knowledge about the basics and latest developments in the instrumentation techniques of Centrifugation, Electrophoresis (IEF, 2D PAGE) and Chromatography and their applications in various research fields.
CO-4	Learn about the basic Radioactivity principles, measurement method and its biological applications.
CO-5	Demonstrate broad knowledge in modern analytical instrumentation with deep knowledge in its core concepts and its applications.

UNIT - I ELECTROCHEMICAL PARAMETERS & MICROSCOPY 16 Hour

Electrochemical Parameters - Definition of pH, pOH, Acid-Base Balance, Hendersons - Hasselbach Equation. Determination of pH - Hydrogen Electrode, Oxygen Electrode, Glass Electrode, Ion Sensing electrode, Buffers in Body Fluids.

Microscopy - Basic Principle and Applications - Light - Compound - Phase Contrast - Dark Field - Fluorescence Microscopy. Scanning Electron Microscopy (SEM) - Transmission Electron Microscopy (TEM).

UNIT - II CENTRIFUGATION TECHNIQUES 15 Hour

Basic Principle of Sedimentation - Centrifugal Force, Sedimentation Rate, Svedberg Unit. Types of Centrifuge, Types of Rotors - Fixed Angle, Vertical, Swinging Bucket, Zonal, Elutriator Rotors. Preparative Ultracentrifuge - Differential Centrifugation, Density Gradient, Rate Zonal, Isopyenic Centrifugation. Analytical Ultracentrifugation - Determination of Molecular Weight by Sedimentation.

UNIT - III CHROMATOGRAPHIC TECHNIQUES 16 Hour

General Principles of Chromatography - Partition and Adsorption Chromatography. Paper Chromatography - Principle, Sample Application, Development - Ascending, Descending and Radial, Detection of Amino Acids and Sugars. Thin Layer Chromatography - Principle, Instrumentation and Applications (Separation of Alkaloids). Column Chromatography - Principle, Factors Affecting Resolution. Basic Principles and Applications of Affinity Chromatography and HPLC.

UNIT - IV ELECTROPHORETIC TECHNIQUES 15 Hour

Electrophoresis - Principle, Instrumentation and Applications of Paper, Starch, Agarose, SDS-PAGE, Cellulose Acetate and Immunoelectrophoresis. Isoelectric Focusing. Blotting Techniques - Southern, Northern, Western. Concepts and Applications of PCR.

UNIT - V PHOTOMETRY DETECTION METHODS & RADIOACTIVE TECHNIQUES

16 Hour

Beer - Lambert's Law, UV-Visible Spectrophotometry - Principle, Instrumentation and Applications. Flame Photometry - Flame Emission Spectrophotometry and Atomic Absorption Spectrophotometry.

Types of Radiation - Units of Radioactivity - Radioisotopes, Half - Life - Radioactivity Measurement; GM and Scintillation Counters; Radioactive Hazards - Uses and Safety Measures; Autoradiography.

Text books

- Upadhyay-Upadhyay Nath. (2016). *Biophysical chemistry*, Himalaya publications.
- Keith Wilson and John Walker. (2010). *Principle and techniques of Practical biochemistry*, (7^{th} Ed.) Cambridge press.
- Keith Wilson and Goulding, K.H. (1993). *A biologists guide to principles and techniques of practical biochemistry*, (3^{rd} Ed). ELBS, London.

Reference books

- Hezl & Peck. (2016) *Analytical Biochemistry*, (3^{rd} Ed), Prentice Hall.
- Sadasivam S and A.Manickam,(2010). *Biochemical methods*, (3^{rd} Ed.) New Age International (P) Ltd publisher.
- Subramanian M.A, (2006). *Biophysics: Principle and techniques.* (1^{st} Ed), MJP publishers.

E - Resources

- https://www.pdfdrive.com/analytical-biochemistry-3rd-ed-david-holme-hazel-peckpdf-e20263959.html
- http://ecoursesonline.iasri.res.in/mod/page/view.php?id=42656
- https://www.ebooks.com/en-us/95946455/wilson-and-walker-s-principles-and-techniques-of-biochemistry-and-molecular-biology/hofmann-andreas-clokie-samuel/

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define the principle, Instrumentation of different types of Light microscopy and electron microscopy and its applications in various fields of research.	K1
CO-2	Discuss the importance and applications of centrifugation techniques in modern day research	K2
CO-3	Separate and calculate the biomolecules using chromatographic techniques.	K3
CO-4	Explain eletrophoretic techniques and its uses.	K4
CO-5	Explain about principle, Bioinstrumentation and applications of latest spectroscopy techniques like Turbidometry, AAS, NMR, ESR and Nephelometry.	K4

BIOCHEMICAL TECHNIQUES PRACTICAL I

UBCR302

Semester : III **Credit : 3**
Category : Core Practical III **Hours/ Week : 3**
Class & Major : II B.Sc Biochemistry **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Learn the various instrumentations that are used in the analytical laboratories.
CO-2	Practice on preparation of buffers and measurement of pH.
CO-3	Acquire the basic knowledge on the theory, operation and function of analytical instruments.
CO-4	Analyze the presence of biological components by chromatography techniques.
CO-5	Practice on checking of BP and blood sugar and its consequences.

BIOMEDICAL TECHNIQUES

1. Measurement of BP
2. Measurement of Blood Sugar Level Using Glycometer.

VOLUMETRIC ANALYSIS

1. Estimation of Iron, Oxalates, Nitrite and Chromates Using Potassium Permanganate.
2. Estimation of Calcium from Milk and Urine.
3. Estimation of Copper and Potassium Dichromate by Iodometry Method.
4. Preparation of Buffers and Measurement of pH.

CHROMATOGRAPHY TECHNIQUES

1. Separation and Detection of Amino acids by Paper Chromatography.
2. Separation and Detection of Simple Sugars by Paper Chromatography
3. Separation of Polar and Non Polar Aminoacids by Thin Layer Chromatography.
4. Separation of Plant Pigments by Column Chromatography.

Text Books

- David T Plummer, *An introduction to practical biochemistry*, 3rd edition, Tata Mac Graw hill Publication, 2008.
- Keith Wilson, John Walker, *Principles and Techniques of Practical Biochemistry and Molecular Biology*, 7th edition, Cambridge University Press, 2010.

Reference Books

- Jayaraman.J. (2011). *Laboratory manual in Biochemistry*, (2nd Ed), New Age International Limited publication.
- Sadasivam.S and Manickam.A (2008). *Biochemical Methods*, (3rd Ed), New Age International publication.
- K. Wilson, K. H. Goulding Hodder & Stoughton. (1993) *Principles and Techniques of Practical Biochemistry*, (3rd Ed.)

E - Resources

- http://elte.prompt.hu/sites/default/files/tananyagok/IntroductionToPracticalBiochemistry/book.pdf
- https://www.pinterest.com/pin/746049494494648558/
- https://www.academia.edu/28271882/An_Easy_Guide_for_Practical_Biochemistry

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Apprehend the basics of instruments used in biochemical analysis and reagent preparation.	K2
CO-2	Cognize the principles of the various analytical instruments used in biochemistry research laboratories.	K2
CO-3	Explore the various separation and quantifying techniques used to isolate and measure the biological samples	K4
CO-4	Compare and sort out the suitable techniques used for the analysis of biological samples chosen.	K3
CO-5	Demonstrate on separation of sugars, amino acids and Plant pigments using different chromatographic techniques	K4

IMMUNOLOGY
UBCM404

Semester : IV **Credit : 4**
Category : Core V **Hours/ Week : 5**
Class & Major : II B.Sc Biochemistry **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the basic concepts of the immune system.
CO-2	Identify the cellular and molecular basis of immune responsiveness.
CO-3	Learn about antigens, immunoglobulin and their diversity.
CO-4	Describe the roles of the immune system in both maintaining health and contributing to disease.
CO-5	Develop the basic techniques for identifying antigen antibody interactions.

UNIT - I INTRODUCTION **14 Hour**

Antigen: Property, Specificity, Cross Reactivity, Antigenicity, Immunogenicity, Antigen Determinants, Haptens, Adjuvants. Antibody: Property, Classes & Subclasses of Ig: Structure Specificity & Distribution. (Antibody Structure, Types, Properties and their Biological Functions)

UNIT - II LYMPOID ORGANS **12 Hour**

Primary & Secondary Lymphoid Organs - Bone Marrow, Thymus, Bursa of Fabricus, Lymphnode, Spleen GALT &MALT. Cells of the Lymphoreticular System.

UNIT-III IMMUNITY **13 Hour**

Types of Immunity- Innate & Acquired Immunity – Active & Passive Immunity, Immune Response. Humoral and Cell Mediated Immunity, Immunization Schedule, Immunity to Infection. Immune Boosters.

UNIT-IV IMMUNE RESPONSE **13 Hour**

Hypersensitivity Reactions - Types and Mechanism. Autoimmunity.Transplantation – Types - Allograft Rejection Mechanism and Prevention of Graft Rejection - Immune - Suppressive Drugs. HLA - Immune Response Genes - HLA Molecules.

UNIT-V IMMUNO TECHNIQUES **13 Hour**

Immunoelectrophoresis, Immunoprecipitation, RIA, ELISA, Immunoblotting, Avidin - Biotin Mediated Immunoassay, Immunohistochemistry, Monoclonal Antibodies & Hybridoma Techniques. Complement Fixation.

Text books

- N.Arumugam. (2014). *Immunology*, Saras publication.
- Ananthanarayanan .K & Jayaramapanikar, (2020) *Text book of microbiology & Immunology*, (8th Ed.)

Reference books

- RoittIvanna, Jonathan Brastoff, David Nale, (2020). *Immunology*, (9th Ed.), Blackwel publishing Lit.
- Janis Kuby, (2013). *Immunology*, (8th Ed.), W.H.Freeman and company.
- Peter Delves, Seamusmartin, Dennis burton, Ivanna Rotti, (2017). *Essentials of immunology*, (13th Ed.), wiley Blackwell publication.

E - Resources

- http://sacema.org/uploads/Essential-Clinical-Immunology.pdf
- http://www.louisbolk.org/downloads/1822.pdf
- https://www.roswellpark.org/sites/default/files/thanavala_9-4 14_innate_immunity_part_1.pdf
- http://www.dphu.org/uploads/attachements/books/books_5451_0.pdf
- http://www.helmberg.at/immunology.pdf

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define the role of Ag and Antibody in immune system	K1
CO-2	Explain the basic concepts of the immune system, different types of immune cells and organs, the cell-mediated and humoral aspects of immunity and immune responses, its disorder and lot more.	K2
CO-3	Illustrate the immune system functions by recognizing and destroying foreign antigens including the harmful microorganisms and other disease-causing microbes.	K3
CO-4	Evaluate the adverse effect of immune system including allergy, hypersensitivity and autoimmunity.	K4
CO-5	Criticize for immunological research and execute it using immunological Techniques.	K5

PHARMACEUTICAL CHEMISTRY
UIDM402

Semester : IV **Credit : 4**
Category : Core VI **Hours/ Week : 4**
Class & Major : II B.Sc Biochemistry **Total Hours : 52**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the Drug Metabolic Pathways, Adverse Effect and Therapeutic Value of Drugs.
CO-2	Study about the Sources of Impurities and Methods to Determine the Impurities in Inorganic Drugs and Pharmaceuticals.
CO-3	Acquire the Medicinal and Pharmaceutical Importance of Inorganic Compounds.
CO-4	Learn the Variety of Inorganic Drug Classes.
CO-5	Evaluate their Clinical Importance and Effects By Bioassays.

UNIT - I INTRODUCTON TO PHARMACEUTICAL CHEMISTRY 10 Hour

Drugs - Definition, Source and Nature, Classification and Nomenclature, ADMET - Routes of Drug Administration, Absorption and Distribution of Drugs, Factors Influencing Drug Absorption And Elimination of Drugs. Determination of ED50 and LD50 Values.

UNIT - II DRUGS AND RECEPTORS 10 Hour

Drug- Receptor Interactions: Receptor - Definition, Agonist and Antagonist of Drugs. Types of Receptor - G - Protein Coupled Receptor, Receptors with Intrinsic Ion Channel and Enzymatic Receptors.

Receptors Regulating Gene Expression, Involvements of Binding Forces in Drug Receptor Interaction, Drug Action not mediated by Receptors, Receptor Theories.

UNIT - III DRUG METABOLISM 10 Hour

Phase I Reactions - Role of Cytochrome P450. Methods of Study of Drug Metabolism, Microsomal and Non Microsomal Reactions. Phase II Reactions-Conjugation Reactions. Physiological Importance of Xenobiotic Metabolism.

UNIT - IV DRUGS ACTING ON VARIOUS SYSTEMS 12 Hour

Drugs Acting on Various Systems: Respiratory System - Cough, Bronchial - Asthma, Pulmonary Tuberculosis. CNS - Sedative - Hypnotic, GI Tract Drugs for Peptic Ulcer, Diarrhea and Constipation. Adverse Drug Reactions and Drug Induced Side Effects, Biological Effects of Drug Abuse, Management of Self - Poisoning and Drug Dependence, Drug Tolerance and Intolerance.

UNIT - V DRUG DELIVERY & DRUG TESTING 10 Hour

Biological Testing and Bioassays - Invitro and Invivo. Cancer Chemotherapy - Cytotoxic Drugs. Immunosuppressive Drug Therapy. Drug Delivery.

Text Books

- K. D. Tripathi,(2010). *Essentials of Medical Pharamacology*, (7th Ed), Jaypee Publishers.
- Jayashree Ghosh. (2010). *A Textbook of Pharmaceutical Chemistry*, (3rd Ed.). Jayashree Ghosh, S.Chand & Company Ltd., New Delhi.
- Donald Cairns, (2012) *Essentials of Pharmaceutical Chemistry*, (4th Ed.). Pharmaceutical Press.

Reference Books

- Satoskar R.S and Bhandar S.D, (1995). *Pharmacology and Pharmacotherapeutics*, (14thEd.)
- Gary Waish, (1998). *Biopharmaceuticals: Biochemistry & biotechnology*, (1st Ed.) John wiley Sons, New York.
- Bertram Katzung, (2012). *Basic and Clinical Pharmacology*, (12th Ed.). Lange Publishers.

E - Resources

- www.eso.sankaranethralaya.org/pdf/course_content/pharmacology.pdf
- https://www.omicsonline.org/conference-proceedings/2161-0444-C1-031-010.pdf
- www.meddean.luc.edu/lumen/meded/therapy/homepage/IntroCourse2015_2016.pdf

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the drugs and its classification	K1&k2
CO-2	Explain the drug receptors and their interaction.	K2
CO-3	Illustrate the metabolism of drugs.	K3
CO-4	Distinguish the chemistry of drugs with respect to their pharmacological activity.	K4
CO-5	Critize about chemotherapeutic of drugs.	K5

BASICS OF BIOINFORMATICS

UBIA401

Semester : IV **Credits : 2**
Category : Allied IV **Hours/Week : 3**
Class & Major : II B.Sc Biochemistry **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the basics concepts of Bioinformatics and its significance in Biological data analysis.
CO-2	Classify different types of Biological databases.
CO-3	Appraise the features of DNA sequence analysis.
CO-4	Understand the concepts of FASTA & BLAST.
CO-5	Familiarize on applications of Bioinformatics

UNIT - I INTRODUCTION TO BIOINFORMATICS **08 Hour**

Bioinformatics - An Overview and Definition, Objectives and Scope - Genomics, Proteomics and Computer Aided Drug Design. Bioinformatics and Internet - Challenges and Applications. Bioinformatics Programmes in India

UNIT - II BIOLOGICAL DATABASE AND ITS TYPES **10 Hour**

Introduction to Data Types and Source. General Introduction of Biological Database; Nucleic Acid Databases - NCBI, DDBJ, SWISS-PROT and EMBL. Protein Information Resources - Biological Databases Protein Databases – Primary, Composite and Secondary. Specialized Genome Databases, TIGR and Acedb, Structure Databases – CATH, SCOP and PBD Sum. String Database

Lab demo class-NCBI, EMBL and DDBJ

UNIT - III DNA SEQUENCE ANALYSIS **07 Hour**

DNA Sequence Analysis - DNA Sequence, Features of DNA Sequence Analysis, EST - Differential Approaches to EST Analysis and C-DNA Libraries.

UNIT - IV SEQUENCE ALIGNMENT **07 Hour**

Pair Wise Alignment - Database Searching (Needleman Algorithm), Comparing Two Sequence - Identity and Similarity, FASTA And BLAST, Multiple Sequence Alignment - Definition – Clustal W, X, MAFT, PILUP.

Lab Demo Class-FASTA, BLAST and Clustal W, X, MAFT, PILUP

UNIT - V BIOINFORMATICS APPLICATIONS **07 Hour**

Perl/Python for Bioinformatics: Basic Concepts and Application in Biological Sequence Analysis. Bioinformatics Tools for Primer Designing and Checking

Text Books

- Attwood T.K and D.J Parry, (2014) *Introduction to Bioinformatics*, Pearson Education Ltd., New Delhi.
- N. Gautham, (2007). *Bioinformatics-Database and Algorithm*, Narrosa publishing house.

Reference Books

- Andreas D Baxevanis and Francis Quellette B F, (2016). *Bioinformatics- a Practical guide to the analysis of genes and proteins*, Willey publication, New Delhi.
- Arthur M. Lesk, (2006). *Introduction to Bioinformatics*, second edition, Oxford University press, UK.
- Jerry Gu, Phlip E Bowrne, (2009). *Structural Bioinformatics*, Willey- blockwell publication, New Delhi.

E - Resources

- www.aun.edu.eg/.../Procedure%20Bioinformatics22.../Xiong%20-%20Es...
- www.iasri.res.in/ebook/CAFT_sd/Concepts%20of%20Bioinformatics.pdf
- goldenhelix.com/.../ebooks/Teaching-Bioinformatics-Concepts-Practical
- www.Bioinformatics.org
- www.bioinfo.mbb.yale.edu/mbb452a/intro/
- www.biology.ucsd.edu/others/dsmith/Bioinformatics.htm

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Explain the concepts of biology in Computer science and scope of bioinformatics.	K2
CO-2	Illustrate the types of biological data bases.	K3
CO-3	Appraise the features of DNA sequence analysis.	K4
CO-4	Describe the concepts of FASTA & BLAST.	K2
CO-5	Explain the applications of bioinformatics.	K4

BIOCHEMICAL TECHNIQUES PRACTICAL II

UBCR402

Semester : IV **Credit : 3**
Category : Core Practical IV **Hours/ Week : 3**
Class & Major : II B.Sc Biochemistry **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand and Apply the Principles of Volumetric and Electrophoretic Techniques in Biochemical Analysis.
CO-2	Develop Technical Competence.
CO-3	Identify Different Organic Compounds Using SDS PAGE and Blotting Techniques, the Various Principles and Instrumentation behind them.
CO-4	Estimate the amount of Sugar, Amino acids, Ascorbic acid and Chloride present in the given solution using suitable Titrimetric method.
CO-5	Demo on separation of DNA and Protein using Blotting techniques.

VOLUMETRIC ANALYSIS

1. Estimation of Amino Acids by Sorenson Formal Titration Method.
2. Estimation of Ascorbic Acid by Titrimetric Method
3. Determination of Saponification Value, Iodine Value and Acid Number Using Edible Oil.
4. Estimation of Reducing Sugar by Benedict's Method.
5. Estimation of Chloride by Mohr's Method.

ELECTROPHORETIC TECHNIQUE (DEMONSTRATION)

6. Separation of Proteins by SDS PAGE.
7. Identification of DNA & Protein by Southern & Western Blots.

Text Book

- David T.Plummer, (1987). An *introduction to practical biochemistry*, (3rd Ed.). Mc Graw Hill, London.

Reference Books

- Jayaraman.J. (2011). *Laboratory manual in Biochemistry*, (2nd Ed), New Age International Limited publication.
- Sadasivam.S and Manickam.A (2008). *Biochemical Methods*, (3rd Ed), New Age International publication

E - Resources

- http://elte.prompt.hu/sites/default/files/tananyagok/IntroductionToPracticalBiochemistry/book.pdf
- https://www.pinterest.com/pin/746049494494648558/
- https://www.academia.edu/28271882/An_Easy_Guide_for_Practical_Biochemistry

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Apprehend the basics of instruments used in biochemical analysis and reagent preparation.	K2
CO-2	Cognize the principles of the various analytical instruments used in biochemistry research laboratories.	K2
CO-3	Explore the various separation and quantifying techniques used to isolate and measure the biological samples	K4
CO-4	Compare and sort out the suitable techniques used for the analysis of biological samples chosen.	K3
CO-5	Demonstrate on separation of DNA and Protein using Blotting techniques	K4

HORMONAL BIOCHEMISTRY

UBCE301/UBCE403

Semester : IV **Credit : 2**
Category : None Major Elective **Hrs/Week : 4**
Class & Major: II UG **Total Hrs : 52**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the structure, biosynthesis and functions of hormones
CO-2	Illustrate how every aspect of our physiology and behavior is directly controlled or modified by hormones using reproduction, growth, development, stress, and metabolism.
CO-3	Recognize the roles of the endocrine system in maintaining homeostasis, integrating growth and development, responding to environmental insults and promoting successful reproduction.
CO-4	Differentiate among endocrine, paracrine and autocrine systems.
CO-5	Understand how hormones are metabolized in blood and tissues and the importance of hormone activation and degradation.

UNIT I INTRODUCTION **10 Hour**

Introduction to the hormones. Hormones-definition, classification, characteristic features. Hormone receptors-features. Regulation of receptor levels. Overview mechanism of hormone action signal transduction.

UNIT II GLYCOPROTEIN HORMONES **10 Hour**

Secretion, biological action, functions and regulation of growth hormone, thyroid stimulating hormone, ardeno corticotrophin hormone, prolactin, gonadotropic hormone, follicle stimulating hormone, luteinizing hormone, antidiuretic hormone and oxytocin. Disorders-Dwarfism, gigantism, acromegaly, hyper and hypopituitarism, cushings disease and diabetes insipidus.

UNIT III THYROID AND PARATHYROID HORMONES **12 Hour**

Thyroid and parathyroid hormones: secretion, functions. Biological action of thyroid hormones. Thyroxine. Disorders: hypothyroidism- cretinism, myxoedema and hashimoto's diseases. Hyperthyroidism-Graves diseases (Exopthalmic goiter) and non-toxic goiter.

UNIT IV PANCREATIC HORMONES **10 Hour**

Pancreatic hormones: synthesis , regulation, biological action, mechanism of insulin. Glucagon, somatostatin and insulin growth factor and their disorders (esp diabetes mellitus, hypoglycemia).

UNIT V ADRENAL AND GONADAL HORMONES **10 Hour**

Adrenal and gonadal hormones: Glucocorticoids and mineralocorticoids- secretion, transport, biological effects, metabolism and excretion. Gonadal hormones- biological action of androgens and estrogens.

Text Books

- Devlin ,*Textbook of Biochemistry (with clinical correlation)* . John wiley and sons publishers .1997
- Lohar ,S. prakasa , Endocrinology –hormones & human health .MJP publishers .2006 .

Reference Book

- Austin and short ,Mechanism of hormone action .Prema Jaypee brothers .1992

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the role of endocrine system in maintaining ionic and glucose homeostasis	K2
CO-2	Explain the role of glycoprotein hormones and its disorders.	K3
CO-3	Describe molecular, biochemical and physiological effects of all hormones and factors on cells and tissues.	K4
CO-4	Understand the integrative communications that regulate, growth, appetite, metabolism and reproduction	K2
CO-5	Elucidate the role of hormones in biological clock	K4

FOOD MICROBIOLOGY
UBCE302 / UBCE404

Semester : IV **Credit : 2**
Category : Non Major Elective **Hours/week : 4**
Class : II UG **Total Hours : 52**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Identify the important pathogens and spoilage microorganisms in foods and the conditions under which they will grow
CO-2	know the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage via fermentation processes.
CO-3	Explain the role of beneficial microbes; harmful microorganisms and food spoilage; pathogenic microorganisms, infection and intoxication, mycotoxin, viruses and parasites
CO-4	Understand the principles involving food preservation.
CO-5	Apply the principles of food science to control and assure the quality of food products

UNIT I INTRODUCTION **10 Hour**

Microorganism- introduction, definition and general classification of food microbes- yeasts, mould and bacteria (*E.coli & C.Botulinum*) and their role in food spoilage.

UNIT II FOOD SPOILAGE **10 Hour**

General principles underlying spoilage of food, fitness and unfitness of food for consumption, contamination an spoilage of non perishable and perishable foods.

UNIT III FOOD BORNE DIEASES **12 Hour**

Food in relation to disease-food born diseases, bacterial poisoning, symptoms and prevention of staphylococcal food poisoning and salmonella food poisoning.

UNIT IV FOOD PRESERVATION **10 Hour**

Control and prevention of microbial food poisoning –Principles of preservation, preservation by high and low temperature, Clinical preservatives- Salt & Sugar as preservatives, new trends in preservation.

UNIT V STERILIZATION AND PASTEURIZATION **10 Hour**

Sterilization-Physical agents-Heat, moist heat, fractional sterilization, pasteurization. chemical agents-Phenols, alcohols, and quaternary ammonium compounds.

Text Books

- Frazier.William.C,westhoff.D.C food microbiology TATA Mc Graw Hill, 4th edition.1993.
- Vijaya Ramesh.K Food microbiology,, MJP publishing company Ltd,2007.

Reference books

- Pelczar M.J.,chan J.E.C.S., Noel.Krieg.R.microbioloy-TATA Mc Graw Hill,5th Edition,1993.
- Prescott, Harley & Kleins, Microbiology,Mc.Graw-Hill International publishing company Limited,7th edition,2008

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Explain the important pathogens and spoilage microorganisms in foods and the conditions under which they will grow	K2
CO-2	Discuss the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage via fermentation processes.	K3
CO-3	Enumerate the role of beneficial microbes; harmful microorganisms and food spoilage; pathogenic microorganisms, infection and intoxication, mycotoxin, viruses and parasites	K4
CO-4	Define the principles involved in food preservation.	K2
CO-5	Explain the principles of food science to control and assure the quality of food products.	K4

CLINICAL NUTRITION

UBCE402/UBCE303

Semester: IV **Credit : 2**
Category: Non Major Elective **Hours/week : 4**
Class : II UG **Total Hours : 52**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Demonstrate knowledge of nutrition in health and the recommended nutrient allowances
CO-2	Understand the importance of dietary management to overcome various blood disorders.
CO-3	Aware about dietary management to overcome various GI disorders.
CO-4	Understand the importance of dietary management to overcome various systemic disorders.
CO-5	Familiarize on dietary management to overcome various renal disorders.

UNIT-I HEALTH AND NUTRITION **10 Hour**

Diet in Health- dietary requirement of Carbohydrates, Proteins, Lipids, Vitamins, Micronutrient & macronutrient. Recommended allowance for children, adolescents and adults.

UNIT-II BLOOD CELL DISORDERS **10 Hour**

Anemia – iron deficiency anemia, microcytic & macrocytic anemia, hereditary anemia-sickle cell & Thalassemia – clinical features, diagnosis & dietary management.

UNIT-III GASTROINTESTINAL DISORDERS **10 Hour**

Diet in disease- fever, fatty liver, peptic ulcer, constipation, gall stone, gastrointestinal disorders- clinical features, diagnosis & dietary management.

UNIT-IV SYSTEMIC DISORDERS **12 Hour**

Clinical features, causes, diagnosis & dietary management in Diabetes Mellitus, Cardiovascular diseases and Atherosclerosis.

UNIT-V RENAL DISORDERS **10 Hour**

Renal disorders- kidney stones, Glomerular nephritis, Chronic & acute renal failure, Causes, clinical features, Diagnosis & dietary management.

Text Books

- Swaminathan, M. *Essential of Food & Nutrition,* BAPPCO, Bangalore, 2003.
- Dr. Jyothi Singh, *Handbook of Nutrition and dietetics* Lotus Press, New Delhi, 2008.

Reference Books

- Allan Caw Robert, A. Cowan Denis St. J. Oreilly. Michael Stewart. James Sheperd. An illustrates color text, Clinical Biochemistry, *"Elseiver Health Sciences"*.5th edition, 2013.
- PatreciaTrueman, *"Nutritional Biochemistry"*. MJP publishes, 3rd edition, 2009.
- Chatterjee Rana Shindae. *"Text book of Medical Biochemistry"*, Jaypee publishers 7th edition, 2008.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define nutrition, nutrient and the role of nutrition in health and the recommended nutrient allowances	K1
CO-2	Explain the importance of dietary management to overcome various blood disorders.	K2
CO-3	Identify the various GI disorders due to dietary imbalance.	K3
CO-4	Discuss the importance of dietary management to overcome various systemic disorders.	K6
CO-5	Summarize the renal disorders that occur due to diet.	K2

MUSHROOM CULTIVATION
UBCE401 / UBCE304

Semester : IV **Credit : 2**
Category : Non Major Elective **Hours/Week: 4**
Class & Major: II UG **Total Hours: 52**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Study the morphology, classification, edible and poisonous mushrooms.
CO-2	Aware about the various steps involved in cultivation of mushroom
CO-3	Explore to preventive measures to be followed during cultivation and post harvest.
CO-4	Trained in cultivating and harvesting of mushrooms.
CO-5	Exposed in preparing variety of mushroom recipes.

UNIT- I INTRODUCTION TO MUSHROOMS AND ITS LIFE CYCLE 9 Hour

History of mushroom cultivation. Morphology, classification - edibile and poisonous mushrooms. Wild and cultivated mushrooms**.** Life cycle of *Agaricus spp* , characteristics and importance of *Volvariella spp., pleurotus spp., Calocybe spp.,* and *Lentinus spp.*

UNIT- II CULTIVATION AND BIOLOGICAL IMPORTANCE 9 Hour

Conditions for tropical and temperate countries - isolation, spawn production, growth media, spawn running and harvesting of mushrooms. Medicinal and nutritional value of mushrooms. Composting: importance in waste recycling.

UNIT- III DISEASES AND POST HARVEST TECHNOLOGY 8 Hour

Diseases and pest affecting mushroom. Post harvest technology: Refrigeration – Freeze drying, drying, canning, irradiation and entrepreneurship.

UNIT- IV MUSHROOM CULTIVATION (PRACTICALS) 20 Hour

Bed and shed preparation, sowing seedlings, pest control, fumigation and harvesting

UNIT- V MUSHROOM RECIPIES (PRACTICALS) 6 Hour

Mushroom soup, Mushroom pickle, Mushroom Pulav, Mushroom Chips

Text Books

- Nital Bahl, Hand book on Mushroom 4th edition. Vijay primlani for oxford & IBH publishing co pvt ltd, New Delhi, 2002.
- Hand book of mushroom cultivation, TNAU publications, 1999.

Reference books

- Chang T.S and Hayes W A, 1978. *The biology and cultivation of edible mushrooms*. Academic press, New York.
- M.C.Nair, C.Gokulapalan and Lulu das, 1997. *Topics on mushroom cultivation*, Scientific publishers, Jodhpur, India

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Identify the different types of mushroom and its benefits in cooking.	K2
CO-2	Identify the fruiting stage and apply the life cycle and culture needs of many mushrooms to the garden and landscape environmental niches.	K3
CO-3	Describe and apply the uses and lore of many mushrooms and culture techniques to further explore their cultivation potential.	K4
CO-4	Apply laboratory techniques to the capture, culture, and fruiting of many types of mushrooms in the home kitchen la	K2
CO-5	Demonstrate the importance of mushroom by preparing various types of receipies.	K4

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Major Core IV / DSC - IV	UBCM305	Biochemical Techniques	Model preparation	Seminar
	Core Practical III	UBCR302	Biochemical Techniques practical I	DPA	Viva Voce
IV	Major Core V / DSC - V	UBCM404	Immunology	Poster presentation	Seminar
	Major Core VI / DSC - VI	UIDM402	Pharmaceutical Biochemistry	Assignment	Seminar
	Allied IV/ GE -IV	UBIA401	Basics of Bioinformatics	Assignment	Seminar
	Core practical IV	UBCR402	Biochemical Techniques Practical II	DPA	Viva Voce
	NME	UBCE304/ UBCE401	Mushroom Cultivation	Assignment	Seminar
		UBCE402/ UBCE303	Clinical nutrition	Assignment	Case study
		UBCE301/ UBCE403	Hormonal Biochemistry	Assignment	Poster presentation
		UBCE302/ UBCE404	Food Microbiology	Model preparation	Seminar

PROGRAMME PROFILE OF M.Sc., BIOCHEMISTRY

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	Upon completion of these courses the students would have
PSO-1	Understand the scientific basis of life process and orient towards the applications of Knowledge acquired in solving clinical problem in society.
PSO-2	Acquire deep scientific knowledge in subjects like cell biology, enzymology, biotechnology, Metabolism, endocrinology, immunology, genetics, genetic engineering and clinical biochemistry.
PSO-3	Detect Various Disorders and Identify the Defect in the Metabolic Pathways and Evaluate Solutions for Metabolic Disorders by Applying the Knowledge of Metabolism.
PSO-4	Undertake biochemical experiments using classical and modern instruments of biochemistry & molecular biology, record and interpret the results, draw conclusions.
PSO-5	Acquiring the ability of leadership skills to manage projects in multidisciplinary environments and to develop skills to carryout experiments listed in and beyond syllabus to implement individual /group and to become an enterprenurer.
PSO-6	Communicate biochemical concepts through effective written and oral presentation and to compete globally with confidence in all the sectors of life science
PSO-7	Instilling knowledge and awareness on professional ethics, bioethical and health issues, intellectual property rights and life-long learning through career oriented courses such as IPR, biosafety and bioethics
PSO-8	develop hands on experience and laboratory experiments perceived will be constructive to pursue research in global level

Semester	Category	Course code	Course title	Previous course code	Contact Hours / Week	Credit
						Min/Max
I	Core I / DSC I	PBCM107	Bimolecular Chemistry	PBCM101	6	4
	Core II / DSC II	PBCM108	Cell Biology	PBCM102	6	4
	Core III / DSC III	PBCM109	Microbiology	PBCM203/ 105	6	4
	Core IV / DSC IV	PBCM110	Molecular Biology	PBCM204/ 106	6	4
	Core Practical I	PBCR103	Microbiology and Molecular Biology Practical	PBCR201/ 102	6	5
				TOTAL	**30**	**21**
II	Core V/ DSC V	PBCM207	Metabolism & Regulation	PBCM201	5	4
	Core VI / DSC VI	PBCM208	Human Physiology	PBCM202	5	4
	Core VII/ DSC VII	PBCM209	Analytical Biochemistry	PBCM103/ 205	5	5
	Core VIII/ DSC VIII	PBCM210	Endocrinology	PBCM104/ 206	4	4
	Core Practical II	PBCR203	Analytical Biochemistry Practical	PBCR101/ 202	6	5

	Core IX/ DSC IX	PBCX201	Mushroom cultivation (Service Learning)	--	-	1
	NME /SEC				5	4
	Online Course	PMAS201	Spoken Tutorial/NPTEL	-	-	-/2
				TOTAL	**30**	**27/29**
III	Core X/ DSC X	PBCM305	Enzymology and Enzyme Technology	PBCM301	6	5
	Core XI/ DSC XI	PBCM306	Immunology	PBCM303	6	5
	Core XII / DSC XII	PRMC301	Research Methodology	PBCM304	5	4
	Core Practical III	PBCR302	Enzymology & Clinical Diagnostics	PBCR301	6	5
	Core XVI / DSC XVI	PBCP401	Project	--	2	-
	Core XIII / DSC XIII	PBCI302	Plant Biochemistry& Industrial Biotechnology	PBCI301	5	4
				TOTAL	**30**	**23**
IV	Core XIV / DSC XIV	PBCM403	Genetics & Genetic Engineering	PBCM401	6	5
	Core XV / DSC XV	PBCM404	Advanced Clinical Biochemistry	PBCM402	6	5
	Core XVI/ DSC XVI	PBCP401	Project	--	18	9
				TOTAL	**30**	**19**
				GRAND TOTAL	**120**	**90/92**

COURSES OFFERED TO OTHER DEPARTMENT
NON MAJOR ELECTIVE

Semester	Category	Course code	Course Title	Previous course code	Contact Hours/ Week	Credit	
						Min.	Max.
II	Non Major Elective	PBCE204	Pharmaceutical Biochemistry	PBCE101/201	5	4	4
		PBCE202	Reproductive Biology & Disorders	PBCH102			
		PBCE203	Modern Lifestyle associated diseases	PBCE103			

ENZYMOLOGY & ENZYME TECHNOLOGY
PBCM305

Semester : III **Credit : 5**
Category : Core X **Hours/ Week : 6**
Class &Major : II M.Sc Biochemistry **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Improve the understanding of enzymatic processes by studying the structure, physical, chemical and catalytic properties of enzymes.
CO-2	Understand the physiological classifications and mechanisms of secretion and extracellular distribution of cellular enzymes.
CO-3	Techniques employed in enzymes purification and characterizations are also emphasized in this course.
CO-4	Provide an awareness of the current and possible future applications of enzyme technologies.
CO-5	Introduced to the theory as well as applications of enzyme technology in food, medical, and household industries.

UNIT - I ENZYME AS BASIS OF LIFE **15 Hour**

Enzymes as Biocatalyst, Properties, Factors Affecting Enzyme Activity, Types of Specificity, Enzyme Turnover, Fundamentals of Enzyme Assay- Enzyme Units, Coupled Kinetic Assay, Enzyme Localization. Nomenclature and Classification of Enzymes According to IUB. Monomeric Enzyme - Chymotrypsin, Typsin and Carboxy Peptidase. Oligomeric Enzymes - Isoenzymes - LDH.

UNIT - II MECHANISM OF ENZYME ACTIVITY **16 Hour**

Active Site, Lock and Key Theory, Induced Fit Model. Collision and Transition State Theories. Mechanism of Catalysis: Proximity and Orientation Effects, General Acid - Base Catalysis, Concerted Acid - Base Catalysis, Nucleophilic and Electrophilic Attacks, Catalysis by Distortion, Metal Ion Catalysis. Theories on Mechanism of Catalysis. Coenzymes - Mechanism and Action of TPP, Coenzyme A, NAD, FAD.

UNIT – III KINETICS OF ENZYME ACTION **15 Hour**

Definition and Importance, Quantitative Analysis of Single Substrate - Michaelis-Menten Equation. Determination & Significance of Km & Vmax. Importance of Kcat/Km. Determination of Ki. Line – Weaver Burk Plot, Edie Hoftee and Hanes Plot. Ping Pong and Random Ordered Mechanisms.

Inhibition- Competitive, Non-Competitive, Uncompetitive and Mixed Inhibition, their Kinetic Differentiation. Determination of Inhibition Constant from MM Equation.

UNIT - IV ENZYME REGULATION **16 Hour**

Enzyme Regulation - General Mechanisms of Enzyme Regulation, Homologous Interaction - Oxygen -Haemoglobin Interaction, Heterologous Interaction -Aspartate Carbonyl Transferase. Co-Operativity and Non- Cooperativity Significance of Positive and Negative Kinetic Co-Operativity. Regulation of Allosteric Regulation - Feedback Regulation, Sequential Feedback, Enzyme Induction and Repression. Enzyme Multiplicity.

UNIT - V ENZYME TECHNOLOGY **16 Hour**

Isolation and Fractionation of Enzymes – Classical Methods of Purification and Crystallization – Separation Based on Molecular Size, Electric Charge, Solubility Difference and Selective Adsorption. Enzyme Immobilization- Properties, Method and its Applications. Advantages and Disadvantages of Immobilized Enzyme. Application of Immobilized Enzyme. Enzyme Engineering - Artificial Enzyme and its Synthesis. Industrial, Diagnostic and Therapeutic Applications of Enzymes. Biosensors - Glucose Oxidase, Cholesterol Oxidase, Urease and Antibodies as Biosensors. Abzymes and Ribozymes.

Text books

- Trevor Palmer, Philip Bonner *Enzymes: Biochemistry, Biotechnology, Clinical Chemistry* 2nd edition, Horwood Publishing Limited, 2007
- Dixon and Webb, *Enzymes*, 3rd edition, Academic Press, New York, 2000.

Reference books

- E.S. West, W.R. Todd, H.S. Mason and J.T. van Bruggen, *A Text Book of Biochemistry,* 4th edition, Oxford and IBH Publishing Co., New Delhi, 2000
- Nicholas C. Price, Lewis Stevens, and Lewis Stevens, *Fundamentals of Enzymology: the Cell and Molecular Biology of Catalytic Proteins*, 3rd edition, Oxford University Press, USA, 2000.
- David L. Nelson Michael M. Cox Lehninger*Principles of Biochemistry,* W. H. Freeman; 4th edition, 2004.

E-Resources

- https://storeiyta.firebaseapp.com/.../enzymes-biochemistry-biotechnology-clinical-che.
- https://quacktradition4ahz.files.wordpress.com/.../fundamentals-of-enzymology-the-ce.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define fundamental properties of enzymes, nomenclature, enzyme catalytic mechanisms and enzyme kinetics.	K1
CO-2	Explain the mechanism of enzyme action, importance of coenzymes.	K2
CO-3	Apply the biochemical calculation for enzyme kinetics.	K3
CO-4	Explain the mechanism of enzyme regulation.	K4
CO-5	Discover the current and future trends of applying enzyme technology for the commercialization purpose of biotechnological products.	K6

IMMUNOLOGY
PBCM306

Semester : III **Credit : 5**
Category : Core XI **Hours/ Week : 6**
Class &Major : II M.Sc Biochemistry **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Study the various cell types involved in immune responses and associated functions.
CO-2	Familiarize cellular and molecular basis of immune responsiveness.
CO-3	Understand the role of cytokines in immunity and immune cell activation; and be able to identify and characterize cytokines of particular immune importance.
CO-4	Understand the significance the Major Histocompatibility Complex in terms of immune response and transplantation.
CO-5	Know the importance of Hybridoma technology and complement system.

UNIT - I INTRODUCTION **15 Hour**

Introduction: Terminologies - History of Immunology - Immunohematology, Blood Groups, Blood Transfusion - Rh - Incompatibilities - Immunity - Types of Immunity - Innate and Acquired. Immune Systems: Anatomy of Lympho-Recticular System - Primary Lymphoid Organ. Secondary Lymphoid Tissue - Cells of the Immune System - Detailed Aspects of T and B Cells - Receptors – Activation and Function. (Immune Reactive Cells – Structure and Functions – Macrophages, Granulocytes, NK Cells, T and B Lymohocytes – Origin, Development, Differentiation).

UNIT - II ANTIGEN –ANTIBODY REACTIONS **16 Hour**

Antigens: Types, Properties, Haptens- Adjuvants, Toxoids Antitoxins, Immunoglobulins - Structure Types and Properties. Theories of Antibody Production. Antigen - Antibody Reactions - In Vitro Methods; Agglutination - Precipitation, Complement Fixation, Immuno Fluorescence, ELISA, RIA, In Vivo Methods.

UNIT - III IMMUNOLOGICAL DISORDERS **16 Hour**

Autoimmunity - Autoimmune Diseases - Pathogenesis - Treatment. Immunodeficiency Disorders-B Cell Deficiencies, T Cell Deficiencies, Secondary Immunodeficiency Diseases - Pathogenesis, Diagnosis and Treatment of AIDS. Immunization Practices- Active and Passive Immunization.

UNIT - IV HYPERSENSITIVITY REACTIONS **15 Hour**

Hypersensitivity Reactions - Antibody Mediated, Type I Anaphylaxis, Type II -Antibody Dependent Cell Cytotoxicity, Type III - Immune Complex Reactions - Respective Diseases and Immunologic Methods of Diagnosis - Cell Mediated Immune Responses - Lymphokines, Cytokines. Type IV – Hypersensitivity Reactions, MHC and Transplantation.

UNIT - V HYBRIDOMA TECHNOLOGY **16 Hour**

Basic Principles of Hybridoma Technology. Monoclonal Antibody (MoAb) Production and Application. Purification and Characterization of Monoclonal Antibody. Labeling of Antibodies. Complement System – Components - Classical and Alternative Pathway.

Text books

- Kuby, Richard A, Goldsby et al. *Immunology*, 4th ed., WH Freeman & Co. 2003.
- Abul Abbas, Andrew Lichtman, and Jordan Pober*Cellular and molecular immunology*, W. B. Saunders, fourth edition, 2000
- Ivan Roitt, Jonathan Brostoff, and David Male *Immunology* Mosby, London. 6th edition, 2001.

Reference books

- Charles Janeway, Jr. and Paul Travers, *Immunobiology - the immune system in health and disease,* 5th edition, Garland Publishing, Inc. 2001.
- H. C. Gooi& Helen Chapel, *ClinicalImmunology:* A PRACTICAL APPROACH. IRL Press at Oxford University, 1991.

e-Resources

- https://www.mh-hannover.de/.../manipulating_the_immune_system_for_therapeutic.p..
- sacema.org/uploads/Essential-Clinical-Immunology.pdf
- www2.nau.edu/~fpm/immunology/lectures/Chap.03-09.pdf

COURSE OUTCOMES

Co No	On completion of the course the student will be able to	Bloom's level
CO-1	Identify the various cell types involved in immune responses and associated functions	K1&K2
CO-2	Distinguish the cellular and molecular basis of immune responsiveness.	K5
CO-3	Explain the role of cytokines in immunity and immune cell activation; and be able to identify and characterize cytokines of particular immune importance;	K3
CO-4	List out the significance of Major Histocompatibility Complex in terms of immune response and transplantation	K5
CO-5	Explain the importance of Hybridoma technology and complement system.	K6

RESEARCH METHODOLOGY
PRMC301

Semester : III **Credit : 4**
Category : Core XII **Hours/Week : 5**
Class &Major : II M.Sc. Biochemistry **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Describe the role and importance of research
CO-2	Understand some basic concepts of research and its methodologies
CO-3	Demonstrate the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.
CO-4	Design a good qualitative purpose statement and a good central question in qualitative research.
CO-5	Evaluate the concepts and procedures of sampling, data collection, analysis and reporting.

UNIT- I FUNDAMENTALS OF RESEARCH **13 Hour**

Research-Meaning, Objectives & Motivation. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method –Understanding the language of research – Concept, Construct, Definition, Variable. Research Process. Problem Identification & Formulation –Research Question–Investigation Question –Measurement Issues –Hypothesis –Qualities of a good Hypothesis – Null Hypothesis & Alternative Hypothesis. Hypothesis Testing –Logic & Importance.

UNIT- II RESEARCH AND EXPERIMENTAL DESIGN **13 Hour**

Research Design: Concept and Importance of Research – Features of a good research. Types and concepts of research design – Exploratory, Descriptive, Qualitative and Quantitative.

UNIT- III MEASUREMENT SAMPLING AND DATA ANALYSIS **13 Hour**

Measurement: Concept & Problems in research –Validity and Reliability. Levels of measurement (Nominal, Ordinal, Interval, Ratio). Sampling – Types and statistics of Simple, Random, Systematic, Stratified Random & Multi-stage. Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis –Cross tabulations and Chi-square test including testing hypothesis of association. ANOVA and Duncan's multiple range tests.

UNIT- IV TOOLS / TECHNIQUES FOR RESEARCH **13 Hour**

Databases for Biological Science Discipline.FASTA, BLAST, EMBL net, DDBJ and NCBI. Protein sequence databases; primary databases SWISS – PROT, TrEMBL, NRL-3D. Secondary Databases; PRO SITE, PROFILES, PRINTS, Pfam, BLOCKS and IDENTITY. Composite protein databases.

UNIT- V THESIS WRITING AND PAPER PUBLICATION 13 Hour

Thesis writing-Introduction, Review of literature, materials and methods, Interpretation of results, Summary and Conclusion, Bibliography, Acknowledgement. Interpretation of Data and Paper Writing –Layout of a Research Paper, Journals in biological science, Impact factor of Journals, Ethical issues related to publishing, Plagiarism and Self-Plagiarism.

Text Books

- Panneerselvam, *Research Methodology*, 1st edition R, Prentice hall of India, New Delhi, 2004.
- Kothari CR, *Research Methodology – Methods and techniques*, 2nd edition, New Wiley Eastern ltd., Delhi, 2009.

Reference Books

- Donald Cooper & Pamela Schindler, *Business Research Methods*, TMGH, 9th edition, 2013
- Alan Bryman & Emma Bell, *Business Research Methods*, 4th edition, Oxford University Press, 2015.
- P.Saravanavel, *Research Methodology*, 14th edition, JBA publishers, 2003.

e- Books

- gent.uab.cat/diego_prior/sites/.../02_e_01_introduction-to-research-methods.pdf
- https://www.heacademy.ac.uk/system/files/msor.3.1s.pdf
- 164.100.133.129:81/econtent/Uploads/Research_Methods.pdf

COURSE OUTCOME

Co No	On completion of the course the student will be able to	Bloom's level
CO-1	Identify and discuss the issues and concepts salient to the research process. Selecting an appropriate research design, and implementing a research project.	K1&K2
CO-2	Learn the applications of packages like WORD, EXCEL, Power Point in entering data, preparing tables, graphs, charts etc.,	K5
CO-3	Apply foundational research skills to address a research question; Demonstrate planning, time and change management skills	K3
CO-4	Evaluate educational research critically and participate in the research community	K5
CO-5	Assess the basic function and working of analytical instruments used in research	K6

ENZYMOLOGY & CLINICAL DIAGNOSTICS
PBCR302

Semester : III **Credit : 5**
Category : Core Practical III **Hours/Week : 6**
Class &Major : II M.Sc. Biochemistry **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Acquire knowledge on general principles of proper evaluation of test findings, and on the scope of particular tests or groups of tests in terms of their specificity, sensitivity, predictive and clinical value.
CO-2	Know how to apply a rational approach when choosing diagnostic algorithms and tests to monitor the efficiency of treatment.
CO-3	Analyzing, critically evaluating and solving technical and scientific problems within the broader, multidisciplinary context in the field of laboratory biomedicine and health.
CO-4	Applying professional knowledge of laboratory diagnostics while estimating clinical significance of biochemical and molecular biological indicators detecting the source of errors and variability of results incurred by performing tests, interpreting the results of laboratory analysis from clinical aspects.
CO-5	Problem-solving approach to experimental data.

ENZYMOLOGY

1. Assay of Salivary Amylase enzyme.
2. Effect of substrate concentration on enzyme activity (Salivary Amylase) and determination of Km value.
3. Effect of inhibitor on activity of Salivary Amylase.
4. Assay of lactate dehydrogenase (LDH).
5. Effect of pH on enzyme activity (Acid phosphatase/Alkaline phosphatase).
6. Effect of temperature on enzyme activity (ACP/ALP)

CLINICAL DIAGNOSTICS

Estimation of: (from blood/plasma/serum/urine)

1. Glucose by GOD-POD Method
2. Protein estimation by Biuret method
3. Triglycerides GPO/POD by kit method
4. Cholesterol by Zak and Zaltsky Method
5. HDL
6. Calcium (Ca) by OCPC Method
7. Iron (Fe) by Dipyridyl Method
8. Copper (Cu) by Dithiocarbonate Method
9. Phosphorus (P) by Fiske- Subbaraow Method
10. Enzyme-linked immunosorbent *assay* (*ELISA*)

Text Books

- David T. Plummer, *An Introduction to practical Biochemistry*,3rd edition, 1999.
- J.Jayaraman, *Laboratory Mannual in Biochemistry*,4th edition, New Age international limited publication,1992.

Reference Books

- Pattabiraman, Laboratory*Mannual in Biochemistry*, 4th edition, 2015.
- Singh .S.P. *Practical Mannual of Biochemistry*,8th edition, CBS Publication 2019.
- Harold Varley, *Practical Clinical Biochemistry*, 6th edition, CBS Publishers, New Delhi, 2005.

e-Resources

- https://www.worldcat.org/title/practicalenzymology/oclc/827358447/
- https://www.worldcat.org/title/practical-enzymology/oclc/1080648481/
- https:// Ferris-Clinical-Advisor-2020-Book ebook/dp/B07VM97C5X/
- https:// Ferris-Clinical-Advisor-2019-Solutions-ebook/dp/B07DL6VH6J/
- https:// Ferris-Clinical-Advisor-Elsevieron-VitalSource ebook/dp/B00Z5KE8T4/

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	State the principles of laboratory diagnostics based on scientific evidence.	K1
CO-2	Explain patients in self-control (diabetes, pregnancy, hypertension &haemodialysis)	K2
CO-3	Evaluate the test results after suitable diagnostic test.	K5
CO-4	Recommend marker enzymes during pathological conditions.	K5
CO-5	Apply the acquired knowledge in planning scientific research ranging from population-based studies to clinical trials.	K6

PLANT BIOCHEMISTRY &INDUSTRIAL BIOTECHNOLOGY

PBCI302

Semester : III **Credit : 4**
Category : Core XII **Hours/Week : 5**
Class &Major : II M.Sc. Biochemistry **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the mechanism of Nitrogen fixation and its importance in agricultural production and economics
CO-2	Know the significance of plant growth regulators in the development of plants
CO-3	Acquire knowledge about the importance of secondary metabolites and its industrial applications
CO-4	Explain and understand the biochemistry of photosynthetic process and its relation to man and its environment
CO-5	Develop a basic understanding of biochemical events associated with structural arrangement of plant cell and organization.

UNIT- I PLANT CELL AND PHOTOSYNTHESIS 13 Hour

Structure of Plant Cell. Photosynthesis: Chloroplast- Structure and Function; Photosynthetic Pigments and Light Harvesting Complexes. Photo System I & II. Photosynthetic Electron Transport and Photophosphorylation. Calvin Cycle (C3 Plants), Hatch Slack Pathway (C4 Plants), Crassulacean Acid Metabolism (CAM).

UNIT – II PLANT RESPIRATIONAND METABOLISM 13 Hour

Plant Respiration: Cyanide Sensitive and Insensitive Respiration., Nitrogen Metabolism: Physical and Biological Nitrogen Fixation, Ammonification, Nitrification, Denitrification Symbiotic Nitrogen Fixation and its Regulation. Nitrogenase System, Nitrate Reductase. Sulphur Metabolism: Sulphate Activation, Reduction of Active Sulphate, Oxidation of Inorganic Sulphur, Incorporation of Sulphur into Amino Acids. Phosphorous Cycle, Carbon Cycle.

UNIT- III PLANT TISSUE CULTUREAND HORMONES 13 Hour

Plant Tissue Culture: Plant Cell Organs and Embryo Culture, Anther Culture, Somaclonal Variation, Protoplast Isolation, Fusion and Culture of Protoplasts, Application of Plant Tissue Culture. Plant Hormones: Biosynthesis, Physiological Effects and Mechanism of Action of Auxins, Gibberellic Acids, Cytokinins, Abscisic Acid, Ethylene, Brassino steroids and Polyamines. Plant Inhibitors and Redardants.

UNIT IV- INTRODUCTION TO INDUSTRIAL BIOPROCESS 13 Hour

Biotechnology: Scope and importance, Commercial Potential of Biotechnology in India. Historical Overview of Industrial Fermentation Process -Traditional and Modern Biotechnology and its Application. Industrial Fermentation- Microorganisms, Mode of Operation, Fermentation Processes - Pictorial Representation.

UNIT V- PRODUCTION OF PRIMARY & SECONDARY METABOLITES 13 Hour

A Brief Outline of Processes for the Production of Some Commercially Important Organic Acids (Citric Acid, Lactic Acid & Acetic Acid); Amino Acids (Glutamic Acid & Tryptophan) And Alcohols (Ethanol & Butanol).

Production of Secondary Metabolites: Antibiotics – Penicillin, Streptomycin & Erythromycin, Vitamins - Vit B12 and Vit B2. Production of Recombinant Proteins Having Therapeutic and Diagnostic Applications, Vaccines, Insulins.

Text books

- Taiz & Ziger, *Plant physiology*, 5th edition, Sinauer associates, 2012.
- Slater A, NW Scott, MR Fowler. *Plant biotechnology*, 2nd edition, OxfordUniversity Press,2008
- Lee, S.Y., Nielsen, J. and Stephanopoulos, G., *"Industrial Biotechnology: Products and Processes"*, John Wiley & Sons, 2016.

Reference books

- William Hopkins & Norman P. A. Huner, *Introduction of Plant Physiology*, Wiley 4th edition, 2008.
- Buchanan, *Biochemistry and molecular Biology of plant*, Wiley 2nd edition,2015.
- Okafor, N., *"Modern Industrial Microbiology and Biotechnology*", CRC Press, 2007

e-Resources

- www.routeetvies.fr/medias/.../1-plant-biotechprinciples-techniques-and- applications1.pd...
- https://faculty.psau.edu.sa/filedownload/doc-10-pdf-9e7f111f15db1aa3830cd806660.
- https://downloads.lww.com/wolterskluwer_vitalstream_com/.../frontmatter.pdf

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the role of biochemists in evaluating the potential industrial and medicinal applications of plants.	K1
CO-2	Understands about the existence of naturally available and metabolically important growth regulators and secondary metabolites and its potential in crop development.	K2
CO-3	Demonstrates ability to explain relation between Photosynthesis, growth hormones and Plant growth.	K3
CO-4	Explain and understand the biochemistry of plant growth and development.	K4
CO-5	Develop skills and knowledge to conduct basic research work in the field of Plant Biochemistry.	K5

GENETICS AND GENETIC ENGINEERING
PBCM403

Semester : III **Credit : 5**
Category : Core XIV **Hours/Week : 6**
Class &Major : II M.Sc. Biochemistry **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the basic principles and concepts of genetics.
CO-2	Study the basic techniques involved genetic engineering and its applications
CO-3	Acquire knowledge on various vectors used in gene cloning.
CO-4	Understand the different types of gene transfer methods.
CO-5	Aware about the applications of genetic engineering.

UNIT – I BASICS OF GENETICS **16 Hour**

History of Genetics Mendelian principles of inheritance – Dominance, codominance, incomplete dominance, segregation, Multiple alleles, Multiple genes.

UNIT –II GENE INHERITANCE **16 Hour**

Interaction of genes. Patterns of Inheritance – Autosomal inheritance, Sex-linked inheritance, Cytoplasmic inheritance.

UNIT – II GENETIC ENGINEERING TECHNIQUES **15 Hour**

Construction of genomic and cDNA libraries, selection and screening of recombinants, probes - types, synthesis and uses of probes. Blotting techniques (Southern, Northern and Western), PCR- types and applications, Sequencing: DNA and RNA, site directed mutagenesis. Chromosome walking, jumping, DNA finger printing and foot printing.

UNIT – III VECTORS AND GENE CLONING **16 Hour**

Enzyme uses in genetic engineering – Restriction endonucleases, restriction digestion, mapping, ligation, Cloning vectors -- Desirable properties of vectors – Prokaryotic & Eukaryotic Expression Systems (Constitutive & Inducible). Plasmid Vectors - Phage Vectors - Cosmids -- Phagemids - BACs - Yeast Vectors - YACs - Lentiviral Vectors -- Adenoviral Vectors – Plant Vectors - Insect Vectors.

UNIT – IV GENE TRANSFER METHODS **16 Hour**

Methods of gene recombination - Bacterial Conjugation, Transformation, Transduction. Gene transfer methods - Microinjection, Electroporation, Microprojectile, Shot Gun method, Ultrasonication, Liposome fusion. Competence, identification of transformed colonies/clones – Blue white screening, DNA sequencing. cDNA Library

UNIT – V APPLICATIONS OFGENETIC ENGINEERING **15 Hour**

Genetic engineering in animals - Production of transgenic mice, Therapeutic products produced by genetic engineering- plasma proteins, human hormones, Genetic engineering in plants: Use of *Agrobacterium tumefaciens* and *A.rhizogenes*, Ti plasmids, Strategies for gene transfer to plant cells – Herbicide resistant, Drought tolerant, pest resistant, salt tolerant transgenic plants and related ethical issues.

Text books

- Satyanarayana U, *Biotechnology*, 2nd edition, Books & Allied (P) Ltd,2008.
- Bernard R. Glick, Jack J. Pasternak, and Cheryl L. Patten, *Molecular biotechnology: Principles and applications of recombinant DNA,* 4th edition, By ASM press.2010
- Singh. K., "*Intellectual property rights on Biotechnology*", Springer, 7th edition,2015
- R.C.Dubey, *A text book of Biotechnology*, 5th revised edition, S.Chand Publications,2014

Reference books

- J. Sambrook, E.F. Fritsch and T. Maniatis, *Molecular Cloning: a Laboratory Manual*, , 3rd edition, Cold Spring Harbor Laboratory Press, New York,2000
- Brown,T.A,"*Gene Clonin gand DNAAnalysis*-An Introduction,6thedition, John Wiley
- & Sons, 2010
- Strickberger. M.W., "*Genetics"*, 3rd edition, Pearson India, 2015.

e-Resources

- *https://www.academia.edu/.../Molecular_Biochemistry Bernard_R._Glick_Jack_J._Paste*
- *https://edisciplinas.usp.br/.../1/MolecularBiology Of The Cell 5th.Ed-pag579+37.pdf*
- *datalake.neurai.io/biotechnology_and_intellectual_property_rights_legal_and_social_..*
- *https://en-us.technetix.com/molecular_cloning_a_laboratory_manual_download.pd*

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define the basics concepts of classical, molecular and evolutionary genetics.	K1
CO-2	Explain how to construction genomic DNA library and cDNA library	K2
CO-3	List the various tools and techniques in rDNA technology- DNA manipulative enzymes.	K3
CO-4	Describe about direct gene transfer methods including microinjection, electroporation and biolistic gun.	K4
CO-5	Discuss the applications of genetic engineering and apply learned knowledge to their future research	K5

ADVANCED CLINICAL BIOCHEMISTRY
PBCM404

Semester : III **Credit : 5**
Category : Core XIV **Hours/Week : 6**
Class &Major : II M.Sc. Biochemistry **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students to
CO-1	Understand the fundamentals of clinical biochemistry related to health.
CO-2	Study about diseases associated with free radicals.
CO-3	Know the disorders of carbohydrate, lipid and amino acid metabolism.
CO-4	Gain knowledge on the tests used to assess liver and renal function.
CO-5	Understand the concepts of oncogenes, protooncogenes and tumor suppressor genes and the tumor markers.

UNIT- I GOOD CLINICAL LAB PRACTICES 15 Hour

Importance of automation in clinical biochemistry. Good Clinical Practices: Basics and principles. Selection of Instruments, Quality assurance, maintenance of quality control programme.

UNIT- II ACID BASE BALANCES 16 Hour

Acid base balance - coagulation of blood pH within normal range disturbances in acid base balance - acidosis, alkalosis, mixed disturbances - laboratory parameters - blood gas analysis. Fluid and electrolyte balance - regulation - disturbances of fluid and electrolyte balance - laboratory parameters in the diagnosis and management of fluid and electrolyte disorders - oral rehydration therapy.

UNIT - III METABOLIC DISORDERS 16 Hour

Diabetes mellitus, Hypo & Hypercholesterolemia. Inborn errors of metabolism: a) Disorders of amino acid metabolism- Tyrosinemia, phenylketonuria, alkaptonuria b) Disorders of nucleic acid metabolism- Disorders in purine/ pyrimidine metabolism. Bone marrow disorders.

UNIT- IV EVALUATION OF ORGAN FUNCTION TESTS & PRENATAL DIAGNOSIS **15 Hour**

Gastric function tests, Liver function tests, renal function test, lung, heart and pancreatic disorder.

UNIT - V CLINICALLY IMPORTANT HORMONES & MARKERS **16 Hour**

Thyroid diseases – hormones and markers, Menstrual disorders – hormones and markers, Tumor markers.

Text books

- C.A.Burtis& Ashwood Teitz, *Fundamentals of Clinical Chemistry*, 6th edition, W. B. Saunders company,2005
- David Plummer, *Practical Biochemistry*, 3rd edition, Tata McGraw- Hill,2000.
- Harrison T.R. Fauci, Braunwald, Isselbacher, *Principles of Internal Medicine*, 14th edition, MC-graw hill, Newyork. Volume I and II2015

Reference books

- Thomas Devlin, Text book of *Biochemistry with clinical correlation,* 7th edition, John Wiley and Sons,2000.
- William J. Marshall & Stephen K. Angert, *Clinical Biochemistry – Metabolic concepts and Clinical aspects,* 3rd edition, Churchill Livingstone,2002.
- P. D. Mayne, A. Hodder, *Clinical chemistry in diagnosis and treatment*, Arnold publication, 6th revised edition, 1994.

e-Resources

- www.raftmaster.org/tietz_textbook_of_clinical_chemistry_and_molecular_diagnostics.
- https://www.academia.edu/35117679/_U_Satyanarayana_Biochemistry

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Discuss the fundamentals of clinical biochemistry related to health.	K1
CO-2	Explain the clinical significance of the free radicals and the enzymes involved.	K2
CO-3	Illustrate the disorders associated with metabolism.	K3
CO-4	Identify the test use to diagnose the liver and renal function.	K4
CO-5	Differentiate the oncogenes, protooncogenes and tumor suppressor genes and the markers used to identify the tumors.	K4

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Core X	PBCM301	Enzymology & Enzyme Technology	Poster presentation	Seminar
	Core XI	PBCM303	Immunology	Poster presentation	Seminar
	Core XII	PRMC301	Research Methodology	Assignment	Seminar
	Core XIII	PDIM401	Plant Biochemistry & Industrial Biotechnology	Assignment	Seminar
IV	Core XIV	PBCM401	Genetics And Genetic Engineering	Assignment	Seminar
	Core XV	PBCM302/ 402	Clinical Biochemistry	Case study	Seminar

INTERNSHIP/ FIELD WORK/ FIELD PROJECT

Semester	Part	Category	Course code	Course Title	Contact Hrs / week	Previous Course Code	Credit Min /Max
II	III	Internship	PBCI201	Internship / Field Work / Field Project	30 Hours	-	- / 1 (Extra Credit)
IV	III	Internship	PBCI401	Internship / Field Work / Field Project	30 Hours	-	- / 1 (Extra Credit)

DEPARTMENT OF CHEMISTRY

PREAMBLE

UG: Programme Profile and the Syllabi of Courses Offered in Semester III and IV Along with I and II Evaluation Components (With Effect from 2021-2024 Batch onwards).

PG: Syllabi of Programme Offered in Semester III and IV along with III and IV Evaluation Components (With effect from 2021-2023 Batch Onwards).

PROGRAMME PROFILE B.Sc., Chemistry

Programme Specific Outcome (PSO)

Upon completion of the programme, the students will be able to

- Development of the Skills in handling various Chemicals, Apparatus and Instruments.
- Application of the Principles of Thermodynamics and Chemical Kinetics in Chemical Reactions.
- Acquiring the Knowledge on Heterocyclic Compounds and Natural Products.
- Ability to apply the basic Principles of various Spectroscopic, Electro and Thermo Analytical Methods to Characterize the Compounds.

Semester	Part	Category	Course code	Course Title	Pervious course code	Contact Hrs/ Week	Credit Min/Max
I	I	Languages / AECC-IITamil / Hindi / French	UTAL107/ UTAL108/ UHIL101/ UFRL101	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I/ French-I	UTAL103/ UTAL104	5	3/4
	II	English/AECC-I	UENL109/ UENL110	English for Communication (Stream – I)/ English for Communication (Stream – II)		5	3/4
	III	Core I/ DSC-I	UCHM109	Inorganic Chemistry-I	-	5	5
		Core II/ DSC-II	UCHM110	Analytical Chemistry	-	4	4
		Core Practical I/ DSC Practical-I	UCHR101	Volumetric Practical	-	3	2
		Allied I/GE	UPHA102	Allied Physics - I	-	3	2
		Allied Practical I/ GE Practical-I	UPHR103	Allied Physics Practical-I	-	3	2
		Core III/ DSC-III	UPEM101	Professional English I		6	4
	IV	Value Education				2	1
				Total		**36**	**26/28**
II	I	Languages/ AECC-II Tamil/ Hindi/French	UTAL207/ UTAL208/ UHIL201/ UFRL201	Basic Tamil-II/ Advanced Tamil-II/ Hindi-II/ French-II	UTAL203/ UTAL204	5	3/4

	II	English/AECC-I	UENL209/ UENL210	English for Communication (Stream – I)/ English for Communication (Stream – II)		5	3/4
	III	Core IV/ DSC-IV	UCHM203	Organic Chemistry-I		5	5
		Core V/ DSC-V	UCHM204	Nuclear & Radiation Chemistry	-	3	3
		Core Practical II/DSC Practical II	UCHR206	Organic Practical	-	3	2
II		Allied II/GE	UPHA201	Allied Physics II	-	3	2
		Allied Practical II /GE Practical II	UPHR202	Allied Physics Practical-II	-	3	2
		Core VI/ DSC-VI	UPEM201	Professional English II		6	4
		Internship	UPSI201	Internship/Field work/Field Project (30 Hours)	-		/1 (Extra Credit)
	IV	NME			-	3	2
	V	Extension Programme/ Physical Education/NCC			-	-	-/2
				Total		**36**	**27/31**
III	I	Languages/ AECC-II Tamil/Hindi/French	UTAL307/ UTAL308/ UHIL301/ UFRL301	Basic Tamil-III/ Advanced Tamil-III/ Hindi-III/ French-III	UTAL303/ UTAL304	5	3/4
	II	English/AECC-I	UENL309/ UENL310	English for Communication (Stream – I) / English for Communication (Stream – II)	UENL306	5	3/4
	III	Core VII/ DSC-VII	UCHM307	Physical Chemistry - I	-	4	4
		Core VIII/ DSC-VIII	UCHM308	Electrochemistry	-	3	2
		Core Practical III /DSC Practical III	UCHR404/ UCHR405	Semi Micro Qualitative Inorganic Analysis		3	-
		Allied/GE	UMAA304	Algebra, Differential Calculus and Trigonometry	-	5	4
	IV	Online Course		Online Course (NPTEL/ST)		3	1/2
		Value Education				2	1
				Total		**30**	**18/21**

IV	I	Languages/ AECC-II Tamil/Hindi/French	UTAL407/ UTAL408/ UHIL401/ UFRL401	Basic Tamil-IV/ Advanced Tamil-IV/ Hindi-IV/ French-IV	UTAL403/ UTAL404	5	3/4
	II	English/AECC-I	UENL409/ UENL410	English for Communication (Stream – I)/ English for Communication (Stream – II)	-/ UENL406	5	3/4
	III	Core IX/ DSC-IX	UCHM407	Molecular Spectroscopy & Photochemistry	-	4	4
		Core X/ DSC-X	UCHM408	Research Methodology	-	3	2
		Core Practical III /DSC Practical III	UCHR404/ UCHR405	Semi micro Qualitative Inorganic Analysis	-	3	4
		Allied/GE	UMAA406	Integral Calculus, Laplace Transform & Ordinary Differential Equation	-	5	4
		Internship	UPSI201	Internship/Field work/Field Project (30 Hours)	-		/1 (Extra Credit)
	IV	NME				3	2
		Soft skill	USKS401			2	1
	V	Extension Programme/ Physical Education/NCC				-	-/2
	Total					**30**	**23/28**
V	III	Core XI/ DSC-XI	UCHM510	Inorganic Chemistry – II	-	5	5
		Core XII/ DSC-XII	UCHM511	Organic Chemistry – II	-	5	5
		Core XIII/ DSC-XIII	UCHM512	Physical Chemistry –II	-	5	5
		Major Elective / DSE-I	UCHO501 UCHO502 UCHO503	Organometallics and Bioinorganic chemistry Heterocyclic Chemistry Organic Spectroscopy	-	5	4
		Core Practical IV /DSC Practical IV	UCHR501	Gravimetric Analysis	-	3	2
		Core XIV/ DSC-XIV	UCHP501	Project	-	5	5
	IV	Value education				2	1
Total						**30**	**27**

VI	III	Core XV/ DSC-XV	UCHM614	Inorganic Chemistry III	-	5	5
		Core XVI/ DSC-XVI	UCHM615	Organic Chemistry III	-	5	5
		Core XVII/ DSC-XVII	UCHM616	Physical Chemistry III	-	5	5
		Core XVIII/ DSCXVIII	UCHM617	Advanced Material Chemistry		2	2
		Major Elective/ DSE-II	UCHO602 UCHO603 UCHO604	Polymer Chemistry Medicinal Chemistry Forensic Chemistry	-	5	4
		Core Practical V /DSC Practical V	UCHR605	Physical Chemistry Practical	-	3	2
		Core Practical VI /DSC Practical VI	UCHR606	Organic Analysis and Preparation	-	3	2
		Viva –Voce	UCHM605	Comprehensive Viva-Voce	-	-	1
		Internship	UPSI201	Internship/Field work/Field Project (30 Hours)	-		/1 (Extra Credit)
	IV	Soft Skill	USKS601		-	2	1
	V	Extension Programme/ Physical Education			-	-	-/2
		Extension Programme	UROX601	Rural Outreach Programme			- / 1 (Extra Credit)
Total						**30**	**27/31**
Grand Total						**192**	**148/166**

LIST OF COURSES OFFERED TO OTHER DEPARTMENTS
ALLIED AND ALLIED OPTIONAL COURSES

Semester	**Part**	**Category**	**Course code**	**Course title**	**Pervious course code**	**Contact hrs per week**	**Credits**
							Min/Max
I	III	Allied- I/GE	UCHA103	Chemistry for Biochemist		3	2
IV	III	Allied- I/GE	UCHA402	Chemistry for physics		3	2
I	III	Allied Practical-I/ GE Practical-I	UCHR104	Organic Analysis	-	3	2
IV	III	Allied Practical-II/ GE Practical-II	UCHR404	Volumetric Analysis		3	2
V	III	Allied Optional	UCHA502 UCHA504 UCHA505 UCHA506	Industrial Chemistry Dairy Chemistry Agricultural Chemistry Environmental Chemistry	-	5	4

NON- MAJOR ELECTIVE COURSES

Semester	Part	Category	Course code	Course title	Pervious course code	Contact hrs per week	Credits
							Min/Max
II	IV	Non major Elective	UCHE204 UCHE205 UCHE206	Food Chemistry Health and Hygiene Cosmetics and Detergents	-	3 3 3	2 2 2
IV	IV	Non major Elective	UCHE401 UCHE402 UCHE403	Agricultural Chemistry Environmental Chemistry Industrial Chemistry		3 3 3	2 2 2

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course Code	Course Title	Pervious Course Code	Hrs per Week	Credits
						Min/Max
II	Core	UCHI201	Internship	-	-	1
IV	Core	UCHI401	Internship	-	-	1
VI	Core	UCHS601/ UCHP601	Green Chemistry (Self Study Paper)/ Project	-	-	1/2

EXPERIENTIAL LEARNING (MANDATORY/ONLY FOR INTERESTED STUDENTS)

Related Paper	Work experience		Proposed period (Sem. Break/May/ Any Other)	Collaborating Agency	Mode of Evaluation
	Nature of the Course/Institution	Proposed Duration (No.of.Days/Weeks/Months)			
UCHM509	Organic Farming	2 days	August	MSME	To get Certificate

SKILL ORIENTATION PROGRAMME (MANDATORY/ONLY FOR INTERESTED STUDENTS)

Semester	Category	Course code	Course title	Collaborating Agency	Hours/Days/Month	Mode of Evaluation
V	Core	UCHT501	Industrial Lab safety	TCIL	4 days	To get Certificate

PHYSICAL CHEMISTRY-I
UCHM307

Semester: III **Credit : 4**
Category: Core VII/DSC-VII **Hours / Week: 4**
Class & Major: II B.Sc., Chemistry **Total hours : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	To study the behavior of molecules in gaseous states
CO-2	To understand the concepts of thermodynamics
CO-3	To understand the physical and chemical properties of systems.
CO-4	To understand the Carnot's Theorem
CO-5	To Understand the Maxwell Relationship

Unit-I GASEOUS STATE **11 Hour**

Types of Molecular Velocities and their Inter Relations-Mean, Rms, Most Probable Velocities - Calculation of Most Probable Velocity, Average Velocity and Root Mean Square Velocity Maxwell's Distribution of Molecular Velocities, Statement of Equation and Explanation (No Derivation)-Graphic Representation-Effect of Temperature on Velocity Distribution. Collision Diameter-Collision Number-Collision Frequency-Mean free Path Degrees of Freedom of Gaseous Molecules-Principle of Equipartition of Energy-Heat Capacity and Molecular Basis. Viscosity of Gases and Effect of Temperature and Pressure on Coefficient of Viscosity

Unit-II THERMODYNAMICS-I **11 Hour**

Introduction: Scope and Importance of Thermodynamics-Energy and its Units-Mechanical Work and Heat and their Relation-thermodynamic Systems and their Characteristics -State of a System-State Function and Path Function and their Characteristics Thermodynamic Functions-Exact and Inexact Differentials. First Law-Statement Mathematical Formulation -Change In Constant Pressure-Cp-Cv Relationship-Work Done in Isothermal, Reversible Expansion and Compression of an ideal Gas-Calculation of E, H and W for Adiabatic Reversible Expansion. Reversible Isothermal Expansion of a Rea Gas Calculation of E, Q, W And H for a Vander Waal's Gas-Joule thomson Effect $(\Delta E/\Delta V)T$ Value for Ideal Gas-Temperature, Calculation and Significance.

Unit-III THERMODYNAMICS-II **10 Hour**

Variation of Enthalpies with temperature-Kirchoff's equation-Hess's law of constant heat summation-statement and applications. Bond enthalpies-definition-calculation from the Thermo chemical data and applications. Zeroth law of thermodynamics and its significance. Second law of thermodynamics-object of the II law-different ways of stating II law and its significance. Conversion of heat into work-Carnot's theorem and cycle-Thermodynamic efficiency-thermodynamic scale of temperature.

Unit-IV THERMODYNAMICS-III **10 Hour**

Entropy-definition and significance the concept of entropy-entropy changes in isolated systems -entropy as a thermodynamic function dependence of entropy on variables of the system. Entropy changes in ideal gas, in mixing of gases, physical transformations and in chemical reactions. Entropy and probability Free energy functions: Helmholtz free energy (A)-definition and temperature dependence-Gibb's free energy with temperature and pressure-Gibb's-Helmholtz equation and its applications -Maxwell's relations.

Unit-V PARTIAL MOLAR QUANTITIES **10 Hour**

Chemical potential-relationship between partial molar quantities-Gibb's Duhem equation- chemical potential in case of a system of ideal gases-application of the concept of chemical potential-Clausius-Claypeyron equation-derivation and its applications. Nernst heat theorem and its application-Third law of thermodynamics-a simple treatment of the law. Temperature dependence of heat capacity and its use in the determination of absolute entropy. Exceptions to III law-residual entropy of CO, N_2O, H_2O, NO and H_2.

Text Books

- Puri, B.R. Sharma, L.R. and Pathania, M.S. (2019). "*Principles of Physical Chemistry",* Vishal Publishing Co. 48th ed.,
- Soni P.L. Dharmarha O.P. Dash U.N. (2011). "*Text Book of Physical Chemistry".* Sultan Chand and Sons.

Reference Books

- Atkins, P. de Paula, J and Keeler. J (2006) "*Atkins' Physical Chemistry"*, 8th ed.,
- Barrow G.M. (2006) Physical Chemistry, Tata McGraw Hill. 5th ed.,

E-Resources

- https://www.nios.ac.in/media/documents/313courseE/L6.pdf
- https://www.cpp.edu/~pbsiegel/supnotes/nts1323.pdf
- https://uou.ac.in/sites/default/files/slm/BSCPH-201.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define an expression for rate constant K for third order reaction	K1
CO-2	Solve the numerical problems based on Rate constant	K3
CO-3	Understand the term specific volume, molar volume and molar refraction	K2
CO-4	Know the meaning of phase, component and degree of freedom	K2
CO-5	Describe the expression Maxwell's relations	K1&K2

ELECTROCHEMISTRY
UCHM308

Semester : III **Credit : 2**
Category : Core VIII/ DSC-VIII **Hours/ week : 3**
Class & Major : II B.Sc. Chemistry **Total Hours : 39**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	To study the electrolytic conductance and transport number
CO-2	To understand the concepts of Debye-Huckel theory of strong electrolytes
CO-3	To understand the Electromotive force of Galvanic cells
CO-4	To understand the concept of electrolyte concentration cells
CO-5	To Understand the concept of transport numbers

UNIT-I ELECTROLYTIC CONDUCTANCE AND TRANSFERENCE-I 8 Hour

Electrolytic conductance-specific conductance-equivalent conductance-molar conductance-variation of molar conductance with dilution-ionic mobility-Hittorf's theoretical device, transport number-determination of transport number- Hittorf's method and moving boundary method.

UNIT-II ELECTROLYTIC CONDUCTANCE AND TRANSFERENCE-II 9 Hour

Kohlrausch's law-calculation of molar conductance-relation between molar ionic conductance and ionic mobility-determination of ionic mobility-applications of Kohlrausch's law-diffusion and ionic mobility-applications of conductance measurements-conductometric titrations-precipitation titrations-Ostwald's dilution law-Debye-Huckel theory of strong electrolytes-activity coefficients of electrolytes-ionic strength-Debye-Huckel theory of mean activity coefficients of strong electrolytes- Debye-Huckel limiting law.

UNIT-III ELECTROMOTIVE FORCE OF GALVANIC CELLS-I 8 Hour

Galvanic cells-reversible electrodes-single electrode potential-thermodynamics of reversible electrodes and cells-Nernst equation-standard electrode potential-the electrochemical series-electromotive force of galvanic cells-activity and mean ionic activity of electrolytes-concentration cells-electrode concentration cells-electrolyte concentration cells

UNIT-IV ELECTROMOTIVE FORCE OF GALVANIC CELLS-II 7 Hour

Types of Electrolyte Concentration cells-concentration cells without transference concentration cells with transference-liquid junction potential-fuel cells-applications of emf measurements-determination of activity coefficients of electrolytes

UNIT-V ELECTROMOTIVE FORCE OF GALVANIC CELLS-III 7 Hour

Determination of transport numbers-determination of valency of ions in doubtful cases- determination of solubility product constants- determination of pH-potentiometric titrations-acid-base titrations-redox titrations-precipitation titrations-oxidation-reduction indicators.

Text books

- Puri, B.R., Sharma L.R. and M. S. Pathania. (2019). "*Principles of Physical Chemistry"*, Jalandhar: Vishal Publishing Co. 48th ed.,
- Arun Bahl, B.S. Bahl and G.D. Tuli, (2014). "*Essentials of Physical Chemistry"*, S. Chand and company private limited. revised ed.,

Reference book

- Peter Atkins and Julio de Paula, (2016). "*Atkin's Physical Chemistry"*, New Delhi: Oxford University Press, 10^{th} ed.,
- Glasstone, S. (1974) "An Introduction to Electrochemistry" Affiliated East West Press Private, Limited, 4^{th} reprint.

E-Resourses

- http://www.freebookcentre.net/chemistry-books-download/Text-book-ofelectrochemistry-(PDF-364P).html
- https://ceramrtr.ceramika.agh.edu.pl/~szyszkin/eis/Modern%20Electrochemistry%20 Vol%202B%20Electrodics%20in%20Chemistry,%20Engineering.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Apply Nernst equation and the Tafel equation to different electrochemical systems	K3
CO-2	Define the term overpotential, explain its origin and the relationship between current and potential for some types of electrochemical cells	K1
CO-3	Examine the conductivity of an electrolyte depends on the electrolyte concentration	K4
CO-4	Evaluate some common electrochemical methods to electrochemical systems and explain which type of information that can be obtained with these techniques	K5
CO-5	Estimate an unknown solution concentration using potentiometric titrations	K6

SEMI MICRO QUALITATIVE INORGANIC ANALYSIS
UCHR404/UCHR405

Semester : III & IV **Credit : 4**
Category : Core Practical III/DSC Practical III **Hours/ week: 3+3**
Class & Major : II B.Sc., Chemistry **Total Hours : 78**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Define practical skills in semi micro qualitative inorganic analysis
CO-2	Identify the basic and acid radicals
CO-3	Develop analytical skills in qualitative inorganic analysis
CO-4	Demonstrate principle and working of various instruments
CO-5	To analysis on various methods of group identification

Unit– I Lab Safety rules, Principles and Analysis of simple acid radicals in Semi-micro Qualitative Analysis **15 Hour**

General Chemistry Laboratory safety rules-General Principles of Qualitative Analysis Analysis of simple acid radicals: a) Carbonate b) Sulphide c) Sulphate d) Chloride e) Bromide f) Iodide g) Nitrate Analysis of interfering acid radicals: a) Fluoride b) Oxalate c) Borate d) Phosphate e) Chromate f) Arsenite

Unit – II Semi–micro Qualitative Analysis – I **15 Hour**

Elimination of interfering acid radicals:

a) Fluoride b) Oxalate c) Borate d) Phosphate e) Chromate f) Arsenite. Identifying the groups of basic radicals-Group I : Ag^{+}, Hg^{2+} , Pb^{2+}

Unit – III Semi–micro Qualitative Analysis – II **16 Hour**

Identifying the groups of basic radicals-Group II :

IIA–Cu^{2+}, Cd^{2+}, Hg^{2+}, Pb^{2+}, Bi^{3+} . IIB–Sn^{2+}, Sn^{4+}, Sb^{3+}, Sb^{5+}, As^{3+}, As^{5+} Group III : Fe^{3+}, Al^{3+}, Cr^{3+}. Group IV: Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+} Group V: Ca^{2+}, Ba^{2+}, Sr^{2+} . Group VI: Mg^{2+}, NH_4^{+}.

Unit –IV Semi–micro Qualitative Analysis – III **16 Hour**

Analysis of basic radicals (group–wise): Lead, Copper, Bismuth, Cadmium, Antimony, Iron, Aluminium, Chromium, Zinc, Manganese, Nickel, Calcium, Strontium, Barium, Magnesium, Ammonium.

Unit –V Semi–micro Qualitative Analysis – IV **16 Hour**

Analysis of a mixtures containing two cations and two anions (of which one is interfering type) (max. 15 Mixtures).

Text Books

- V.V. Ramanujam, (1974) "*Inorganic Semi Micro Qualitative Analysis"*, The National Publishing Company, Chennai, 3rd ed.,
- V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu (2004) *"Basic Principles of Practical Chemistry",* Sultan Chand & Sons, New Delhi, 2nd ed.,

Reference books

- Svehla. G, Sivasankar. B, (2012) *"Vogel's Qualitative Inorganic Analysis",* Pearson Education, 7th ed.,
- A.O. Thomas, (2003) "*Practical Chemistry",* Scientific Book Centre, Cannanore.

E-Resources

- https://id.scribd.com/document/311336414/SEMI-MICRO-QUALITATIVEANALYSIS-OF-SIMPLE-INORGANIC-SALT-docx
- http://www.rbmcollege.ac.in/sites/default/files/files/reading%20material/inorganicqualitative-analysis.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the organic and inorganic salts	K1&K2
CO-2	Understand the basic concepts behind in the chemical compounds	K1&K2
CO-3	Apply and analyze the sample using various techniques	K3
CO-4	Select the exact method for particular compounds	K5
CO-5	Design new methods to analyze the chemical compounds	K6

MOLECULAR SPECTROSCOPY & PHOTOCHEMISTRY
UCHM407

Semester : IV **Credit : 4**
Category : Core IX/DSC-IX **Hours/ week : 4**
Class & Major : II B.Sc Chemistry **Total Hours : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	To recall the fundamental concept of Rotational, Vibrational and Raman spectroscopy
CO-2	To understand the fundamental concept of NMR and ESR spectroscopy
CO-3	To know the photochemical processes
CO-4	To comprehend the Franck-Condon principle
CO-5	To cognize the PMR spectra of organic molecules

UNIT-I ROTATIONAL AND VIBRATIONAL SPECTROSCOPY 11 Hour

Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration, concept of group frequencies. Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.

UNIT-II RAMAN SPECTROSCOPY 10 Hour

Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion.

UNIT-III ELECTRONIC SPECTROSCOPY 10 Hour

Electronic spectroscopy: Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation, calculation of electronic transitions of polyenes using free electron model.

UNIT-IV NMR AND ESR SPECTROSCOPY 11 Hour

Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of NMR spectroscopy, Larmor precession, chemical shift and low resolution spectra, different scales, spin-spin coupling and high resolution spectra, interpretation of PMR spectra of organic molecules.

Electron Spin Resonance (ESR) spectroscopy: Its principle, hyperfine structure, ESR of simple radicals.

UNIT-V PHOTO CHEMISTRY 10 Hour

Difference between thermal and photochemical processes. Laws of photochemistry Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield photochemical reaction mechanism- hydrogen- chlorine, hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, and Photosensitized reactions- energy transfer processes (simple example).

Text books

- Banwell, C. N. & McCash, E. M. (2006) "*Fundamentals of Molecular Spectroscopy"*, Tata McGraw-Hill, New Delhi, 4th ed.,
- Puri B.R, Sharma L.R & Pathania M.S, (2016) "*Principles of Physical Chemistry",* Vishal publishing & Co, 47th Ed.,

Reference books

- Gordon M. Barrow, (1962) "*Introduction to Molecular Spectroscopy"*, McGraw-Hill
- Inc.
- Nicholas J. Turro, (1991) "*Modern Molecular Photochemistry",* University Science Books.
- K. K. Rohatgi-Mukherjee, (1978) "*Fundamentals of Photochemistry"*, New Age
- International.

E-Resources

- http://cires1.colorado.edu/jimenez/AtmChem/CHEM-5151_S05_L5.pdf
- https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Principles_of_ Modern_Chemistry_(Oxtoby_et_al.)/Unit_5%3A_Rates_of_Chemical_and_Physical_Process es/20%3A_Molecular_Spectroscopy_and_Photochemistry

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Recognize characteristics of organic molecules	K1&K2
CO-2	Understand the structures of newly synthesized compounds	K1&K2
CO-3	Apply their knowledge to characterize the chemical compounds	K3
CO-4	Analyze the coupling reaction between hydrogen	K4
CO-5	Evaluate and apply knowledge of modern techniques for organic samples.	K5

RESEARCH METHODOLOGY

UCHM408

Semester : IV **Credit : 2**
Category : Core X/DSC-X **Hours/ week : 3**
Class & Major : II B.Sc Chemistry **Total Hours : 39**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	To impart knowledge about the basic concepts of research
CO-2	To provide a road map for conducting research
CO-3	Students are expected to identify, explain and apply basic concepts of research
CO-4	Acquire information, recognize various issues related to research and to learn instrumental methods required for research in chemistry
CO-5	Have some idea about writing literature survey report, review and scientific article

UNIT - I LITERATURE SURVEY **7 Hour**

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 RESOURCES AND WRITING SCIENTIFIC PAPERS **8 Hour**

Information Technology and Library Resources: The Internet and World Wide Web. Internet resources for chemistry. Finding and citing published information. Methods of Scientific Research and Writing Scientific Papers: Reporting practical and project work. Writing literature surveys and reviews. Organizing a poster display.

UNIT - III EXPERIMENTATION **8 Hour**

Experimentation - Design of an experiment, data collection – types of data - interpretation and deduction –repeatability and replication- Accuracy and precision, Revision or modification of scientific theories and laws

UNIT-IV EDUCATIONAL SOFTWARES **9 Hour**

INFLIBNET, NICNET, BRNET, NPTEL, VIRTUAL LABS OF MHRD academic services Chemistry related softwares- Chem sketch and Chem Draw for structure drawing, Chemical Databases-Pubchem, ZINC, Cambridge Structural Database (CSD), Molecular visualization tools –Avogadro, Molden, Molekel, File format-PDB and CIF, Graphical tools- Excel and Origin (elementary idea only with computer assistance).

UNIT – V PROPOSAL WRITING AND PLAGIARISM **7 Hour**

Patent and project proposal – writing – knowledge of various funding agencies. Plagiarism – definition, classification and their limitations

Text Books

- Kothari, C. K.; Garg, G. Research Methodology-Methods and Techniques, 3rd Ed., New Age International, New Delhi (2014).
- Kumar, R. Research Methodology–A Step-By-Step Guide for Beginners; 2nd Ed., Pearson Education: New Delhi (2005).

Reference Books

- Montgomery, D. C. Design & Analysis of Experiments; 8th Ed., Wiley India: Noida (2013). 4.
- Dean, J. R.; Jones, A. M.; Holmes, D.; Reed, R.; Weyers, J.; Jones, A. Practical Skills in Chemistry, 2nd Ed. Prentice-Hall, Harlow (2011).
- Hibbert, D. B.; Gooding, J. J., Data Analysis for Chemistry. Oxford University Press (2006).

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Demonstrate the ability to choose methods appropriate to research aims and objectives	K1
CO-2	Understand the limitations of particular research methods	K2
CO-3	Develop skills in qualitative and quantitative data analysis and presentation	K3
CO-4	Develop advanced critical thinking skills	K6
CO-5	Demonstrate enhanced writing skills	K2

SEMI MICRO QUALITATIVE INORGANIC ANALYSIS
UCHR404/UCHR405

Semester **: III & IV** **Credit : 4**
Category **: Core Practical III/DSC Practical III** **Hours/ week: 3+3**
Class & Major **: II B.Sc., Chemistry** **Total Hours : 78**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Define practical skills in semi micro qualitative inorganic analysis
CO-2	Identify the basic and acid radicals
CO-3	Develop analytical skills in qualitative inorganic analysis
CO-4	Demonstrate principle and working of various instruments
CO-5	To analysis on various methods of group identification

Unit– I Lab Safety rules, Principles and Analysis of simple acid radicals in Semi-micro Qualitative Analysis **15 Hour**

General Chemistry Laboratory safety rules-General Principles of Qualitative Analysis Analysis of simple acid radicals: a) Carbonate b) Sulphide c) Sulphate d) Chloride e) Bromide f) Iodide g) Nitrate Analysis of interfering acid radicals: a) Fluoride b) Oxalate c) Borate d) Phosphate e) Chromate f) Arsenite

Unit – II Semi–micro Qualitative Analysis – I **15 Hour**

Elimination of interfering acid radicals:

a) Fluoride b) Oxalate c) Borate d) Phosphate e) Chromate f) Arsenite. Identifying the groups of basic radicals-Group I : Ag^{+}, Hg^{2+} , Pb^{2+}

Unit – III Semi–micro Qualitative Analysis – II **16 Hour**

Identifying the groups of basic radicals-Group II:

IIA–Cu^{2+}, Cd^{2+}, Hg^{2+}, Pb^{2+}, Bi^{3+} . IIB–Sn^{2+}, Sn^{4+}, Sb^{3+}, Sb^{5+}, As^{3+}, As^{5+} Group III : Fe^{3+}, Al^{3+}, Cr^{3+}. Group IV: Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+} Group V: Ca^{2+}, Ba^{2+}, Sr^{2+} . Group VI: Mg^{2+}, NH_4^{+}.

Unit –IV Semi–micro Qualitative Analysis – III **16 Hour**

Analysis of basic radicals (group–wise): Lead, Copper, Bismuth, Cadmium, Antimony, Iron, Aluminium, Chromium, Zinc, Manganese, Nickel, Calcium, Strontium, Barium, Magnesium, Ammonium.

Unit –V Semi–micro Qualitative Analysis – IV **16 Hour**

Analysis of a mixtures containing two cations and two anions (of which one is interfering type) (max. 15 Mixtures).

Text Books

- V.V. Ramanujam, (1974) "*Inorganic Semi Micro Qualitative Analysis"*, The National Publishing Company, Chennai, 3rd ed.,
- V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu (2004) *"Basic Principles of Practical Chemistry",* Sultan Chand & Sons, New Delhi, 2nd ed.,

Reference books

- Svehla. G, Sivasankar. B, (2012) *"Vogel's Qualitative Inorganic Analysis",* Pearson Education, 7th ed.,
- A.O. Thomas, (2003) "*Practical Chemistry",* Scientific Book Centre, Cannanore.

E-Resources

- https://id.scribd.com/document/311336414/SEMI-MICRO-QUALITATIVEANALYSIS-OF-SIMPLE-INORGANIC-SALT-docx
- http://www.rbmcollege.ac.in/sites/default/files/files/reading%20material/inorganicqualitative-analysis.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the organic and inorganic salts	K1&K2
CO-2	Understand the basic concepts behind in the chemical compounds	K1&K2
CO-3	Apply and analyze the sample using various techniques	K3
CO-4	Select the exact method for particular compounds	K5
CO-5	Design new methods to analyze the chemical compounds	K6

UG Evaluation Component – III and IV

Semester	Course Code	Course Title	Component-III	Component-IV
III	UCHM307	Physical Chemistry - I	Assignment	Seminar
	UCHM308	Electrochemistry	Assignment	Seminar
IV	UCHM407	Molecular Spectroscopy & Photochemistry	Assignment	Seminar
	UCHM408	Research Methodology	Assignment	Seminar
	UCHR404/ UCHR405	Semi micro Qualitative Inorganic Analysis	Practice of analyzing cations and anions	Practice of analyzing mixtures containing two cations and two anions

PROGRAMME PROFILE M.Sc., Chemistry

Programme Specific Outcome (PSO)

Upon completion of the programme, the students will be able to

- Development of the Skills in Handling Various Chemicals, Apparatus and Instruments.
- Application of the Principles of Thermodynamics and Chemical Kinetics in Chemical Reactions
- Acquiring the Knowledge on Heterocyclic Compounds and Natural Products
- Ability to Apply the Basic Principles of Various Spectroscopic, Electro and Thermo Analytical Methods to Characterize the Compounds

Semester	Category	Course Code	Course Title	Contact	Credits	
				Hrs/Week	Min	Max
I	Core-I/DSC-I	PCHM113	Organic Chemistry-I	5	4	4
	Core-II/DSC-II	PCHM114	Inorganic Chemistry-I	5	4	4
	Core-III/ DSC-III	PCHM115	Physical Chemistry-I	5	4	4
	Core-IV/DSC-IV	PCHM116	Analytical Chemistry	5	4	4
	Core Practical-I/ DSC Practical-I	PCHR203	Organic Practical	5	-	-
	Core Practical-1I/ DSC Practical-II	PCHR204	Inorganic Practical	5	-	-
			Total	**30**	**16**	**16**
II	Core-V/DSC-V	PCHM207	Organic Chemistry-II	5	4	4
	Core-VI/DSC-VI	PCHM208	Inorganic Chemistry-II	5	4	4
	Core-VII/DSC-VII	PCHM209	Physical Chemistry-II	5	4	4
	Core Practical-I/ DSC Practical-I	PCHR203	Organic Practical	5	5	5
	Core Practical-II/ DSC Practical-II	PCHR204	Inorganic Practical	5	5	5
	NME			5	4	4
	Service Learning	PCHX201	Vermicomposting	-	1	1

	Internship	**UPSI201**	**Internship/Field work/Field Project**	-	-	**-/1 (Extra Credit)**
			Total	**30**	**27**	**28**
III	Core-VIII/DSC-VIII	PCHM309	Organic Chemistry-III	5	4	4
	Core-IX/DSC-IX	PCHM310	Inorganic Chemistry-III	4	4	4
	Core –X/DSC-X	PCHM311	Physical Chemistry-III	4	4	4
	AECC		Research Methodology	5	4	4
	Core-XI/GE	PCHI301	Sustainable Materials and Technologies	5	4	4
	Core Practical –III/ DSC Practical-III	PCHR401	Physical Chemistry Practical	5	-	-
	Core XVII/ DSCXVII	PCHP401	Project	2	-	-
			Total	**30**	**20**	**20**
IV	Core-XIII/DSC-XIII	PCHM412	Organic Chemistry-IV	6	4	4
	Core-XIV/DSC-	PCHM413	Inorganic Chemistry-IV	5	4	4
	XIV					
	Core-XV/DSC-XV	PCHM414	Physical Chemistry-IV	5	4	4
	Core-XVI/DSC-VI	PCHM411	Natural Products	5	4	4
	Core Practical –III/ DSC Practical	PCHR401	Physical Chemistry Practical	5	5	5
	Core XVII/ DSCXVII	PCHP401	Project	4	6	6
	Internship	UPSI201	Internship/Field work/Field Project	-		-/1 (Extra Credit)
			Total	**30**	**27**	**28**
			Grand Total	**120**	**90**	**92**

EXTRA CREDIT EARNING PROVISION

Semester	**Category**	**Course Code**	**Course Title**	**Pervious Course Code**	**Hrs per Week**	**Credits**
						Min/Max
II	-	-	Online Course	-	-	1

ORGANIC CHEMISTRY- III
PCHM309

Semester : III **Credits : 4**
Category : Core-VIII/DSC-VIII **Hours/Week : 5**
Class&Major : II-M.Sc., Chemistry **Total Hours : 65**

COURSE OBJECTIVES:

CO No.	**To enable the students**
CO-1	Understand the preparation and properties of heterocyclic compound
CO-2	Discuss fundamentals of concept of UV and IR spectroscopy
CO-3	Apply the gained knowledge from Mass spectroscopy to identify the structure
CO-4	Understand the NMR spectroscopy for ^{1}H and ^{13}C
CO-5	Describe organic structure by various spectroscopy method

UNIT-I HETEROCYCLIC COMPOUNDS **13 Hour**

Nomenclature of heterocyclic compounds. Preparation, Properties and uses - Pyrazole, Oxazole, Pyridazine, Pyrimidine, Pyrazines and Thiozole. **Alkaloids:** Classification and isolation of alkaloids-General methods of Structural elucidation. Structural elucidation of Papaverine, Cocaine, Morphine.

UNIT-II UV-Vis AND IR SPECTROSCOPY **14 Hour**

UV-Visible spectroscopy: Frank-condon principle, Types of electronic transitions, Chromophores & Auxochromes, absorption and intensity shifts, Factors influencing positions & intensity of absorption bands, Absorption spectra of dienes, polyenes & unsaturated carbonyl compounds, Woodward- Fieser rules for conjugated dienes and carbonyl compounds.

IR SPECTROSCOPY: Principle, vibrational frequencies & factors affecting them, IR absorption frequencies of functional groups, identification of functional groups, Finger Print Region, Significance of Far IR region.

UNIT-III MASS SPECTROMETRY **12 Hour**

Principle - EI, CI& FAB-Base peak, isotopic peaks, metastable peak, parent peak, Fragmentation–Nitrogen, even electron rule and pattern, McLafferty rearrangement, Retro -Diel's Alder reaction fragmentation pattern of hydrocarbons, alcohols, aldehydes and ketones, Quantitative and qualitative analysis with GC-MS.

UNIT-IV1D NMR SPECTROSCOPY **14 Hour**

Basic principles of NMR experiments-CW & FT NMR-^{1}H NMR-Chemical Shift & Coupling constant-Factors influencing Proton Chemical Shift & Proton-Proton Coupling constant, AX & AB spin system-Spin decoupling-Nuclear Over hauser effect-Chemical exchange.^{13}C NMR chemical shift& factor affecting ^{13}C Chemical shift.

UNIT-VIDENTIFICATION OF ORGANIC COMPOUNDS **12 Hour**

Applications of organic spectroscopy: Structure determination of organic compounds by using UV-Vis, IR, ^{1}H &^{13}C-NMR and Mass spectroscopic techniques (simple molecules only-restricted to 12 carbon systems with/without one hetero atom).

Text Books

- Finar.I.L, (2006)"*Organic Chemistry, Vol-I&II"*, ELBS Publication, 5th ed.,
- Sharma. Y.R, (2013) "*Elementary Organic Spectroscopy"*, S. Chand Publication, 5th ed.,

Reference Books

- Dyer. J, (1980) "*Applications of Organic Spectroscopy"*, Prentice &Hall of India Pvt Ltd., New Delhi.
- Mukerjee. S.M & Singh. S.P, (1990) "*Organic Reaction Mechanism"*, McMillan India Ltd., Chennai.
- Gurdeep R. Chatwal, (2009) *"Organic chemistry of Natural products"*, Volume I & II Himalaya Publishing House, New Delhi.
- Kemp. W, (2001) *Organic Spectroscopy*, Mcmillan Ltd.
- Silverstein. R.M, Bassler, G.D. & Monsu, (2004) *"Spectrometric Identification of Organic Compounds",* John Wiley & Sons, New York.
- Jag mohan, (2007) "*Organic Spectroscopy: Principles and Applications",* Alpha Science International Ltd., Harrow, U.K. 2nd ed.,
- V.K. Ahluwalia, Rakesh K. Parashar, (2015) "*Organic Reaction Mechanisms",*Narosa Publishing House Pvt. Ltd. 8th Reprint.

E-Resources

- https://www.k-state.edu/bmb/labs/jc/teaching/bioch590/bioch590-6-NMR.pdf https://www.weizmann.ac.il/plants/aharoni/sites/plants.aharoni/files/uploads/june 192007.pdf
- http://chemistry.syr.edu/totah/che575/support/3a1/3-1.MS.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Explain the nomenclature of heterocyclic compound	K1 &K2
CO-2	Predict and characteristics of functional groups using UV and IR spectroscopy.	K2
CO-3	Apply the Mass spectroscopy to identify the structure from Fragmentation pattern, effect of isotopes.	K3
CO-4	Differentiate nuclear magnetic resonance spectroscopy of ^{1}H and ^{13}C	K4
CO-5	Determine the given molecular structure using NMR, IR, UV-Vis and MS spectra from a	K5

INORGANIC CHEMISTRY- III
PCHM310

Semester : III **Credit : 4**
Category : Core-IX/DSC-IX **Hours/week : 4**
Class & Major : II-M.Sc., Chemistry **Total hours : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the properties & applications of f-block elements
CO-2	Know about the application of Nuclear Chemistry in various fields
CO-3	Get the knowledge of various Inorganic reactions.
CO-4	To impart knowledge of chemistry of organometallic compounds
CO-5	To know about various catalyst application

UNIT-I CHEMISTRY OF LANTHANIDES AND ACTINIDES 11 Hour

Lanthanides and actinides-Occurrence, isolation, Position in the periodic table, lanthanide contraction, oxidation state, color, spectral, magnetic characteristics, coordination numbers, and stereochemistry, nuclear and non-nuclear applications. Separation of lanthanides by (i) Ion exchange method and (ii) Solvent extraction method (Principles and technique).

UNIT-II NUCLEAR CHEMISTRY-I 11 Hour

Subatomic particle, isotope, isotone, isobar, nuclear forces, Meason theory of nuclear forces, stability of the nucleons-N/P ratio and stability belt, liquid drop model, shell and combined model of the nucleus. Mass defects and Binding energy. Natural and artificial radioactivity. Radioactivity disintegration, Group displacement law, radioactive series, Trans uranium element.

UNIT-III NUCLEAR CHEMISTRY-II 10 Hour

Nuclear transmutation, classification of nuclear reactions- elastic, inelastic, spallation, capture, fission and fusion reaction, Q-value of nuclear fission, mechanism and fission bomb. Nuclear fusion-Mechanism, stellar energy and Hydrogen bomb. Modes of

radioactive decay detection and determination of activity by Cloud Chamber and Geiger Muller Counter. Nuclear reactors-Fast Breeder reactors, particle accelerators, Cyclotron and Synchrotron.

UNIT-IV ORGANO METALLIC CHEMISTRY-I **10 Hour**

Carbon donors: Alkyls and aryls metallation, Chain and cyclic donors, olefines, acetylene, and allyl system.

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

UNIT-V ORGANO METALLIC CHEMISTRY-II **10 Hour**

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).

Text books:

- Arniker .H.J, (2000) *"Nuclear chemistry"*, Wiley Eastern Co, 2nd ed.,
- Wahid U.Malik, G.D.Tuli&R.D.Madan, (2010) *"Selected Topics in Inorganic Chemistry"*, S.Chand& Company Ltd., New Delhi.

Reference books:

- Maheshwar Sharma & Madhuri Sharma, (2009) *"Nuclear chemistry"*, Ane Books Pvt. Ltd
- Singh. G, (2008) *"Chemistry of Lanthanides and Actinides"*, Discovery publishing.
- Huheey, J.E. Keiter, E.A. and Keiter, R.L.(2006) "*Inorganic Chemistry"*, Harper and Row, New York, 4t ed.,

E-Resources

- https://www.alchemyst.co.uk/pdf/Inorganic/lanthanides_and_actinides.pdf
- http://chemistry.bd.psu.edu/jircitano/Wilkinsons13.pdf
- https://nptel.ac.in/courses/104101006/downloads/lecture-notes/mod3/lec4.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Remember the lanthanide and actinide series.	K1
CO-2	Explain the characteristics of radioactive decays, knows the basics of measurement of radioactivity and has the knowledge of the main applications of nuclear chemistry	K2
CO-3	Prepare various types of nuclear changes or processes including fission, fusion and decay reactions.	K3
CO-4	Describe and explain catalytic processes using an organometallic compound as a catalyst	K4
CO-5	Determine organometallic compounds are used as catalysts in organic synthesis	K5

PHYSICAL CHEMISTRY-III
PCHM311

Semester	**: III**	**Credit : 4**
Category	**: Core –X/DSC-X**	**Hours/Week : 4**
Class & Major	**: II M.Sc., Chemistry**	**Total Hours : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Apply the fundamental knowledge in the colloidal system
CO-2	Analysis of adsorption isotherm
CO-3	Know about the function of the catalysts and its surface action and apply it for research work
CO-4	To get the knowledge kinetic reaction in solution and fast reaction type
CO-5	Understand the chemistry of corrosion

UNIT-I COLLOIDAL STATE **11 Hour**

Colloidal system-classification, Preparation of lyophobic colloidal solutions Dispersion methods and Condensation methods-Purification of colloidal solutions-general properties of colloidal systems. Properties of hydrophobic colloidal systems-Electrical properties and electro kinetics properties. Determination of size of colloidal particles.

UNIT-II SURFACE CHEMISTRY **11 Hour**

Kinetics of surface reactions: Physical and chemical adsorption-adsorption isotherms types of adsorption isotherms - Langmuir adsorption isotherm. B.E.T theory for multilayer adsorption, measurement of surface area-Mechanism of heterogeneous catalytic unimolecular and bimolecular reactions.

UNIT-III CATALYSIS **10 Hour**

Acid Base catalysis-mechanism of Langmuir-Hinshelwood and Eley Rideal–Bronsted catalytic law - Catalysis by enzymes-effects of substrate concentration, pH and temperature on enzyme catalyzed reactions-reversible and irreversible enzyme inhibition mechanism.

UNIT-IV KINETICS OF REACTIONS IN SOLUTION AND FAST REACTION **10 Hour**

Kinetics of reaction in solution-Diffusion controlled reactions in solutions-influence of ionic strength on rates of reactions-primary and secondary salt effect, dielectric constant.

Kinetics of fast reaction-relaxation method-temperature and pressure jump methods flash photolysis

UNIT-V CORROSION **10 Hour**

Corrosion-definition-costs of corrosion-economic losses-human life and safety-types of corrosion-dry corrosion-wet corrosion-mechanisms-galvanic corrosion-concentration cell corrosion-atmospheric corrosion-soil corrosion-pitting corrosion-inter-granular corrosion water line corrosion-stress corrosion-microbial corrosion. Corrosion and passivation of metals-Pourbiax and Evan's diagrams. Corrosion control methods. Inhibitor-types and theory.

Text books

- Crow, D. R. (2014) "*Principles and applications of electrochemistry"*, Chapman & Hall/CRC, 4th ed.,
- Atkins .P and de Paula. J, (2006) *"Atkins' Physical Chemistry"*, Oxford University Press, Oxford. 8th ed.,

Reference Books

- Somorjai, G.A, Yimin Li, (2010)*"Introduction to Surface chemistry and Catalysis*", John Wiley & Sons, 2nd ed.,
- Puri, Sharma and Pathania, (2013) "*Principle of Physical chemistry"*, Vishal Publication, 46th ed.,
- Laidler, K.J. "*Chemical Kinetics"*, (2008)Pearson Education India, 3rd ed.,

E-Resources

- https://nptel.ac.in/courses/113108051/module1/lecture1.pdf
- http://www.uobabylon.edu.iq/eprints/publication_12_18276_228.pdf
- https://chem.libretexts.org/Courses/University_of_California_Davis/UCD_Chem_107B%3A_Physical_Chemistry_for_Life_Scientists/Chapters/2%3A_Chemical_Kineti cs/2.10%3A_Fast_Reactions_in_Solution

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Recognize concentration and mechanism of catalysis	K1
CO-2	Describe and understand the Colloidal system	K1& K2
CO-3	Apply the knowledge to adsorption isotherm	K3
CO-4	Differentiate the Kinetics of reaction in solution and fast reaction	K4
CO-5	Criticize and Understand and analyze the application corrosion.	K5 & K2

SUSTAINABLE MATERIALS AND TECHNOLOGIES
PPHI301/PCHI301

Semester : III **Credit : 4**
Category : Core XI **Hours/week : 5**
Class & Major: II - M.Sc Chemistry & Physics **Total Hours : 65**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the concept of sustainable materials
CO-2	Learn about green chemistry strategies for designing the chemical synthesis
CO-3	Explore the theoretical understanding of various physical and chemical properties of nanomaterials
CO-4	Acquire the knowledge of various techniques to nanomaterials
CO-5	Get knowledge nanomaterials properties and their application

UNIT– I INTRODUCTION TO MATERIALS **13 Hour**

Concept of Sustainable materials, Classification of materials: Crystalline & amorphous materials, high Tc superconductors, alloys & composites, semiconductors,

solar energy materials, luminescent and optoelectronic materials, Polymer, Liquid crystals and quasi crystals, Ceramics.

UNIT– II GREEN CHEMISTRY **14 Hour**

Introduction: Prospects and future of Green Chemistry - Twelve guiding principles of green chemistry - Concept of atom economy - Green starting materials, Green reagents, Green solvents and reaction conditions, Green synthesis - Real world cases (Traditional Vs. Green processes) Synthesis of Ibuprofen, Adipic acid - Biomimetic, multifunctional reagents; Combinatorial green chemistry; Non-covalent derivatization.

UNIT– III GREEN TECHNOLOGIES **13 Hour**

Green Solvents: Enhancement of selectivity, efficiency, and industrial applicability - Ionic liquids-Supercritical fluids - Solvent free neat reactions in liquid phase - Flourous phase reactions Green Catalysis: Heterogeneous catalysis: Use of zeolites, silica, alumina, clay, polymers, cyclodextrins, and biocatalysts.

UNIT - IV CHARACTERIZATION TECHNIQUES RELATED TO NANOMATERIALS **13 Hour**

Electron Microscopy techniques: Scanning Electron Microscope, Transmission Electron Microscope, Field emission scanning electron microscopy, Atomic Force Microscopy, X-ray photoelectron spectroscopy, (XPS), Energy Dispersive X-Ray Analysis (EDX).

UNIT– V APPLICATION OF NANOMATERIALS **12 Hour**

Overview of nanomaterials properties and their applications, Molecular Electronics and Nanoelectronics – Nanobots- Biological Applications – Quantum Devices – Nanomechanics – Photovoltaic cells- Nano structures as single electron transistor.

Reference Books

- K. Barriham, D.D. Vvedensky, *Low Dimensional Semiconductor Structures: Fundamental and Device Applications*, Cambridge University Press, 2001.
- V.K. Ahluwalia, *Methods and Reagents of Green Chemistry: An Introduction by Green Chemistry*, Ane Books India, 2006.
- Bontempi, Elza, *Raw Materials Substitution Sustainability*, Springer International Publishing, 2017.
- G. Cao, *Nanostructures & Nanomaterials: Synthesis, Properties & Applications*, Imperial College Press, 2004.

Text Books

- J.George, Marcel Dekker, *Preparation of Thin Films*, Inc., New York. 2005.
- Rashmi Sanghi & M. M. Srivastava, *Green Chemistry – Environment Friendly Alternatives*, Narora Publishing House, 2003.
- Elson Longo, Felipe de Almeida La Porta, *Recent Advances in Complex Functional Materials*, Springer, 2017.

e-Books

- https://asdlib.org/onlineArticles/ecourseware/Bullen/SPMModule_BasicTheoryAFM.pdf
- http://etsf.ehu.es/files/nanorobots_work.pdf
- http://www.me.nchu.edu.tw/lab/CIM/www/courses/Manufacturing%20Processes/Ch07- Ceramics-Wiley.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Remember the sustainable materials	K1
CO-2	Explain processes and products that are safe and hazard free	K2
CO-3	Apply knowledge of green chemistry in alignment with sustainability principles realizing benefits for society.	K3
CO-4	Analyse mechanistic problems and develop new functional materials.	K4
CO-5	Select new materials for various applications	K5

PHYSICAL CHEMISTRY PRACTICAL
PCHR401

Semester : III & IV **Credit : 5**
Category :Core Practical -III **Hours/Week: 5+5**
Class & Major : II M.Sc Chemistry **Total Hours : 130**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	To understand the phase rule of binary system
CO-2	To know the kinetics of acid hydrolysis of ester
CO-3	To understand the concept of partition co-efficient
CO-4	To understand the basic concepts of conductometric and potentiometric titrations
CO-5	To understand the concepts polarimeter

Phase rule

- Binary system of Naphthalene & Biphenyl
- Binary system of Naphthalene & M-dinitrobenzene
- Three component System(CH_3COOH, H_2O & $CHCl_3$)

Kinetics

- Hydrlolysis of Ester
- KI Vs $K_2S_2O_8$
- I_2 Vs CH_3COCH_3 (By Calorimetric method)
- Comparision of Strength of two Acids.

Partition Co-efficient

- Instability constant ($KI_3 = KI + I_2$) - Strength of KI

Potentiometry

- Mixture of acids Vs Strong base
- FAS Vs $K_2Cr_2O_7$
- Determination of dissociation constant of week acid
- Sparingly soluble salts $BaSO_4$ (concentration cell)

Conductometric

- Mixture of acids Vs NaOH
- Verification of Onsager's theory
- Degree of dissociation & dissociation constant of a week electrolyte Determination of solubility of a sparingly soluble salts

Polarimeter

- Inversion of Sucrose

Text book

- Alexander Findlay and Kitcher. J.A, "Practical physical chemistry", Longmans, Green, 2010.

Reference book

- Shoemaker .D.P and Garland .C.W, "Experiment physical chemistry", 8th ed., Mc Graw- Hill, New York, 2009.

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define the practical knowledge about the chemical kinetics	K1
CO-2	Understand the conductivity experiments	K2
CO-3	Apply potentiometric titrations in identification of acids	K3
CO-4	Analyze the experimental data	K4
CO-5	Develop the partition co-efficient of new compounds in a mixture of two immiscible solvents	K6

ORGANIC CHEMISTRY- IV
PCHM412

Semester : IV **Credits : 4**
Category : Core-XIII/DSC-XIII **Hours/Week : 6**
Class & Major : II-M. Sc., Chemistry **Total Hours : 78**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	To introduce the students regarding the fundamentals of photochemistry and various photochemical reactions in detail.
CO-2	To classify pericyclic reactions into cyclo-addition reactions, electrocyclic reactions and sigmatropic rearrangements
CO-3	The students will be able to familiar with various types of rearrangement reactions.
CO-4	The use of important reagents in organic synthesis
CO-5	The concept of retrosynthesis and the terms involved

UNIT - I PHOTOCHEMISTRY **18 Hour**

Absorption of Electromagnetic Radiation-Excited state, Types - Quantum yield - jablonski diagram : Phosphorescence & Fluorescence - Energy transfer and Photo sensitization- Inter system crossing - photochemical reactions - photoreduction, photo enolisation, cis - trans isomerisation, photo oxidation, photo addition, photoreactions of ketones - Norrish type I & II reactions and Di-Pi methane rearrangement.

UNIT - II PERICYCLIC CHEMISTRY **15 Hour**

Introduction of pericyclic reactions - Conservation of molecular orbital Symmetry - Methods to explain Pericyclic reactions - Electrocyclic reactions (FMO Approach) - Cycloaddition - Cheleotropic reactions - Sigmatropic Rearrangement - Correlation Diagram method

UNIT - III MOLECULAR REARRANGEMENT **15 Hour**

Introductory concept of rearrangements, migrating aptitude, memory effect. Pinacol - Pinacolone, Wager- Meerwein, , Favorski, Baeyer - Villiger, Wolf, Stevens (in cyclic systems) Von Richter rearrangements, Hoffman, Curtius, Lossen, Schmidt, Beckman, Benzil Benzilic, Benzidine , Fries and cope rearrangement.

UNIT - IV MORDERN REAGENTS FOR ORGANIC SYNTHESIS **12 Hour**

CrO_3, peracids, Osmiumtetroxide, DDQ, Seleniumdioxide, DCC, DMSO, aluminium triisopropoxide, Diazomethane, LAH, $NaBH_4$, organoboranes, NBS, LTA, Wittig reagent. Pd compounds- heck & Suzuki coupling.

UNIT - V RETROSYNTHESIS **18 Hour**

An introduction to retero synthesis - Synthon, Synthetic equivalent, Umpolung-Target molecule, Functional group interconversion, Disconnection approach - One group disconnection - Disconnection of alcohols, olefins and ketones - Logical and illogical disconnection, Two group disconnection- 1,2 - 1,3 - 1,4 - 1,5 and - Deoxygenated skeletons and dicarbonyls. Retero Diels Alder reaction, Reterosynthesis.

Text books

- Jonathan clayden, Nick Greeves and Warrner Stuart, Organic Chemistry, Oxford University Press, Oxford, UK, 2012.
- Jerry March, *Advanced Organic Chemistry*, 6th edition, John Wiley & Sons. NewYork, 2007.
- Ahluwalia .V.K, *Organic Reaction Mechanism*, 4th edition, Narosa Publishers, 2011.

Reference books

- Coyle .J.D, *Organic Photo Chemistry*-Wiley,2004
- Aggarwal. O.P, "Reaction *and Reagents in organic chemistry*", 4th edition, Goyle publications, 2004.
- Gaikwad .N.J, Chaudari R.Y, Patil V.R., *Retrosynthetic analysis and synthesis of drugs*, Nirali prakashan Publication, 2006.

e-Books

- https://www.massey.ac.nz/~gjrowlan/chem312/lct1.pdf
- http://diposit.ub.edu/dspace/bitstream/2445/61063/25/5.%20Organic%20Synthesis.%20Int roduction%20to%20Retrosynthetic%20Analysis.pdf
- https://www.massey.ac.nz/~gjrowlan/chem312/tutorial.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Remember the photochemical transformations in photochemistry	K1
CO-2	explain type of pericyclic mechanism is operative in a reaction	K2
CO-3	Carry out various types of rearrangement reactions and their mechanism.	K3
CO-4	explain role of reagents in organic synthesis	K4
CO-5	Evaluate and Create synthetic routes to complex organic molecules through cycloaddition reactions	K5&K6

INORGANIC CHEMISTRY-IV

PCHM413

Semester	**: IV**	**Credit**	**: 4**
Category	**: Core-XIV/DSC-XIV**	**Hours/week**	**: 5**
Class & Major	**: II-M.Sc., Chemistry**	**Total hours**	**: 65**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	To understand the basic concept of Inorganic Chains, Rings, Cages And Clusters
CO-2	To obtain theoretical understanding of how inorganic reactions take place
CO-3	To know the fundamental principles of synthesis of alkene complexes by ligand and C-H activation of alkenes – alkyne
CO-4	To able to use knowledge about structure and bonding issues to understand the stability and reactivity of Cyclopentadienyl complexes
CO-5	To study organometallic catalytic and alkene reaction

UNIT-I INORGANIC CHAINS, RINGS, CAGES AND CLUSTERS 15 Hour

Silicate minerals – ortho-, pyro-, and meta-silicates – pyroxene, amphiboles– two dimensional silicates – talc, mica and three dimensional aluminosilicates, feldspar, ultramarine –Polymeric sulphur nitride, phosphonitrilic compounds-trimers and tetramers - homocyclic inorganic ring systems – Concept of multi-centered bond – structure of B_2H_6, B_4H_{10}, $[B_{12}H_{12}]^{2-}$, B_6H_{10}, B_8H_{12}, $B_{10}H_{14}$ – Wade's rules, closo, nido, arachno boranes and carboranes – The "styx" code. Silicones -preparation, properties and uses.

UNIT-II EPR AND PHOTOELECTRON SPECTROSCOPY 12 Hour

Electron spin resonance: theory, g value– factors affecting the magnitude of g-values, hyperfine structure, ESR of organic free radicals, ESR of inorganic ions, ESR of simple free radicals in solutions, zero field splitting and Krammer's degeneracy. Photoelectron spectra koopmam's theorem, fine structure in PES and Application of UPS

UNIT-III ORGANOMETALLIC CHEMISTRY-III 14 Hour

Alkene complexes - synthesis of alkene complexes by ligand substitution - by reduction and by metal atom synthesis - bonding of alkenes to transition metals - bonding in diene complexes - reactivity of alkene complexes - ligand substitution - reactions with nucleophiles - olefin hydrogenation - hydrosilation - Wacker process - C-H activation of alkenes - alkyne complexes - bonding in alkyne complexes - reactivity of alkynes - alkyne complexes in synthesis - cobalt catalysed alkyne cycloaddition

UNIT-IV ORGANOMETALLIC CHEMISTRY-IV 12 Hour

Cyclopentadienyl complexes - metallocenes - synthesis of metallocenes - bonding in metallocenes - reactions of metallocenes - Cp2Fe/Cp2Fe+ couples in biosensors - bent sandwich complexes - bonding in bent sandwich complexes - metallocene halides and hydrides - metallocene and stereospecific polymerization of 1-alkenes - cyclopentadiene as a non-spectator ligand – monocyclo pentadienyl (half-sandwich) complexes - synthesis and structures of allyl complexes - arene complexes - synthesis - structure and reactivity of arene complexes - multidecker complexes.

UNIT-V ORGANOMETALLIC CHEMISTRY-V 12 Hour

Organometallic compounds in homogeneous catalytic reactions - coordinative unsaturation - acid-base behaviour reaction - migration of atoms or groups from metal to ligand - insertion reaction - reactions of coordinated ligands - catalytic reactions of alkenes

- isomerisation of alkenes - hydrogenation - hydroformylation and hydrosilation of alkenes - alkene polymerisation and oligomerisation - fluxional molecules.

Text Books

- F. Albert Cotton, Geoffrey Wilkinson, Carlos A. Murillo, Manfred Bochmann, (1999) "*Advanced Inorganic Chemistry"*, 6th ed.,
- Parish.R. V, (1990) "*NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry*," EllisHorwood, New York.

Reference Books

- Huheey, J. E. Keiter, E. A. and Keiter, R. L. Medhi, O.K. (2009) "*Inorganic Chemistry-Principles of structure and reactivity"*, Pearson Education, 4th ed.,
- Manfred Bochmann,(1994) "*Organometallics 1, Complexes with transition metalcarbon σ-bonds"*, Oxford science publications, Oxford.
- Manfred Bochmann, (1994) "*Organometallics 2, Complexes with transition metalcarbon π-bonds"*, Oxford science publications, Oxford.

E-Resources

- https://www.rsc.org/Education/Teachers/Resources/Inspirational/resources/6.4.4.pdf
- https://nptel.ac.in/courses/104108062/module6.pdf
- http://www.anilmishra.name/notes/nqr1.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe cluster, ring ,cages and chain of main group elements	K1
CO-2	Acquire skill to interpret the spectra of EPR and Photoelectron Spectroscopy for inorganic compounds.	K2
CO-3	Prepare various alkene and alkyne complex	K3
CO-4	Analyze Cyclopentadienyl metalloccene- sandwich and half-sandwich complexes	K4
CO-5	Determine the Organometallic reaction	K5

PHYSICAL CHEMISTRY-IV
PCHM414

Semester : IV **Credit : 4**
Category : Core-XV/DSC-XV **Hours/Week : 5**
Class &Major : II M.Sc. chemistry **Total Hours : 65**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Study of Vibrating diatomic molecule, energy levels of a diatomic molecule, simple harmonic and anharmonic oscillator, Scattering of light and Raman Spectrum. rotational and vibrational Raman Spectra
CO-2	To analyse the samples using different analytical techniques like SEM, TEM, AFM, and STM.
CO-3	To study the kinetics of polymerization
CO-4	Understand concepts of photo and Radiation Chemistry.
CO-5	To know about the electro analytical techniques

UNIT– I ROTATIONAL AND VIBRATIONAL SPECTROSCOPY 15 Hour

The rotation of molecules, rotational spectra-rigid diatomic molecule, intensity of spectral lines, selection rules, effect of isotopic substitution. Diatomic molecules as non-rigid rotors. Polyatomic molecules-linear, symmetric and asymmetric top molecule. Stark effect.

Vibrating diatomic molecule: energy of diatomic molecules as simple harmonic oscillator- energy levels, vibrational transitions, selection rules; anharmonic oscillator-energy levels, selection rules, vibrational transitions. - Diatomic vibrating rotator: Born-Oppenheimer approximation, vibration of polyatomic molecules-fundamental vibrations, linear molecules, symmetric top and asymmetric top molecules.

UNIT - II MICROSCOPY TECHNIQUES 12 Hour

Principle, theory, Instrumentation and Application of Optical microscopy - Scanning electron microscope (SEM) - Transmission electron microscope (TEM)- Atomic force microscope(AFM) - Surface Tunneling microscope (STM) - Energy dispersive X-ray spectroscopy (EDX).

UNIT – III MACROMOLECULES 13 Hour

Polymerization in homogeneous and heterogeneous phases - Kinetics of polymerization (Ionic and Addition)-kinetics of copolymerization - Mechanism of Polymerization - Chain Initiation- Propagation - Termination-Transfer -Inhibition and Retardation. Properties of polymers: Molecular weight of polymers - Mw, Mn determination - Light Scattering, Ultra centrifuge - Gel Permeation Chromatography.

UNIT- IV PHOTO and Radiation Chemistry 10 Hour

Photovoltaic and photogalvanic cells, photoelectrochemical cells, photo assisted electrolytes of water, aspects of solar energy conversion. Radiation chemistry-Interaction of high energy radiation with matter-primary and secondary processes-G value- radialysis of waterhydrated electron.

UNIT - V ELECTRO ANALYTICAL TECHNIQUES 15 Hour

Polarography – theory, DME, diffusion, Kinetic and catalytic currents, current-voltage curves for reversible and irreversible systems, Qualitative and quantitative application to inorganic systems. Amperometric titrations- theory, types of titration curves, Cyclic Voltammetry - theory, instrumentation, differential pulse Voltammetry - principle and instrumentation.

Text Books

- Banwell .C. N and McCash .E. M, *Fundamentals of Molecular Spectroscopy*, 4th ed., Tata McGraw Hill, New Delhi, 2007.
- Drago. R. S, *PhysicaI Methods in Chemistry; Saunders*: Philadelphia, 2008.
- Allen J. Bard and Israel Rubinstein, *Electroanalytical chemistry*, vol.22, Marcel Dekker, 2004.

Reference Books

- Atkins. P and J. de Paula, *Physical Chemistry*, 7th ed., Oxford University Press, Oxford, 2002.
- Raman .K. V, Gopalan .R and Raghavan .P. S, *Molecular Spectroscopy*, Thomson and Vijay Nicole, Singapore, 2004.
- Weil .J. A, Bolton .J. R and Wertz .J. E, *Electron Paramagnetic Resonance*; Wiley Interscience, 2005.

e-Books

- https://pubweb.eng.utah.edu/~lzang/images/Lecture_6_STM.pdf
- https://gcep.stanford.edu/pdfs/assessments/solar_assessment.pdf
- https://shodhganga.inflibnet.ac.in/bitstream/10603/88264/10/10_chapter%201.pdf

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Recognize diatomic molecule	K1
CO-2	Predict the samples using different analytical techniques like SEM, TEM, AFM, STM.	K2
CO-3	Illustrate the polymerization and its types	K3
CO-4	Analyse the photo and radiation Chemistry	K4
CO-5	Evaluate the electrochemical processes.	K5

NATURAL PRODUCTS
PCHM411

Semester : IV **Credit : 04**
Category : Core-XVI/DSC-VI **Hour/Week : 05**
Class & Major : II M.Sc., Chemistry **Total Hour : 65**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Explain Basic Knowledge in Chemistry involved in Natural Products
CO-2	To understand the pathway involved in biosynthesis of aromatic amino acids
CO-3	To understand the isolation and structural elucidation of alkaloids
CO-4	Implications of chemistry in **traditional drugs**
CO-5	Various techniques that are involved in the separation methods

Unit-I STRUCTURAL BASIS OF NATURAL PRODUCTS 13 Hour

Chemical and spectral approaches to simple molecules of natural origin. Identification of natural products by chromatographic and spectroscopic methods and application of I.R., N.M.R. and Mass spectroscopy in the structural elucidation of organic compounds. Concept of stereoisomerism taking examples of natural products Eg.citral, menthol, camphor, ephedrine, atropine etc.; standardization of traditional drug formulations, chromatographic study of some herbal constituents

Unit-II SEPARATION TECHNIQUES 13 Hour

Need for learning separation techniques, separation techniques in natural product research and drug discovery, extraction techniques. Chromatography: General principles, classification of chromatographic techniques, normal and reversed phase, bonded phase chromatography, stationary phases, activity of stationary phases, elutropic series, and separation mechanisms. Column Chromatography, Flash and Vacuum Liquid Chromatography, High Pressure Liquid Chromatography (HPLC)-Planar Chromatography TLC/HPTLC/OPLC.

Unit-III AROMATIC AMINO ACIDS & PHENYL PROPANOIDS 13 Hour

Introduction: The Shikimate Pathway, The Sulfa drugs, Siderophores, Cinnamic Acid derivatives, Coumarins, Lignans-Lignins, The Condensed Tannins, Lignans, Coumarins, Flavanoids, & Terpenoid Quinones.

Unit-IV ALKALOIDS **14 Hour**

Classification, biosynthetic studies and basic metabolic pathways, introduction to biogenesis of secondary metabolites, chemistry, general methods of extraction, isolation, chemical tests, isolation and structural elucidation of Pyridine alkaloids, Tropane alkaloids, Quinoline and Isoquinoline alkaloids, Phenanthrene alkaloids, Indole alkaloids, Imidazole alkaloids, Alkaloid amines, Glycoalkaloid, Xanthine alkaloid.

Unit-V STUDY OF TRADITIONAL DRUGS **12 Hour**

Classification of indigenous drugs traditional drugs, common vernacular names, botanical source, chemical constituents, uses and marketed formulations with ingredients like -Amla, Shatavari, Bhilwua, bael, bach, rasna, punarnava, gokhru, shankhapushpi, brahmi adusa, arjuna, lahsun, guggul, gymnema, neem ,tulsi, Shilajit and Spirulina.

Text Books:

- I.L. Finar, (2002)*"Organic Chemistry: Stereochemistry and the Chemistry Natural Products",* Volume II, 5th ed.,
- Gurdeep R. Chatwal, (2014)*"Organic Chemistry of Natural Products: volume I and II",* edited by Arora M, Himalaya publishing house.

References Books:

- James E Robbers, Varro E Tyler and Lynn R Brady, (2011)*"Pharmacognosy"*, Wolters Kluwer India Pvt. Ltd. 9th ed.,
- William C. Evans (2009)*"Trease and Evans Pharmacognosy"*, Elsevier Health, UK, 16th ed.,

e -books

- https://www.uou.ac.in/lecturenotes/science/MSCCH-17/CHEMISTRY%20LN%208%20NATURAL%20PRODUCTS-converted.pdf
- https://www.researchgate.net/publication/313163260_Natural_Products_Chemistry_T he_Emerging_Trends_and_Prospective_Goals

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the structure of Natural products by spectroscopic methods	K1
CO-2	Understand the Separation techniques involved in the separation of natural products	K2
CO-3	Prepare the aromatic amino acids using biosynthetic approach	K3
CO-4	Compare the biosynthesis of alkaloids	K4
CO-5	Create traditional drugs from various plants	K6

PG Evaluation Component-III and IV

Semester	Course Code	Course Title	Component-III	Component-IV
III	PCHM309	Organic Chemistry-III	Assignment	Seminar
	PCHM310	Inorganic Chemistry-III	Assignment	Seminar
	PCHM311	Physical Chemistry-III	Assignment	Seminar
IV	PCHM413	Inorganic Chemistry - IV	Preparation of Coordination complexes	Experimental procedure and its discussion
	PCHM411	Natural Products	Isolation of Natural product	Experimental procedure and its discussion

DEPARTMENT OF PHYSICS

PREAMBLE

UG: Programme profile and syllabi of courses offered in the III and IV semesters along with evaluation components III & IV (With effect from 2021-2024 batches onwards)

PG: Programme profile and syllabi of courses offered in III and IV semesters along with evaluation components III & IV (With effect from 2021-2023 batches onwards) are presented in this booklet.

PROGRAM PROFILE: B.Sc., (Physics)

PSO1: Application of the knowledge in the principles of nature and ability to solve and apply the concepts of physics in various fields including Material Science, Mechanics, Thermal Physics and Electricity.

PSO2: Learning of laboratory skills, enabling measurements in basic physics and analysis of measurements to draw valid conclusions.

PSO3: Development of the skills for problem solving and scientific reasoning for the prospective physicists and logical reasoning.

PSO4: Analysis of the behavior of materials from atomic level to macroscopic level.

Semester	Part	Category	Course code	Course Title	Previous Course Code	Contact Hour/Week	Credit Min/ Max
I	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL107/ UTAL108	Basic Tamil I/ Advanced Tamil I	UTAL105/ UTAL106/ UHIL101/ UFRL101	5	3/4
	II	Communicative English /AECC – I	UENL109/ UENL110	English for Communication (Stream – I)/ English for Communication (Stream – II)	UENL107/ UENL108	5	3/4
	III	Major Core (DSC) – I	UPHM106	Properties of Matter	-	4	4
	III	Major Core (DSC) – II	UPHM107	Mechanics	UPHM103	5	5
	III	Major Core (DSC) – III	UPHR102/ UPHR202	Major Practical I	-	3	2
	III	Allied (GE) – I	UMAA114	Allied Mathematics I	UMAA104	6	5
	III	PE	UPEM101	Professional English I	-	6	4
	IV	Value Education (SEC)			-	2	1
					TOTAL	**36**	**27/29**

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/Week	Credit Min/ Max
II	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL207/ UTAL208	Basic Tamil I/ Advanced Tamil I	UTAL205/ UTAL206 UHIL201/ UFRL201	5	3/4
	II	Communicative English /AECC – I	UENL209/ UENL210	English for Communication (Stream – I)/ English for Communication (Stream – II)	UENL207/ UENL208	5	3/4
	III	Major Core (DSC) – IV	UPHM204	Thermal and Statistical Physics	UPHM203	4	4
	III	Major Core (DSC) – V	UPHM205	Optics	UPHM302/ UPHM406	4	4
	III	Major Core (DSC) – VI	UPHR203/ UPHR101	Major Practical II	-	3	2
	III	Allied (GE) - I	UMAA222	Allied Mathematics II	UMAA212	6	5
	III	PE	UPEM201	Professional English I	-	6	4
	III	Internship	UPHI201	Internship / Field Work / Field Project	-	30 Hours	-/1
	IV	NME (Skill Enhancement Course)	-	-	-	3	2
	V	Extension Programme/ Physical Education/NCC	-	-	-	-	1/2
					TOTAL	**36**	**28/32**
III	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL307/ UTAL308	Basic Tamil I/ Advanced Tamil I	UTAL305/ UTAL306/ UHIL301/ UFRL301	5	3/4
	II	Communicative English /AECC – I	UENL309/ UENL310	English for Communication (Stream – I)/ English for Communication (Stream – II)	UENL307/ UENL308	5	3/4
	III	Major Core (DSC) – VII	UPHM305	Electricity and Magnetism	UPHM402	5	4
	III	Major Core (DSC) – VIII	UPHM304	Mathematical Physics	UPHM509	4	3
	III	Major Core (DSC) – IX	UPHR305	Major Practical III	-	3	2
	III	Allied (GE) - III	UCSA306	Computational Physics with Python	-	3	3
	III	Allied (GE) - IV	UCSR310	Computational Physics with Python Lab	-	3	2
	IV	Value Education (SEC)	-	-	-	2	1
					TOTAL	**30**	**21/23**

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/Week	Credit Min/ Max
IV	I	Languages / AECC – II Tamil/ Hindi/ French	UTAL407/ UTAL408	Basic Tamil I/ Advanced Tamil I	UTAL405/ UTAL406/ UHIL401/ UFRL401	5	3/4
	II	Communicative English /AECC – I	UENL409/ UENL410	English for Communication (Stream – I)/ English for Communication (Stream – II)	UENL407/ UENL408	5	3/4
	III	Major Core (DSC) – X	UPHM407	Atomic Physics	-	6	4
	III	Major Core (DSC) – XI	UPHR405	Major Practical IV	-	3	3
	III	Allied (GE) -V	UCHA401/ UCHA402/ UCHA403	Chemistry for Physics	-	3	3
	III	Allied (GE) - VI	UCHA402/ UCHR403	Volumetric and Organic Analysis-I	-	3	2
	III	Internship	UPHI401	Internship / Field Work / Field Project	-	30 Hours	-/1
	IV	NME (Skill Enhancement Course)	UPHE403/ UPHE404	Electronics Communication System / Applied Electronics	-	3	2
	IV	Soft Skill (SEC)			-	2	1
	V	Extension Programme/ Physical Education/NCC			-	-	-/2
					TOTAL	**30**	**21/26**
V	III	Major Core (DSC) – XII	UPHM507	Quantum Mechanics	-	5	5
	III	Major Core (DSC) – XIII	UPHM505	Basic Electronics	-	4	4
	III	Major Core (DSC) – XIV	UPHM506	Solid State Physics	UPHM608	4	4
	III	Major Elective (Discipline Specific Elective) - XV	UPHO501/ UPHO502	Medical Physics / Energy Physics	-	4	4
	III	Major Core (DSC) – XVI	UPHR502	Major Practical V	-	3	3
	III	Major Core (DSC) – XVII	UPHP501/ UPHP502	Project / Instrumentation Techniques	-	5	4/5
	III	Online Course		NPTEL/Spoken Tutorial	-	3	½
	IV	Value Education (SEC)			-	2	1
					TOTAL	**30**	**26/28**

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/Week	Credit Min/ Max
VI	III	Major Core (DSC) – XVIII	UPHM609	Numerical methods and Basic Computational Physics	-	5	4
	III	Major Core (DSC) – XIX	UPHM611	Nuclear and Radiation Physics	-	5	4
	III	Major Core (DSC) – XX	UPHM612	Material Science	-	5	4
	III	Major Core (DSC) – XXI	UPHM613	Digital Electronics	-	5	4
	III	Major Core (DSC) – XXII	UPHR605	Major Practical VI	-	3	3
	III	Major Elective (Discipline Specific Elective) - XXIII	UPHO601/ UPHO603/ UPHO604	Nanophysics/ Functional Materials/ Astrophysics and Special Theory of Relativity	-	5	4
	III	Viva Voce	UPHM610	Comprehensive Viva Voce	-	-	1
	III	Internship	UPHI601	Internship / Field Work / Field Project	-	30 Hours	-/1
	IV	Soft Skill (SEC)			-	2	1
	V	Extension Program - me/Physical Education/NCC			-	-	-/2
	V	Extension Programme	UROX601	Rural Outreach Programme	-	30 Hours	-/1
					TOTAL	**30**	**25/29**
					GRAND TOTAL	**192**	**148/167**

LIST OF COURSES OFFERED TO OTHER DEPARTMENTS
NON-MAJOR ELECTIVES

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/Week	Credit Min/ Max
II	IV	Non Major Elective (Skill Enhancement Course)	UPHE202	Applied Physics	-	3	2
			UPHE203	Biomedical Instrumentation	-	3	2
			UPHE204	Electrical Appliances	-	3	2
			UPHE205	Telecommunication System	UPHE304 /UPHE503	3	2
			UPHE206	Servicing and maintenance of home appliances	UPHE303	3	2

ALLIED

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/ Week	Credit Min/ Max
III	III	Allied(GE) – V	UPHA304	Electronics for Computer Science	-	3	3
III	III	Allied(GE) – VI	UPHR304	Electronics Practical for Computer Science	-	3	2
IV	III	Allied(GE) – VII	UPHA402	Electronics for Mathematics	-	3	3
IV	III	Allied(GE) – VIII	UPHR402	Electronics Practical for Mathematics	-	2	2
IV	III	Allied (GE) – IX	UPHA403	Digital Electronics for Computer Science	UPHA303	3	3
IV	III	Allied (GE) – X	UPHR403	Digital Electronics Practical for Computer Science	UPHR303	3	2

Inclusion of Experiential Learning

Experiential Learning (Mandatory)

Course Mapping				Collaborating Agency - MSME		
Semester	Course Code	Course Title	Assessment	Course Title	Hour / Days/ Month	Mode of Evaluation
IV	UPHM407	Atomic Physics	Component IV	Solar Energy	4 Days	Reflection

ELECTRICITY & MAGNETISM
UPHM305

Semester : III **Credit : 4**
Category : Major Core (DSC) – VII **Hours/Week : 5**
Class & Major : II B.Sc Physics **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Remember the basic concept of Potential, Electric field, and Capacitor.
CO-2	Understand the Thermoelectric Diagrams and its uses.
CO-3	Apply the Faradays law in Electromagnetic Induction.
CO-4	Analyze the electric and magnetic properties in Maxwell's equation.
CO-5	Experiment the circuits, motors with the help of electromagnetic induction.

UNIT-I ELECTROSTATICS **13 Hour**

Electric Charges - Coulombs Law – Electrostatic Potential - Electric Potential as Line Integral of Electric field - Relation between Electric Potential and Electric Field in Vector Form - Poisson's and Laplace's Equations –Capacitance - Spherical and Cylindrical Capacitor- Energy of a Charged Capacitor - Energy Density - Loss of Energy due to Sharing of Charges. Electrometers - Kelvin's Attracted Disc Electrometer.

UNIT-II CURRENT ELECTRICITY AND THERMO ELECTRICITY **13 Hour**

Carey Foster Bridge - Theory - Determination of Temperature Coefficient of Resistance. Calibration of Ammeter and Voltmeter using a Potentiometer - Seebeck, 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 - Thermoelectric Diagrams and Uses.

UNIT – III MAGNETISM **13 Hour**

Ampere's Law – Biot-Savart Law – Applications – Intensity of Magnetization-Magnetic Susceptibility- Magnetic Permeability-Types of Magnetic Materials- Properties of Para, Dia and Ferromagnetic Materials-Langevin's Theory of Dia and Para Magnetism-Weiss's theory of Ferromagnetism - B-H curve-Energy Loss due to Magnetic Hysteresis- Ballistic Galvanometer Method for Plotting B-H Curve - Magnetic Properties of Iron and Steel - Terrestrial Magnetism – Magnetic Elements.

UNIT-IV MAXWELL'S EQUATIONS **13 Hour**

Intensity of Magnetization and the Relation B=u(H+M), M-H and B-H Curves for a Two Magnetometer - Magnetic Material using Magnetometer Method– Condition for the Discharge to be Oscillatory- Frequency of Oscillation**.** AC Generator Two Phase and Three Phase– Dip Circle – Maxwell's Equation – Displacement Current – Link to Charge Conservation – Speed of Outing Field Front: The Connection with Light.

UNIT-V ELECTROMAGNETIC INDUCTION AND TRANSIENT CURRENTS 13 Hour

Faraday's Laws of Electromagnetic Induction in Vector Form- Determination of Self-Inductance by Anderson's Bridge Method and Absolute Mutual Inductance by BG - Growth and Decay of Current in a Circuit Containing Resistance and Inductance - Growth and Decay of Charge in a Circuit Containing Resistance and Capacitor - Measurement of High Resistance by Leakage - Growth and Decay of Charge in a LCR Circuit.

Text Books

- Murugeshan, R. (2006). *Electricity and Magnetism*. (8th Ed.). S. Chand & Co. New Delhi.
- Narayanamurthy, M. & Nagarathnam, N. (2009). *Electricity & Magnetism. (*6th Ed.). National Publishing Co. Meerut.

Reference Books

- Sehgal, D.L. Chopra, K.L. & Sehgal, N.K. *Electricity and Magnetism.* Sultan Chand & Sons. New Delhi.
- Griffiths, David J. (2007). *Introduction to Electrodynamics*. (3rd Ed.). Prentice Hall of India Pvt Ltd. New Delhi.

e-Resources

- https://physicaeducator.files.wordpress.com/2017/11/electricity_and_magnetism-by-purcell-3ed-ed.pdf
- https://openpress.usask.ca/physics155/

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the fundamentals of electric charges, potential, electric fields.	K1&K2
CO-2	Learning the basic concepts in thermoelectric principles.	K3
CO-3	Understand the classification of the magnetic properties and its applications.	K1&K2
CO-4	Analyze the electric and magnetic properties in Maxwell's equation.	K4
CO-5	Create the circuits, motors with the help of electromagnetic induction.	K5

MATHEMATICAL PHYSICS
UPHM304

Semester : III **Credit : 3**
Category : Major Core (DSC) – VIII **Hours/Weeks : 4**
Class & Major : II B.Sc Physics **Total Hours : 52**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Define the mathematical knowledge for the description of physical phenomenon.
CO-2	Express the skills of learning and appreciating Physics through Mathematics.
CO-3	Comment the complex functions are generally supposed to have a domain.
CO-4	Deduce the Fourier series can be defined as a way of representing a periodic function.
CO-5	Explain the mathematical statistics deals with situations which can be described.

UNIT I APPLICATION OF VECTOR 11 Hour

Vector Algebra - Divergence, Gradient and Curl and their Physical Significances - Simple Problems – Gauss' Divergence Theorem, Green's Theorem and Stokes Theorem (Statement and Proof only) – Particle Motion in a Potential Field using Gradient, Faraday Law based on the Stokes Theorem, Conservation of Electrical Charges using Divergence.

UNIT II DIFFERENTIAL EQUATION AND APPLICATIONS 10 Hour

Linear Ordinary Differential Equations - First Order – Solution by Separable Equations. Initial Value Problem - Theorem for Initial Value Problems. Boundary Conditions - Applications of Differential Equations: General Solution of Wave Equation in One Dimension, Newton Law of Cooling, Rate of Decay of Radioactive Materials.

UNIT III COMPLEX ANALYSIS 10 Hour

Brief Review of Complex Numbers and their Graphical Representation - De Moivre's Theorem - Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions- Examples of Analytic Functions. Application of Analytic Function to Flow Problems.

UNIT IV FOURIER SERIES AND ITS APPLICATIONS 10 Hour

Periodic Functions – Expansion of Periodic Functions in a Series of Sine and Cosine Functions and Determination of Fourier Coefficients – Even and Odd Functions and their Fourier Expansions. Simple Applications of Fourier Series : Half and Full Wave Rectifiers.

.UNIT V BASIC MATHEMATICAL STATISTICS 11 Hour

Importance of Statistics, concepts of Statistical Population and a Sample - Quantitative and Qualitative Data - Collection of Primary and Secondary Data - Univariate Statistics – Mean, Median, Mode, Standard Deviation, Dispersion, Skewness and Kurtosis – Frequency Distribution-Graphical representation of Frequency Distribution – Normal Distribution-Characteristics and Applications.

Text Books

- Sathyaprakash, (2010). *Mathematical Physics*. S. Chand Publishers. New Delhi.
- Murugesan, R. (2010). *Mechanics and Mathematical Methods*. S. Chand Publishers. New Delhi.

Reference Books

- Grewal, B.S. (2014). *Higher Engineering Mathematics*. (43rd Ed.). Khanna Publishers. New Delhi.
- Greenberg, M.D. (2010). *Advanced Engineering Mathematics.* Pearson Education Publishers (Singapore). (2nd Ed.).

e-Resources

- https://www.amazon.in/Mathematical-Physics-Applications-Problems-Solutions/dp/9388264827
- https://goldbart.gatech.edu/PostScript/MS_PG_book/bookmaster.pdf

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the vector algebra, divergence, gradient and curl and their physical significances.	K1&K2
CO-2	Apply the differential equations in Newton law of Cooling and radioactive materials.	K3
CO-3	Analyze the complex numbers and their graphical representation in analytic function to flow problems.	K4
CO-4	Explain the periodic functions in a series of sine and cosine functions.	K1 & K3
CO-5	Evaluate the statistical laws in frequency and normal distribution characteristics.	K1 & K5

MAJOR PRACTICAL III
UPHR305

Semester : III **Credit : 2**
Category : Major Core (DSC) – IX **Hours/Week : 3**
Class & Major : II B.Sc Physics **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Understand the Concepts of Electricity and Magnetism Through Direct Experiment.
CO – 2	Apply the Experimental Errors on Various Techniques of Electricity and Magnetism.
CO – 3	Construct the techniques to Make Error Free Measurements.
CO – 4	Demonstrate Knowledge and Comprehension of the Basic of Physics.
CO – 5	Execute the independent Problem Solving Skills.

List of Experiments

1. Deflection Magnetometer in TAN A Position.
2. Deflection Magnetometer in TAN B Position.
3. Calibration of Low Range Voltmeter – Potentiometer.
4. Calibration of High Range Voltmeter – Potentiometer.
5. Capacitance of a Capacitor using Ballistic Galvanometer.
6. Air Wedge – Thickness of an object.
7. Spectrometer- Grating – Wavelengths of Monochromatic Light Sources (Sodium lamp)- Normal Incidence.
8. Spectrometer- Grating – Wavelengths of Polychromatic Light Sources (Mercury lamp)- Normal Incidence.
9. Spectrometer – i-d Curve.
10. Planck's Constant- using Laser Light.

Text Book

- Srinivasan, N. Balasubramaniam, S. & Ranganathan, R. (2006). *The Text Book of Practical Physics*. Sultan Chand & Sons.
- Ponnusamy, A. & Amalanathan, B. (2000). *Practical Physics.* Bright Publishers.

Reference Books

- Ouseph, C.C. & Rangarajan, G. (2000). *A Text Book of Practical Physics*. Viswanatha Publishers.
- Barrett, C.S. & Massalski, T.B. (2012). *Structure of Metals*. McGraw-Hill Book Company.

e-Resources

- https://www.worldcat.org/title/electromagnetic-radiation/oclc/1083096643
- https://www.Structure-Analysis-Electron-Diffraction-Vainshtein-ebook/dp/B01DRXHOA0

- https://www.Electronic-Instrumentation-Measurement-Rohit-Khurana-ebook/dp/B01HI93MGY

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Apply the components in Deflection Magnetometer.	K1 & K3
CO – 2	Calculate the thickness of a thin wire by forming interference fringes using an air wedge arrangement.	K3
CO – 3	Measure the wavelengths of light over a wide range of Spectrometer-Grating.	K1 & K2
CO – 4	Operate the potentiometer both low and high range.	K5
CO – 5	Develop the Planck's Constant- using Laser Light.	K6

ELECTRONICS FOR COMPUTER SCIENCE
UPHA304

Semester : III **Credit : 3**
Category : Allied (GE) – V **Hours/Week : 3**
Class &Major: II B.Sc Computer Science **Total Hours : 39**

Course Objectives

CO No.	To enable the student
CO – 1	Aware of Semiconductor Diodes and their Working Principle.
CO – 2	Acquire Knowledge about Semiconductors, Number System, and Integrated Circuits.
CO – 3	Understand the Characteristics and working of Semiconductor Devices.
CO – 4	Strength of the Operational Amplifier using an IC's.
CO – 5	Apply the components to semiconductor diodes and transistor.

UNIT – I BASIC ELECTRONICS COMPONENTS **7 Hour**

Resistor –Resistor Color Codes – Resistor Units – Capacitors – Polarity of Capacitors - Application of Capacitors –Variable Resistor –Potentiometer.

UNIT – II SEMICONDUCTORS **8 Hour**

Semiconductor Materials - Intrinsic and Extrinsic Types - p-n Junction - Forward Bias and Reverse Bias Conditions p-n Junction in Breakdown Region - Zener Diode and Applications.

UNIT – III TRANSISTOR AND ITS APPLICATIONS **8 Hour**

Transistor and Applications: Working Principle of BJT - FET – MOSFET - CMOS - Application of BJT - MOSFET as Amplifier and Switch.

UNIT – IV OPERATIONAL AMPLIFIER **9 Hour**

The Ideal Operational Amplifier (Op-Amp) – Pin configuration of IC 741- Characteristics of Op-Amp - Op-amp as Inverting & non-inverting amplifier –Adder – Subtractor – Differentiator - Integrator.

UNIT – V SPECIAL PURPOSE DIODES **7 Hour**

Photo Diode - Solar Cell - Seven Segment Display- Multi - Meter - LED Display - Photo Transistor - PIN Diode – Laser diode.

Text Books

- Metha, V.K. (2001). *Principle of Electronics*. S. Chand & Company Ltd. New Delhi.
- Chattopadhyay, S. (2006). *Text Book of Electronics*. New Central Book Agency Pvt. Ltd. Kolkata.

Reference Books

- Bhattacharyaa, B. (2007). *Electronics Principles and Applications*. New Central Book Agency P.Ltd. Kolkata.
- Maini, Anil K. & Varsha Agarwal. (2009). *Electronic Devices and Circuits*. Wiley India Pvt. Ltd. New Delhi.

e-Resources

- https://www.elsevier.com/books/computer-electronics/bourdillon/978-0-434-98405-3
- http://www.freebookcentre.net/electronics-ebooks-download/Lecture-Notes-on-Basic-Electronics-for-Students-in-Computer-Science-(PDF-20P).html

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Understand the conception of resistor and capacitors	K1 & K3
CO – 2	Analyze the semiconductor materials and its characteristics	K3
CO – 3	Create the thoughts about the FET, BJT and CMOS	K1 & K2
CO – 4	Display the IC 741 and its pin configuration properties	K5
CO – 5	Verify the seven segment displays and its characteristics.	K6

ELECTRONICS PRACTICAL FOR COMPUTER SCIENCE
UPHR304

Semester : III **Credit :2**
Category : Allied (GE) – VI **Hours/Week : 3**
Class &Major: II-B.Sc Computer Science **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Practice the Theoretical concepts of Electronics through direct Experiments.
CO – 2	Understand the Significance of Electronics in Practical Life.
CO – 3	Demonstrate Knowledge and Comprehension of the Basic of Physics.
CO – 4	Develop Independent Problem Solving Skills.
CO – 5	Knowing the importance of diode.

List of Experiments

1. Transistor common-emitter (CE) characteristics.
2. PN-junction diode characteristics.
3. Zener diode-VI characteristics.
4. Voltage Stabilization using Zener diode.
5. Construction of a half wave rectifier using diode.
6. Construction of a full wave rectifier using diode.
7. OP-Amp as Inverting and Non-inverting Amplifier.
8. OP-Amp as Adder and Subtractor.
9. OP-Amp as Differentiator and Integrator.
10. Study of BCD to Seven Segment Display.

Text Books

- Srinivasan, N. Balasubramanian, S. & Ranganathan, R. (2006). *The Text Book of Practical Physics.* Sultan Chand & Sons.
- Mittal, A.K. (2016). *Asian Electronics Practical*. Asian Publisher.

Reference Books

- Paul Scherz. (2002). *Practical Electronics for Inventors*. (4th Ed.). McGraw-Hill Education TAB.
- Navas, K.A. (2018). *Electronics Lab Manual (Volume 2).*(6th Ed.). PHI Learning Pvt Ltd.

e-Resources

- https://www.amazon.in/Practical-Electronics-Complete-Introduction-Yourself/dp/1473614074

- https://www.pragationline.com/electronics-technology-practical-book-for-ea-eb-ec/

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Apply the conception of Zener diode.	K1 & K3
CO – 2	Analyze the PN-junction diode characteristics.	K3
CO – 3	Create the thoughts about the OP-Amp.	K1 & K2
CO – 4	Construct the circuit of the bridge rectifier.	K5
CO – 5	Verify the seven segment displays and its characteristics.	K6

ATOMIC PHYSICS
UPHM407

Semester : IV **Credit : 4**
Category : Major Core (DSC) – X **Hours/Week : 6**
Class and Major : II-B.Sc Physics **Total Hours : 78**

Course Objectives

CO No.	To enable the students
CO-1	Understand the Fundamental Properties of Atom and Atomic Models.
CO-2	Solve the Problems related to Physics of Materials on the Atomic and Molecular Scales.
CO-3	Compare the Spectrum of different Atoms and their Transitions.
CO-4	Learn the atomic structures.
CO-5	Comprehend the role of atoms and electromagnetic radiation.

.

UNIT -I BASIC PROPERTIES OF ATOMS **16 Hour**

Positive Rays – Discovery – Properties – Positive Ray Analysis - Thompson Parabola Method – Determination of e/m - Determination of Mass – Discovery of Stable Isotopes – Limitations –Dempster's Mass Spectrograph - Aston's Mass Spectrograph – Mass Defect and Packing Fraction – Critical Potentials - Methods of Excitations of Atoms – Experimental Determination of Critical Potentials - Frank and Hertz's Experiment- Davis and Goucher's Method.

UNIT-II THE PHOTOELECTRIC EFFECT **15 Hour**

Photoelectric Emission – Laws - Lenard's Experiment - Richardson and Compton Experiment-Einstein's Photoelectric Equation - Experimental verification by Millikan's Experiment - Photoelectric Cell.

UNIT-III ATOMIC MODELS **16 Hour**

The Bohr Atom - Somerfield's Relativistic Model – Vector Atom Model – Quantum Numbers associated with Vector Atom Model - Coupling Schemes (LS, JJ Coupling) Pauli's Exclusion Principle – Periodic Classification of Elements – Magnetic Dipole Moment due to

Orbital Motion of Electron - Magnetic Dipole Moment due to Spin – Stern and Gerlach Experiment.

UNIT-IV ATOMIC STRUCTURE **16 Hour**

Optical spectra - Spectral Terms and their Notations - Fine Structure of Sodium D-Lines – Alkali Spectra-Spectrum of Helium- Zeeman Effect-Experiment - Expression for the Zeeman Shift -Larmor's Theorem - Quantum Mechanical Explanation for the Normal Zeeman Effect - Anomalous Zeeman Effect - Paschen Back Effect - Stark Effect.

UNIT-V ATOMS AND ELECTROMAGNETIC RADIATION **15 Hour**

X- Rays – Production and detection of X-Rays - Continuous and Characteristic X-Ray Spectra - Moseley's Law- Absorption of X- Rays by Matter – Bragg's Law – The Bragg X-Ray Spectrometer - Compton Effect – Change of Wavelength – Experimental Determination - Industrial and Medical Application of X-Rays.

Text Books

- Murugesan, R. (2008). *Modern Physics.* S. Chand & Co.
- Arthur Beiser. (2006). *Concept of Modern Physics*. Tata McGraw-Hill Edition.

References Books

- Subramaniam, N. and Brij Lal. (2003). *Atomic and Nuclear Physics*. S. Chand.
- Gupta, A.B. and Dipak. *Atomic Physics*. Ghosh-Books & Allied Publisher.

e-Resources

- https://www.amazon.com/dp/1107188733?tag=uuid10-20
- https://www.amazon.com/dp/1104837951?tag=uuid10-20

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the fundamentals of atoms and its developments.	K1 & K3
CO-2	Analyze the concepts of photoelectric effect and its verification.	K3
CO-3	Apply the photoelectric effect in the atomic models for transition of electrons in the energy levels.	K1 & K2
CO-4	Evaluate the electric and magnetic effects in the atomic structures.	K5
CO-5	Compose the interaction of atoms with electromagnetic radiation.	K6

MAJOR PRACTICAL IV
UPHR405

Semester : IV **Credit : 3**
Category : Major Core (DSC) – XI **Hours/Week : 3**
Class &Major: II B.Sc Physics **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Gain the Practical Knowledge of Optics.
CO – 2	Understand the Concepts of Optical Devices and Principles.
CO – 3	Demonstrate Knowledge and Comprehension of the Basic of Physics.
CO – 4	Determine the refractive index.
CO – 5	Integrate the independent Problem Solving Skills.

List of Experiments

1. Calibration of Low Range Ammeter – Potentiometer.
2. Calibration of High Range Ammeter – Potentiometer.
3. Field along Axis of the Coil – Vibration Magnetometer.
4. Carey Foster's Bridge – Resistance and Specific resistance.
5. Determination of m and B_H using deflection magnetometer in TAN C.
6. Determination of refractive index (μ) of a Concave Lens.
7. Determination of radius of curvature of given Lens – Newton's Rings.
8. Spectrometer- i-i' curve.
9. Determination of refractive index of a prism using Spectrometer with mercury lamp.
10. Determination of Cauchy's constant using Spectrometer.

Text Books

- Srinivasan, M. Balasubramanian, N. & Ranganathan, R. (2013). *A Text Book of Practical Physics.* Sultan Chand & Sons. New Delhi.
- William Watson. (2015). *A Text-book Of Practical Physics*. Arkose Press.

Reference Books

- Lionel Laurence. (2019). *General and Practical Optics*. Forgotten Books.
- Gupta, S.L. & Kumar, V. (2002). *Practical Physics*. (25th Ed.) Pragathi Prakashan.

e-Resources

- https://www.amazon.in/B-Sc-Practical-Physics-Arora-C-L/dp/8121909090
- https://www.flipkart.com/b-sc-practical-physics/p/itmdx5k4vuw5bhna

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Apply the basic components in potentiometer.	K1 & K3
CO – 2	Understand the Deflection Magnetometer.	K3
CO – 3	Execute the refractive index of a prism.	K1 & K2
CO – 4	Deduce the radius of curvature using Newtons rings	K5
CO – 5	Experiment the Cauchy's constant using Spectrometer.	K6

ELECTRONICS FOR MATHEMATICS
UPHA402

Semester : IV **Credit : 3**
Category : Allied (GE) – VII **Hours/week : 3**
Class & Major: II B.Sc Mathematics **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Acquire knowledge about semiconductors, number system, and integrated circuits.
CO – 2	Understand the characteristics and working of semiconductor devices.
CO – 3	Apply the basic logic gates and their constructions.
CO – 4	Practice the number system.
CO – 5	Evaluate the logic gates and universal gates using ICs.

UNIT-I SEMICONDUCTOR DEVICES **11 Hour**

Semiconductor-types-intrinsic and extrinsic-p-type & n-type semiconductors-properties- p-n junction diode- Zener diode characteristics-Zener diode as Voltage regulator.LED and its applications. Photodiode-Characteristics and application.

UNIT-II TRANSISTOR AND RECTIFIER **8 Hour**

Transistor -characteristics- common base – common emitter, common collector – RC coupled amplifier-filter circuit-half wave rectifier-full wave rectifier-Bridge rectifier- Photo transistor.

UNIT-III OPERATIONAL AMPLIFIERS **7 Hour**

Introduction – Characteristics of an ideal OP-AMP – CMRR– Inverting/Non-inverting Amplifiers - Adder, subtractor, differentiator and integrator.

UNIT-IV NUMBER SYSTEM **7 Hour**

Number system-analog to digital signals-digital circuit-Number system: binary number system-decimal to binary conversion-binary to decimal conversion-octal number system-hexadecimal number system

UNIT –V DIGITAL ELECTRONICS **6 Hour**

Logic gates -AND, OR, NOT gate construction using diodes and transistors- NAND and NOR gates – Universal building blocks.XOR gate- Boolean algebra – Demorgan's theorem – verification - Basics of integrated circuit.

Text Books

- Metha, V.K. *Principle of Electronics*, S. Chand & Company Ltd., New Delhi. 2001
- Sedha, R.S. *A Text book of Applied Electronics*, S. Chand & Company Ltd., New Delhi, 2005.

Reference Books

- Theraja, B.L. , (2005). *Basic Electronics*. S. Chand & Company Ltd., New Delhi.
- Gaykwad, A. (1995). *Operational Amplifiers and Linear Integrated circuits*, Printice Hall of India Pvt. Ltd.

e-Resources

- https://www.amazon.com/Basic-Electronics-Dover-Books-Engineering/dp/0486210766
- https://www.flipkart.com/basic-electronics-mdu/p/itmdxde7yhghgznt

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Examine the concept diodes and its types.	K1 & K2
CO – 2	Recognize the transistor, rectifier and its characteristics.	K3
CO – 3	Apply the characteristics of operational amplifier.	K1 & K2
CO – 4	Verify the number system.	K5
CO – 5	Execute the logic gates and universal gates using ICs.	K6

ELECTRONICS PRACTICAL FOR MATHEMATICS
UPHR402

Semester : IV **Credit : 2**
Category : Allied (GE) – VIII **Hours/week : 2**
Class &Major: II B.Sc Mathematics **Total Hours : 26**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Practice the Theoretical concepts of Electronics through direct Experiments.
CO – 2	Understand the Significance of Electronics in Practical Life.
CO – 3	Demonstrate Knowledge and Comprehension of the Basic of Physics.
CO – 4	Develop Independent Problem Solving Skills.
CO – 5	Validate the importance of diode.

List of Experiments

1. PN-junction diode characteristics
2. Zener diode-VI characteristics
3. Voltage Stabilization using Zener diode
4. Demorgan's theorem-Verification using gates
5. NAND and NOR as universal building block
6. OP-Amp as Adder and Subtractor
7. OP-Amp as Integrator and Differentiator
8. OP-Amp as Inverting and Non-inverting Amplifier
9. Half subtractor and full subtractor
10. AND and OR gates using diodes

Text Books

- Srinivasan, N. Balasubramanian, S. & Ranganathan, R. (2006). *The text book of Practical Physics.* S. Chand & Sons.
- Ouseph, C.C. Ranagarajan, G. (1990). *A text book of Practical Physics*, S. Viswanathan Publisher Part I.

Reference Book

- Ponnusamy, & Amalanathan, B. (2002). *Practical Physics*. Bright Publishers.

e-Resources

- https://www.amazon.in/B-Sc-Practical-Physics-Arora-C-L/dp/8121909090
- https://www.flipkart.com/b-sc-practical-physics/p/itmdx5k4vuw5bhna

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Apply the conception of Zener diode.	K1 & K3
CO – 2	Analyze the PN-junction diode characteristics.	K3
CO – 3	Create the thoughts about the OP-Amp.	K1 & K2
CO – 4	Construct the NAND and NOR as universal building block.	K5
CO – 5	Verify the gates using Demorgan's theorem.	K6

DIGITAL ELECTRONICS FOR COMPUTER SCIENCE

UPHA403

Semester : IV **Credit : 3**
Category : Allied (GE) – IX **Hours/week : 3**
Class & Major: II B.Sc Computer science **Total hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Remember the knowledge in designing of basic gates.
CO – 2	Solve Boolean expressions.
CO – 3	Construct adder, subtractor, multiplexer and decoder.
CO – 4	Acquire knowledge on flip flops, registers, counters and their application.
CO – 5	Counters are specially designed synchronous sequential circuits.

UNIT- I NUMBER SYSTEM **7 Hour**

Binary, octal, hexadecimal-inter conversion-gray code-excess3-code-ASCII code-basic gates-De-Morgan's theorem-universal gates.

UNIT- II KARNAUGH MAP **8 Hour**

Laws of Boolean algebra-solving Boolean expressions- K-Map- minterms-SOP-K- Map simplification using minterm (2,.3 and 4 variables)- POS- K-map simplification using maxterms (2,3 and 4 variables)- incomplete specified functions)

UNIT- III ADDER AND MULTIPLEXERS **6 Hour**

Half adder- full adder – half subtractor –full sub tractor-decoder-BCD to seven segment decoder-encoder-decimal to BCD encoder-multiplexer- applications-de-multiplexer.

UNIT -IV REGISTERS **9 Hour**

RS Flip flop using NOR and NAND gates-clocked RS flip flop-D Flip flop-JK flip flop-master slave flip flop-registers-shift registers (right to left and and left to right)-applications.

UNIT -V COUNTERS **9 Hour**

Counters –modulus of a counters-asynchronous counter (4 bits)-synchronous counters(3 bits)-BCD counters-D/A conversion-R-2R binary ladder method –A/D conversion –successive approximation.

Text Books

- Malvino and Leach, (2007). *Digital Principles and Applications*, Tata Mc Hill. New Delhi.
- Vijayendran, Viswanathan, S. (2002). *Digital Fundamentals*, Printers and Publishers Pvt. Ltd.
- Virendra Kumar, (2000). *Digital Electronics*, New Age International Publishers.

Reference Books

- Avinash Kapoor, (2008). *Digital Electronics*, National Publishing House, New Delhi.
- Maheshwariu, (2008). *Principles and Practice of Electronics*, National Publishing House, New Delhi.
- Morris Mano, (2008). *Digital Logic and Computer Design*, Pearson Education.

e-Resources

- https://www.shahucollegelatur.org.in/Department/Studymaterial/sci/it/BCA/FY/digielec.pdf
- https://www.wiley.com/en-us/Digital+Electronics+2%3A+Sequential+and+Arithmetic+Logic+Circuits-p-9781848219854

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Study the Number System & De-Morgan's theorem	K1 & K3
CO – 2	State the laws of Boolean algebra.	K3
CO – 3	Discuss about the Adder And Multiplexers	K1 & K2
CO – 4	Overview of Flip flop.	K5
CO – 5	Explain the modulus of a counters.	K6

DIGITAL ELECTRONICS PRACTICAL FOR COMPUTER SCIENCE

UPHR403

Semester :IV **Credit : 2**
Category : Allied (GE) – X **Hours/Week: 3**
Class &Major: II B.Sc Computer Science **Total Hours : 39**

Course Objectives

CO No.	To enable the students
CO – 1	Acquire Knowledge On Adder, Subtractor, Multiplexer And Decoder.
CO – 2	Apply the concepts in the Construction of Basic Logic Gates.
CO – 3	Solve Boolean Expressions.
CO – 4	Construct Flip Flops And Registers.
CO – 5	Develop Independent Problem Solving Skills.

List of Experiments

1. Basic Logic Gates (AND, OR, NOT) Using Discrete Components.
2. Simplification of Boolean Expression Using Karnaugh Map.
3. Verification of Demorgan's Theorem and Boolean Algebra.
4. NAND as Universal Gates.
5. NOR as Universal Gates.
6. Adder Using NAND Gates.
7. Subtractors Using NAND Gates.
8. Multiplexer and Demultiplexer.
9. RS, T Flip Flops Using NAND Gates.
10. Digital to analog convertor – weighted resistor method.

Text Books

- William Kleitz. (2007). *Digital Electronics: A Practical Approach*. (8th Ed.). Pearson.
- Tooley, M. (2008). *Practical Digital Electronics Handbook*. (8th Ed.). Bpb Publicatons.

Reference Books

- Ponnusamy & Amalanathan, B. (2002). *Practical Physics*. Bright Publishers.
- Raval, K.G. (2017). *A Practical Approach to Analog and Digital Electronics.* Oxford Book Company.

e-Resources

- https://ssit.edu.in/dept/assignment/declabmanual.pdf
- https://www.technicalbookspdf.com/tag/digital-electronics-practical-book-pdf/

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Apply the Basic Logic Gates.	K1 & K3
CO – 2	Sketch the Universal Gates.	K3
CO – 3	Create the thoughts about the Digital to analog convertor.	K1 & K2
CO – 4	Construct the Multiplexer and Demultiplexer.	K5
CO – 5	Verification of Demorgan's Theorem and Boolean Algebra.	K6

ELECTRONICS COMMUNICATION SYSTEM

UPHE403

Semester : IV **Credit : 2**
Category : NME (Skill Enhancement Course) **Hours/Week : 3**
Class & Major : All UG (Except UG Physics) **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Understand basic role of Electromagnetic Waves.
CO – 2	Apply the Production, Reception and Transmission of AM & FM.
CO – 3	Analyze the Existence of AM & FM in Communication System.
CO – 4	Divide the concepts of Electromagnetic Waves and their Applications.
CO – 5	Comprehend the role of Modulated waves in Communication Systems.

UNIT - I PROPAGATION OF RADIO WAVES 9 Hour

Introduction to EM waves – Reflection and refraction of radio waves at the surface of the earth – Ground wave propagation - Sky wave propagation – Space wave propagation.

UNIT - II AM GENERATION & TRANSMISSION 8 Hour

Need for modulation – Amplitude modulation – Frequency Spectrum of the AM Wave - Modulation Index – Power relations in the AM Wave – AM generation – AM Transmitter.

UNIT- III FM GENERATION & TRANSMISSION 8 Hour

Frequency Modulation - Frequency Spectrum of the FM Wave – Effect of Noise – Wide Band & Narrow Band FM-FM Generation – FM Transmitter.

UNIT -IV AM & FM RECEPTION 7 Hour

AM Receiver – TRF Receiver – Super Heterodyne Receiver – Image Frequency Rejection – FM Receiver – Amplitude Limiter – De-Emphasis – FM Detection – Balanced Slope Detector – Phase Discriminator – Ratio Detector.

UNIT -V PULSE MODULATION **7 Hour**

PAM Modulation & Detection – PWM Modulation & Detection – PPM Modulation & Detection – Quantization & Quantization Error – PCM Modulation & Detection.

Text Books

- Wayne, T. (2012). *Electronic Communication Systems*. (4th Ed.). Pearson Education India.
- Kennedy, G. Bernard, D. Prasanna, S.R.M. (2012). *Electronic Communication Systems*. (6th Ed.). McGraw Hill Education India.

Reference Books

- Louis, E. Frenzel. (2015). *Principles of Electronic Communication Systems*. (4th Ed.). McGraw Hill.
- Simon, H. (2007). *Communication Systems*. (2nd Ed.). Wiley.

e-Resources

- https://www.amazon.in/Kennedys-Electronic-Communication-Systems-Kennedy/dp/0071077820
- https://soaneemrana.org/onewebmedia/ELECTRONICS%20COMMUNICATION%20SYSTEM%20BY%20GEORGE%20KENNEDY.pdf

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Judge the propagation of radio waves**.**	K1 & K3
CO – 2	Implement the generation & transmission.	K3
CO – 3	Evaluate the Frequency Modulation.	K1 & K2
CO – 4	Predict the AM Receiver.	K5
CO – 5	Facilitate the PAM Modulation & Detection	K6

APPLIED ELECTRONICS
UPHE404

Semester : IV **Credit : 2**
Category : NME (Skill Enhancement Course) **Hours/Week : 3**
Class & Major : All UG (Except UG Physics) **Total Hours : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Understand the concepts of Active and Passive Components.
CO – 2	Apply the methods of Communication.
CO – 3	Analyze the basic Components to the Switches.
CO – 4	Structure the role of Resistor, Capacitor, Inductor and Transducer and their Applications.
CO – 5	Reflect the basic Components to the Switches.

UNIT I ACTIVE COMPONENTS **8 Hour**

Introduction to Active Components -Resistor- Types – Resistor Color Code- Capacitor- Types-Inductor-Transducer –Application of Active Components.

UNIT II PASSIVE COMPONENTS **8 Hour**

Introduction to Passive Components Transistor – Types – DIODE –Types-Integrated Circuits – Display Device – Power Sources Application of Passive Components – Difference between Active and Passive Components.

UNIT III METHODS OF TURN ON & TURN OFF **8 Hour**

AC Gate Triggering – R Triggering – RC Triggering – DC Gate Triggering - Pulse Gate Triggering – Natural Commutation – Force Commutation – Self – Impulse – Resonant - Complementary – External – Load side – Line Side.

UNIT IV SILICON CONTROLLED RECTIFIER **8 Hour**

Triggering of Series connected SCR's - Triggering of Parallel Connected SCR's – Current & Voltage Protection - Snubber Circuit.

UNIT V STATIC SWITCHES **7 Hour**

Single Phase AC Switches – Three Phase AC Switches – Three Phase Reversing Switches – AC Switches for Bus Transfer – DC Switches – Solid State Relays.

Text Books

- Sedha, R.S. (2019). *A Text Book of Applied Electronics*. S. Chand and Company Limited.
- Truman, S.G. (2003). *Applied Electronics*. (2nd Ed.). MIT Press.

Reference Books

- Princy, U. (2019). *Hand Book of Applied Electronics & Instrumentation*.
- Katre, J.S. Barabate, R.A. Shah, U.S. (2014). *Applied Electronics*. (2nd Ed.). Tech Max Publications.

e-Resources

- https://mitpress.mit.edu/9780262571906/applied-electronics/
- https://www.amazon.in/Textbook-Applied-Electronics-RS-Sedha/dp/8121927838

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO – 1	Apply the conception of resistor and capacitors	K1 & K3
CO – 2	Analyze the Difference between Active and Passive Components.	K3
CO – 3	Create the thoughts about the Gate Triggering	K1 & K2
CO – 4	Examine the Snubber Circuit	K5
CO – 5	Verify the static switches characteristics.	K6

III AND IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component-III	Component-IV
III	Major Core (DSC) – VII	UPHM305	Electricity and Magnetism	Working model (Generation of electricity)	Usage of magnetic materials in day today life (Poster presentation)
	Major Core (DSC) – VIII	UPHM304	Mathematical Physics	Problem Solving	Assignment
	Allied (GE) – V	UPHA305	Electronics for Computer Science	Seminar	Seminar
IV	Major Core (DSC) – X	UPHM407	Atomic Physics	Oral presentation	Poster Presentation
	Allied(GE) – VII	UPHA402	Electronics for Mathematics	Seminar	Seminar
	Allied(GE) – IX	UPHA403	Digital Electronics for Computer Science	Poster Presentation	Oral presentation
	NME (Skill Enhancement Course)	UPHE403	Electronic Communication System	Seminar	Seminar
	NME (Skill Enhancement Course)	UPHE404	Applied Electronics	Seminar	Seminar

PROGRAM PROFILE: M.Sc., Physics

PSO1: Proficiency in various Mathematical Concepts for the proper Understanding of Application in all Physical Systems especially in Electronics, Electromagnetism, Material Science, Classical and Quantum Mechanics.

PSO2: Learning of Laboratory Skills, Enabling Measurements in a Physics and Electronics Laboratory and Analysis of the Measurements to draw valid Conclusions.

PSO3: Operation of the different Electronic and Physical Devices such as Microprocessor, Microcontroller, Laser, Linear and Nonlinear Optical Instruments in Atomic Scale.

PSO4: Ability to Synthesis Crystals and Nanomaterials for various Technological Applications.

Semester	Category	Course Code	Course Title	Previous Course Code	Contact Hour/Week	Credit Min/ Max
I	Core I	PPHM101	Mathematical Physics I	-	6	5
	Core II	PPHM107	Classical Mechanics	PPHM102	7	6
	Core III	PPHM105	Electronics	-	6	4
	Core IV	PPHM106	Molecular Spectroscopy	PPHM203	6	5
	Core V	PPHR101	General Practicals	-	5	3
				Total	**30**	**23**
II	Core VI	PPHM205	Mathematical Physics II	PPHM401	5	4
	Core VII	PPHM201	Quantum Mechanics I	-	5	5
	Core VIII	PPHM208	Electromagnetic Theory	PPHM104	5	3
	Core IX	PPHM207	Solid State Physics I	PPHM302	5	3
	Core X	PPHR203	Electronics Practicals	-	5	3
	NME	PPHE201	Nanoscience	PPHE101	5	4
	Service Learning	PPHX201	Energy Audit	-	-	1
	Extra Credit	PPHS201	Spoken Tutorial / NPTEL	-	-	-/2
	Internship	PPHI201	Internship / Field Work / Field Project	-	30 Hours	-/1
				Total	**30**	**23/26**

Semester	Category	Course Code	Course Title	Previous Course Code	Contact Hour/Week	Credit Min/ Max
III	Core XI	PPHM301	Quantum Mechanics II	-	5	5
	Core XII	PPHM303	Microprocessor and Microcontroller	-	4	4
	Core XIII	PPHM307	Statistical Mechanics	PPHM202	4	3
	Core XIV	PPHP301	Project	-	2	-
	Core XV	PRMC301	Research Methodology	-	5	4
	Core XVI	PPHR303	Microprocessor and Microcontroller Practicals	-	5	3
	Core XVII	PIDM301	Sustainable Materials and Technologies	-	5	5
				Total	**30**	**24**
IV	Core XVIII	PPHM406	Laser and Nonlinear Optics	PPHM303	6	4
	Core XIX	PPHM402	Nuclear and Particle Physics	-	7	4
	Core XX	PPHM403	Solid State Physics-II	-	7	4
	Core XXI	PPHM405	Crystal growth and Thin Films	PPHM302	6	4
		PPHP401	Project	-	4	4
	Internship	PPHI401	Internship / Field Work / Field Project	-	30 Hours	-/1
				Total	**30**	**20/21**
				GRAND TOTAL	**120**	**90/94**

QUANTUM MECHANICS II

PPHM301

Semester : III **Credit : 5**
Category : Core XI **Hours/Weeks : 5**
Class & Major: II M.Sc Physics **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Remember the time perturbation effects in quantum mechanics.
CO-2	Understand the scattering and semi classical theory of quantum particles.
CO-3	Examine the semi-classical theory of radiation
CO-4	Calculate the Quantum field theory.
CO-5	Explain the concept of generalized momentum is carried over into quantum mechanics.

UNIT- I TIME DEPENDENT PERTURBATION THEORY 13 Hour

Time Dependent Perturbation Theory-First and Second Order Transitions-Transition to Continuum of States-Fermi Golden Rule-Constant and Harmonic Perturbation- Collision-Adiabatic and Sudden Approximation- A Charged Particle in an Electromagnetic Field.

UNIT -II SCATTERING THEORY 13 Hour

Scattering theory- Scattering of a particle by a fixed centre of force. Scattering amplitude differential and total cross sections. Method of partial waves. Phase shifts. Optical theorem. Scattering by a hard sphere and potential well. Integral equation for potential scattering. Green's function. Born approximation. Yukawa and Coulomb potential.

UNIT- III SEMI-CLASSICAL THEORY OF RADIATION 13 Hour

Application of the time dependent perturbation theory to semi-classical theory of radiation –Einstein's coefficients –absorption -induced emission-spontaneous emission - Einstein's transition probabilities-dipole transition -selection rules –forbidden transitions.

UNIT-IV QUANTUM FIELD THEORY 13 Hour

Quantization of Wave Fields- Classical Lagrangian Equation-Classical Hamiltonian Equation - Field Quantization of the Non-Relativistic Schrodinger Equation-Creation-Quantization of Electromagnetic Field Energy and Momentum.

UNIT- V GENERALISED ANGULAR MOMENTUM 13 Hour

Infinitesimal rotation, Generator of rotation, Commutation rules, Matrix representation of angular momentum operators, Spin, Pauli spin matrices, Rotation of spin states, Coupling of two angular momentum operators, Clebsch Gordon co-efficients- Applications.

Text Books

- Mathew, P.M. & Venkatesan, K. (2010). *Text Book of Quantum Mechanics.* Tata McGraw Hill.
- Aruldhas, G. (2006). *Quantum Mechanics*. Prentice Hall of India.
- David J.Griffith, (2006). *Introduction to Quantum Mechanics.* Pearson Prentice Hall.

Reference Books

- Devanathan, A. (2006). *Quantum Mechanics.* Narosa Publishing. New Delhi.
- Schiff, L.I. (1968). *Quantum Mechanics*. Mc Graw Hill.
- Ghatak, A.K. and Loganathan, S. (2006). *Quantum Mechanics.* McMillan India.
- Shankar, R. (2005). *Principles of Quantum Mechanics.* Springer.

e-Resources

- https://link.springer.com/book/10.1007/978-3-642-84129-3
- https://www.routledge.com/Quantum-Mechanics-II-Advanced-Topics/Rajasekar-Velusamy/p/book/9781482263459

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Analyze the approximation methods for time-independent problems and WKB.	K1 & K3
CO-2	Distinguish variational equation and its application to ground state of the hydrogen and Helium atom.	K4
CO-3	Illustrate Perturbation theory and Interaction of an atom with the electromagnetic field.	K3
CO-4	Explain the Relativistic Quantum Mechanics using Dirac equation, Dirac matrices and Klein Gordon Equation.	K1 & K2
CO-5	Evaluate the second quantization of the Schrödinger wave field for bosons and fermions.	K4

MICROPROCESSOR AND MICROCONTROLLER
PPHM303

Semester : III **Credit : 4**
Category : Core XII **Hours/week : 4**
Class &Major : II M.Sc Physics **Total Hours :52**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the internal organization of microprocessor and microcontroller.
CO-2	Design the microprocessor and microcontroller based systems.
CO-3	Plan the interfacing memory and peripherals.
CO-4	Apply the interfacing system in applications.
CO-5	The concept of Microcontroller 8085 Architecture and Programming.

UNIT- I MICROPROCESSOR 8085 **10 Hour**

Internal Architecture of 8085- Addressing Modes-Direct-Indirect-register addressing-register indirect addressing-Immediate addressing-Instruction Set-Programming techniques-interrupts of 8085.

UNIT- II PROGRAMMING WITH 8085 **11 Hour**

Addition-Subtraction and Multiplication-square and square root-BCD to Binary Conversion-Binary to BCD conversion-Bubble Sort Method-largest and smallest-Ascending and Descending Order-Sum of Series-Time delay subroutine-Clock Program.

UNIT -III INTERFACING MEMORY AND PERIPHERALS **10 Hour**

Basic interfacing concepts-Peripheral I/O instructions-Device select and data transfer-I/O mapped I/O-Memory mapped I/O-Interfacing of ROM, RAM and EPROM Chips-Interfacing of 8255.

UNIT-IV INTERFACING APPLICATIONS **10 Hour**

Seven Segment Display Interface-Keyboard Interface-Interfacing to Digital to Analog Converter(DAC)-Analog to Digital Converter(DAC)-Stepper Motor Interface-Hardware Controlled Serial I/O using programmable chip 8251(USART).

UNIT- V MICROCONTROLLER 8051 ARCHITECTURE AND PROGRAMMING **11 Hour**

Architecture of 8051-Key features of 8051-Memory Organization-Program Memory (internal and external ROM) data memory-Internal RAM organization-special function registers-addressing modes-instruction set-data instructions-arithmetic instructions-logical instructions-Rotate and Swap operations-simple programs.

Text Books

- Ramesh Goankar, (2000). *Microprocessor Architecture programming and applications with the 8080A/8085*. Pen ram International Ltd.
- Doughlas, V. Hall (1991). *Microprocessor Interfacing Programming and Hardware.* (2nd edition) Tata McGraw Hill Publishing Co. Ltd.

Reference Books

- Mohammed Rafiquzzaman. (2002). *Microprocessor and Microcomputer based system*, Universe Verlag Biefield.
- Kenneth, J. Ayala. (2000). *The 8051 Microcontroller Architecture, Programming and Applications*. (2nd edition) Penram International Ltd.

e-Resources

- https://books.google.co.in/books/about/MICROPROCESSORS_AND_MICROCONTROLLERS.html?id=viEaDAAAQBAJ&redir_esc=y
- https://kanchiuniv.ac.in/coursematerials/VIJAYARAGHAVAN_mp%20_mc%20notes.pdf

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Learn importance of Microprocessors and Microprocessors architectures and its feature.	K1
CO-2	Understand the 8085 Microprocessors basic programs with applications.	K1& K3
CO-3	Apply the Basic interfacing concepts.	K2 & K3
CO-4	Develop interfacing to real world devices with applications.	K5
CO-5	Execute the 8051 Microcontroller Architecture, programming and special functions registers.	K6

STATISTICAL MECHANICS
PPHM307

Semester : III **Credit : 3**
Category : Core XIII **Hours/Weeks: 4**
Class & Major : II M.Sc., Physics **Total Hours : 52**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the fundamental concepts of thermodynamics in order to understand Statistical Mechanics.
CO-2	Understand the principles of classical statistical mechanic and its application to compute the various parameters of molecules.
CO-3	Explain the Bose-Einstein Statistics and thermodynamic properties of an ideal BE gas, liquid helium.
CO-4	Review the concept of Fermi Dirac Statistics and Specific heat of an electron gas, One dimensional metal and Effect of Periodic structures.
CO-5	Illustrate the Fluctuations and Brownian motion, Fourier analysis of a random function, and Electrical noise.

UNIT – I INTRODUCTION **11 Hour**

Phase Space-Ensemble-Ensemble average-Liouville Theorem-Equation of motion- Equal-a priori-probability-Statistical equilibrium-Micro canonical ensemble-Entropy of an ideal Boltzmann gas using micro canonical ensemble-Gibb's paradox- MB, BE and FD statistics-various distributions using micro canonical ensemble.

UNIT - II CANONICAL AND GRAND CANONICAL ENSEMBLES **10 Hour**

Entropy of a system in contact with a heat reservoir-Ideal gas in canonical ensemble-Maxwell velocity distribution-Equipartition of energy-photons. Grand canonical ensemble-Ideal gas in grand canonical ensemble-Canonical partition function-Harmonic oscillator in canonical ensemble and grand canonical ensemble.

UNIT – III BOSE-EINSTEIN STATISTICS **10 Hour**

Bose-Einstein distribution-Bose-Einstein condensation- Thermodynamic properties of an ideal BE gas-Liquid Helium-Landau spectrum of Phonons and Rotons- Helium 4 and Helium 3 mixtures-Superfluid phases of Helium 3.

UNIT – IV FERMI-DIRAC STATISTICS **11 Hour**

Fermi-Dirac distribution-degeneracy-Thermionic emission-White dwarfs-Nuclear matter-Quantum Hall effect-Specific heat of an electron gas-One-dimensional metal- Effect of Periodic structures.

UNIT - V FLUCTUATIONS **10 Hour**

Introduction-mean square deviation-Fluctuations in ensembles-Concentration fluctuations in quantum statistics-One dimensional random walk-Brownian motion-Fourier analysis of a random function-Electrical noise.

Text Books

- Agarwal .B.K. and Melvin Eisner. (2003). *Statistical mechanics*. New Age International Limited. (2nd Ed.).
- Bhattacharjee, (1996). *Statistical Mechanics.* Allied Publishers Limited.
- Pathria, R. K. and Beale, Paul D. (2011). *Statistical Mechanics.* Butterworth-Heinemann print. New Delhi. (3rd Ed.).

Reference Books

- Donald, A. McQuarrie, (2003). *Statistical Mechanics*. Viva Books Private Limited.
- Silvio, Salinas, R.A. (2004). *Introduction to Statistical Physics.* Springer.

e-Resources

- http://www.issp.ac.ru/ebooks/books/open/Statistical_Mechanics.pdf
- https://www.amazon.in/Statistical-Mechanics-Pathria/dp/9380931891

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Illustrate the statistical physics and thermodynamics as logical consequences of the postulates of Statistical mechanics.	K1 & K3
CO-2	Analyze the principles of statistical mechanics to selected problems.	K4
CO-3	Evaluate the ensemble approach in statistical mechanics to a range of situations.	K5
CO-4	Explain the classical and quantum statistics and statistical distribution laws	K2
CO-5	Distinguish between the ideal Bose systems and Fermi systems	K4

RESEARCH METHODOLOGY
PRMC301

Semester : III **Credit : 4**
Category : Core XV **Hours/Week : 5**
Class & Major: II M.Sc Physics **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Enhance the knowledge on research and its methodologies.
CO – 2	Familiarize writing research report and thesis.
CO – 3	Analyze the Sampling design, data collection and analysis with statically package (Sigma STAT, SPSS for student t-test, ANOVA, etc.) and hypothesis testing.
CO – 4	Study the Interpretation, Report writing, research ethics and IPR and Patents and Basic, principles and general requirements of patent law.
CO – 5	Explain the tools for Analytical Technique, and principles of XRD, SEM, TEM, EDAX, AFM, EPMA and Instrumentation

UNIT I INTRODUCTION TO RESEARCH METHODOLOGY 07 Hour

Meaning of research; objective of research; motivation in research; types of research- Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical- research approaches; significance of research, research methods versus methodology; Research and scientific methods; Importance of knowing how research is done; Research process; Criteria for good research.

UNIT II RESEARCH PROBLEM AND RESEARCH DESIGN 15 Hour

Research problem: Selecting research problem; necessity of defining a problem; techniques of defining problem; formulation of research problem, objectives of research problem. Meaning of research design; need for research design; important concept related to research design; different research designs; basic principles of experimental design; important experimental design.

UNIT III SAMPLING DESIGN, DATA COLLECTION AND ANALYSIS 18Hour

Census and sample surveys, Characteristics of good sample design Different types of sample designs, Techniques of selecting a random sample-Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma STAT,SPSS for student t-test, ANOVA, etc.), hypothesis testing.

UNIT IV INTERPRETAION, REPORT WRITING, RESEARCH ETHICS AND IPR 15 Hour

Interpretation and report writing; Meaning of interpretation; techniques of interpretation; precautions in interpretation; significance of report writing, layout of research report, types of reports; Presentation of research work-oral, poster and writing research paper; Precautions for writing research report, conclusion.

Ethics-ethical issues, related to research, IPR-Intellectual Property Rights in Research and Development-Patents and Patent Laws: Objectives of the patent system - Basic, principles and general requirements of patent law.

UNIT V TOOLS FOR ANALYSIS 10 Hour

Analytical Technique – principles of single crystal and powder X-ray diffraction, FT–IR, Raman and UV-visible spectrometers – SEM, TEM, EDAX, AFM, EPMA – Instrumentation – Sample preparation – Analysis of materials – study of dislocation – ion implantation uses.

Text books

1. Kothari, C. R. (1980). *Research Methodology: Research and techniques*. New Delhi: New Age International Publishers.
2. Carlos, C.M. (2000). Intellectual property rights. the WTO and developing countries: the TRIPS agreement and policy options. Zed Books. New York.
3. Beier, F.K. Crespi, R.S. and Straus T. *Biotechnology and Patent protection.* Oxford and IBH Publishing Co. New Delhi.
4. Darren George and Paul Mallery – SPSS for Windows, Pearson Education.

5. Sivasankar, B. (2012). *Instrumental methods of analysis.* Oxford University Press. New Delhi.

References

1. Kothari, C. R. (1990). *Research Methodology: Research and techniques.* New Delhi: New Age International Publishers.
2. Singh, Y. K. (2006). *Fundamental of Research Methodology and Statistics*. New Delhi. New International (P) Limited, Publishers.
3. Wallinman, N. (2006). Your Research Project: A step-by-step guide for the first-time researcher. London: Sage Publications.
4. Senthil Kumar Sadasivam and Mohammed Jaabir M. S. (2008). *IPR, Biosafety and Biotechnology Management*. Jasen Publications. India.
5. Frank A. Settle, (1997). *Handbook of Instrumental Techniques for Analytical Chemistry*, Upper Saddle River. NJ: Prentice Hall PTR. New Jersey.

e-Resources

- http:// www.ptt.ed/-super7/430114401/4391.ptt/.
- https://www.heacademy.ac.uk/system/files/msor.3.Is.pdf
- 164.100.133.129.81/econtent/uploads/research-methods.pdf

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Determine the Importance of how research is done.	K1 & K3
CO-2	Choose the Problem and Research Design.	K4
CO-3	Correlate the Sampling Design And Data Collection for research.	K5
CO-4	Evaluate the Report Writing, Research Ethics.	K2
CO-5	Manage the Instrumentation for sample analysis.	K4

SUSTAINABLE MATERIALS AND TECHNOLOGIES
PIDM301

Semester : III **Credit : 5**
Category : Core XVII **Hours/week : 5**
Class & Major: II - M.Sc Physics & Chemistry **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Learn the Concept of Sustainable Materials.
CO – 2	Understand about Green Chemistry Strategies for Designing the Chemical Synthesis.
CO – 3	Explore the Theoretical Knowledge of Physical and Chemical Properties.
CO – 4	Judge the characterization of the Materials using different kinds of Techniques.
CO – 5	Produce the Nanodevices Materials.

UNIT– I INTRODUCTION TO MATERIALS 13 Hour

Concept of Sustainable Materials, Classification of Materials: Crystalline & Amorphous Materials, High Tc Superconductors, Alloys & Composites, Semiconductors, Solar Energy Materials, Luminescent and Optoelectronic Materials, Polymer, Liquid Crystals and Quasi Crystals, Ceramics – Metals, CNT, Graphene, Bucky Balls.

UNIT– II GREEN CHEMISTRY 14 Hour

Introduction: Prospects and Future of Green Chemistry - Twelve Guiding Principles of Green Chemistry - Concept of Atom Economy - Green Starting Materials, Green Reagents, Green Solvents and Reaction Conditions, Green Synthesis - Real World Cases (Traditional Vs. Green Processes) Synthesis of Ibuprofen, Adipic Acid - Biomimetic, Multifunctional Reagents; Combinatorial Green Chemistry; Non-Covalent Derivatization.

UNIT– III GREEN TECHNOLOGIES 13 Hour

Green Solvents: Enhancement of Selectivity, Efficiency, and Industrial Applicability - Ionic Liquids-Supercritical Fluids - Solvent Free Neat Reactions In Liquid Phase – Flourous Phase Reactions Green Catalysis: Heterogeneous Catalysis: Use of Zeolites, Silica, Alumina, Clay, Polymers, Cyclodextrins, and Biocatalysts.

UNIT– IV CHARACTERIZATION TECHNIQUES RELATED TO NANOMATERIALS 13 Hour

Electron Microscopy Techniques: Scanning Electron Microscope, Transmission Electron Microscope, Field Emission Scanning Electron Microscopy, Atomic Force Microscopy, X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis (EDX).

UNIT– V APPLICATION OF NANOMATERIALS 12 Hour

Overview of Nanomaterials Properties and their Applications, Molecular Electronics and Nanoelectronics – Nanobots- Biological Applications – Quantum Devices – Nanomechanics–

Photovoltaic Cells- Nano Structures as Single Electron Transistor – Quantum Dots – Nanotubes And Nano Wire For Nano Device Fabrication.

Text Books

- George, J. Marcel Dekker. (2005). *Preparation of Thinfilms*. Inc. New York.
- Rashmi Sanghi, Srivastava, M.M. (2003). *Green Chemistry – Environment Friendly Alternatives*. Narora Publishing House.
- Elson Longo, Felipe de Almeida La Porta. *(*2017). *Recent Advances in Complex Functional Materials.* Springer.

Reference Books

- Barriham, K. & Vvedensky, D.D. (2001). *Low Dimensional Semiconductor Structures: Fundamental and Device Applications*. Cambridge University Press.
- Ahluwalia, V.K. (2006). *Methods and Reagents of Green Chemistry: An Introduction by Green Chemistry*. Ane Books India.
- Bontempi, Elza. (2017). *Raw Materials Substitution Sustainability*. Springer International Publishing.
- Cao, G. (2004). *Nanostructures & Nanomaterials: Synthesis, Properties & Applications.* Imperial College Press.

e– Resources

- https://www.elsevier.com/books/introduction-to-materials-science/mercier/978-2-84299-286-6
- https://onlinelibrary.wiley.com/doi/book/10.1002/9780470988305
- http://www.mrforum.com/product/9781945291739/
- https://doi.org/10.1016/j.aca.2015.11.008
- https://www.taylorfrancis.com/books/9781315153285

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the concept of sustainable Materials, green chemistry and Nano materials.	K1 & K2
CO-2	Illustrate the characterization studies of SEM, TEM XPS and EDX studies.	K3
CO-3	Distinguish the concept of Biological and electronic application of nanomaterials	K4
CO-4	Detect the FESEM and AFM characterization studies to improve the employability skill.	K1 & K6
CO-5	Simulate the concept of green solvents, catalysis and zeolites.	K5

MICROPROCESSOR AND MICROCONTROLLER PRACTICALS
PPHR303

Semester : III **Credit : 3**
Category : Core XVI **Hours/Week : 5**
Class and Major: II M.Sc., Physics **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO – 1	Program a Microcontroller to perform various tasks.
CO – 2	Implement Microprocessor based embedded System.
CO – 3	Design of Microprocessors/Microcontrollers-based Systems.
CO – 4	Plan Circuits for various Applications using Microcontrollers.
CO – 5	Assess the importance of Microprocessors and Microprocessors architectures and its feature.

List of Experiments

1. Addition, Subtraction, Multiplication and Division of 8 bit Numbers using 8085.
2. Selection of smallest and Largest Element of an Array.
3. Conversion of Decimal to Hexa Decimal and vice versa.
4. Ascending & Descending Order.
5. Encryption and Decryption - code conversion.
6. Microprocessor 8085 – solving Equation.
7. Traffic Control System using Microprocessor.
8. Automation of Stepper Motor using Microcontroller.
9. Thermistor – Microcontroller.
10. Study of Seven Segment display using Microcontroller.

Text Books

- Ghosh, P.K. & Sridhar, P.R. (2001). *Introduction to Microprocessors for Engineers and Scientists.* (2nd Ed). Prentice- Hall of India. New Delhi.
- Yu-Cheng Liu, & Glenn A. Gibson. (2015). *Microcomputer Systems*: 8086/8088 Family. (2nd Ed). Pearson Education India. New Delhi.
- Microprocessor 8085 – solving Equation.
-

Reference Books

- Muhammad Ali Mazidi**,** Rolin McKinlay, & Janice Gillispie Mazidi. (2007). *The 8051 Microcontroller and Embedded Systems: Using Assembly and C.* Pearson Education India**.** (2nd Ed.)**.**
- Ramesh Gaonkar. (2013). *Microprocessor Architecture, Programming and Applications with the 8085*. *Prentice-Hall of India*. New' Delhi. (6th Ed.).

e-Resources

- http://eie.sliet.ac.in/files/2021/03/Lab-Manual-for-Microprocessor-and-Microcontroller-Lab.pdf
- https://www.amazon.in/Microprocessor-Microcontroller-Laboratory-LAB-Manual/dp/1637459726

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Execute the Seven Segment display using Microcontroller.	K1 & K2
CO-2	Prepare the 8085 Microprocessors basic programs with applications.	K2
CO-3	Organize the Basic interfacing concepts.	K5
CO-4	Develop interfacing to real world devices with applications.	K4
CO-5	Predict the 8051 Microcontroller Architecture, programming and special functions registers.	K6

LASER AND NONLINEAR OPTICS
PPHM406

Semester : IV **Credit : 4**
Category : Core XVIII **Hours/Weeks : 6**
Class & Major : II M.Sc Physics **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Define the different types of laser.
CO-2	Understand the field of non linear optics.
CO-3	Apply the working function of fiber optics.
CO-4	Analyze the optical nonlinearities are exhibited high damage threshold and high optical quality
CO-5	Describes the behavior of light in nonlinear media.

UNIT -I LASERS **16 Hour**

Gas lasers – He-Ne, Ar^+ ion lasers – Solid state lasers – Ruby – Nd: YAG, Ti Sapphire – Organic dye laser – Rhodamine – Semiconductor lasers – Diode laser, p-n-junction laser, GaAs Laser.

UNIT- II INTRODUCTION TO NONLINEAR OPTICS **16 Hour**

Refractive index – frequency dependent and intensity dependent refractive index - Wave propagation in an anisotropic crystal – Polarization response of materials to light – Second harmonic generation – Sum and difference frequency generation – Phase matching –four wave mixing - Third harmonic generation – self focusing – Parametric amplification - bistability

UNIT- III MULTIPHOTON PROCESSES **15 Hour**

Two photon process – Theory and experiment – Three photon process parametric generation of light – Oscillator – Amplifier – Stimulated Raman scattering – Intensity dependent refractive index optical Kerr effect – photorefractive, electron optic effects

UNIT- IV NONLINEAR OPTICAL MATERIALS **16 Hour**

Basic requirements – Inorganics – Borates(Sodium and potassium penta borates) – Organics – Urea, Nitro aniline – Semi organics – Thiourea complex – X-ray diffraction, FTIR and FT-NMR qualitative study – Kurtz test – Laser induced surface damage threshold

UNIT -V FIBER OPTICS **15 Hour**

Step – Graded index fibers – wave propagation – Fiber modes – Single and multimode fibres – Numerical aperture – Dispersion – Fiber bandwidth – Fiber loss – Attenuation coefficient – Material absorption

Text Books

- Laud, B.B. (2010). *Lasers and Nonlinear Optics.* New Age International (P) Ltd. New Delhi. (4th Ed.).
- Robert W. Boyd, (2012). *Nonlinear Optics*. Academic Press. New York. (3rd Ed.).

Reference Books

- Govind P. Agarwal, (2003). *Fiber-Optics Communication Systems*, John Wile & Sons. Singapore. (3rd Ed.).
- William T. Silvast, (2013). *Laser Fundamentals*. Cambridge University Press. Cambridge.
- Mills, D.L. (2005). *Nonlinear Optics – Basic Concepts*. Springer. Berlin.

e-Resources

- https://www.amazon.in/Lasers-Non-Linear-Optics-B-B-Laud/dp/8122430562
- https://pragatiprakashan.in/laser-and-nonlinear-optics.html

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Analyze about lasers, nonlinear optics, and the multiphonon process.	K1 & K2
CO-2	Explain the terms Junction Diode, Semiconductor Laser, Wave Propagation, and Dispersion in simple terms.	K2
CO-3	Examine the ideas of solid lasers, gas lasers, fibers, and harmonic production.	K5
CO-4	Describe the concepts of frequency generation, parametric amplification, and the Laser Induced Surface Damaged Threshold.	K4
CO-5	Develop the employability skill to learn the terms of Fiber Optics, X-ray Diffraction and FTIR study.	K6

•

NUCLEAR AND PARTICLE PHYSICS

PPHM402

Semester : IV **Credit : 4**
Category : Core XIX **Hours/week : 7**
Class & Major : II M.Sc Physics **Total Hours : 91**

Course Objectives

CO No.	To enable the students
CO-1	Acquire the nuclei model and its associated particles.
CO-2	Understand the working process of nuclear reactor and detectors.
CO-3	Compare the different elementary particles.
CO-4	Appraise the Interactions of radiations with matter.
CO-5	Rate the Relativistic kinematics and classification of Elementary particles.

UNIT- I STATIC PROPERTIES OF NUCLEI AND NUCLEAR MODEL 18 Hour

Nuclear size-determination from electron scattering-nuclear form factors-angular momentum-spin and moments of nuclei-nuclear model reactions-shall model-Nilsson model-physical concept of the unified model.

UNIT-II TWO NUCLEAN SYSTEM AND NUCLEAR FORCES 19 Hour

Dipole and quadruple moments of the deuteron- central and tensor forces-ecridenced for saturation property-neutron-proton scattering-exchange character-spin dependence (ortho and para-hydrogen) –charge independence and charge symmetry. Iso spin formalism-general form of the nucleon-nucleon force-S-wave effective range theory-proton-proton scattering-evidence for hard core potential.

UNIT-III NUCLEAR DECAYS AND REACTIONS **18 Hour**

Electromagnetic decays: selection rules-Fermi theory of beta decay-kurie plot-Fermi and Gamow – teller transitions-parity violation in beta decay-introduction to nuclear reactions.

UNIT-IV NUCLEAR DETECTORS **18 Hour**

Interactions of radiations with matter-Ge and Si solid state detectors-colorimeter and the use for measuring get energies-syndication and Cerenkov counters-quantization ideas-hybrid detectors.

UNIT-V ELEMENTARY PARTICLES **18 Hour**

Relativistic kinemetics-classification spin and parity determination of pions and strange particles –Gelmann nishijima scheme-properties of quark and their classification-elementary ideas of Su(2) and Su(3)-symmetric groups and hadron classification-introduction to the standard model-electro weak interactions-W and Z Bosons.

Text Books

- Krane. K.S. (2008). *Introducing nuclear physics.* Wiley India.
- Roy, R.R. and Nigam B.P. (2005). *Nuclearphysics Theory and experiment.* New Age International.
- Tayal. D.C. (1997). *Nuclear physics.* Himalaya Publication.
- Sathiya Prakash. (2011). *Nuclear Physics.* Pragati Prakashan Publication.

Reference Books

- Griffith, D. (2008). *Introduction to elementary particles.* Academic press (2nd Ed.).
- Nutshell, A. by Bertulani, C.A. (2007). *Nuclear physics.* Princeton University press. (1st Ed.).
- Cohen, B.L. (2003). *Concept of Nuclear physics*. McGraw-Hill.

e-Resources

- https://www.wiley.com/en-us/Nuclear+and+Particle+Physics%3A+An+Introduction%2C+3rd+Edition-p-9781119344612
- https://www.amazon.in/Nuclear-Particle-Physics-Satadal-Bhattacharyya/dp/9389211158

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	State nuclear size ,shape , bindingenergy.etc and also the characteristics of nuclear force in detail	K1 & K2
CO-2	Evaluate the nuclear models and potentials associated.	K5
CO-3	Illustrate the nuclear decay processes, alpha, beta and gamma decay.	K3
CO-4	Explain the Nuclear reactions, Fission and Fusion and their characteristics.	K2
CO-5	Lead the forces in nature and classification of particles and study in detail conservations laws and quark models.	K4

SOLID STATE PHYSICS –II

PPHM403

Semester : IV **Credit : 4**
Category : Core XX **Hours/week : 7**
Class & Major: II - M.Sc Physics **Total Hours : 91**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Review of the Semiconductor Properties and Fermi level-mobility of charge carriers, effect of temperature on mobility.
CO-2	Acquire the dielectric properties and piezo, pyro and ferroelectric properties of crystals.
CO-3	Understand the basic frameworks of solid state physics.
CO-4	Develop the Magnetic Properties of quantum theory of magnetism ferromagnetism and anti-ferromagnetism, ferrimagnetism.
CO-5	Explore the theoretical understanding of various physical properties of condensed matter.

UNIT- I SEMI CONDUCTING PROPERTIES **18 Hour**

Carrier concentration in semiconductors-Fermi level-mobility of charge carriers-effect of temperature on mobility-electrical conductivity of semi conductors-Hall effect in semi conductors-junction properties: metal-metal junction, metal-semiconductor junction, semiconductor-semiconductor junction.

UNIT- II DIELECTRIC PROPERTIES **19 Hour**

Dipole moment-polarization-electric field of a dipole-polarizability-classical theory of electronic polarisation-polarisability, Dielectric constant and polarizability – Clausius Mossotti equation- piezo, pyro and ferroelectric properties of crystals-anti Ferro electricity and ferric electricity

UNIT- III OPTICAL PROPERTIES **17 Hour**

Classical model drude model- optical refractive index and relative dielectric constant - colour centres (types and generation) – Luminescence-Photoconductivity

UNIT -IV MAGNETIC PROPERTIES **19 Hour**

classification of magnetic materials-atomic theory of magnetism-Langevin's classical theory of diamagnetism and para magnetism-quantum theory of magnetism ferromagnetism-Weiss molecular field theory-ferromagnetic domains-domain theory-anti ferromagnetism, ferrimagnetisms.

UNIT -V SUPERCONDUCTING PROPERTIES **18 Hour**

Sources of superconductivity-Meissner effect-thermodynamics of superconducting transition-isotope effect-London penetration depth-coherence length-band gapelements of BCS theory-flux quantisation-Josephson effect-High Tc superconductivity.

Text Books

- Wahab, M.A. (2005). *Solid state physics, Structure and properties of materials.* Narosa publishing house. (2nd Ed.).
- Micea, Rogalski, S. and Palmer, Stuart. B. (2001). *Solid state physic.* Gordon and Breach science publishing.
- Puri, R.K. and Babbar, V.K. (2005). *Solid state physics*. S. Chand and company Ltd. (3rd Ed.).
- Palanisamy, P.K. (2003). *Solid state physics.* Scitech publications (India). Ltd.

Reference Books

- Charles Kittel, (2000). *Introduction to solid state physics.* Wiley eastern limited, (7th Ed.).
- Ajay Kumar Saxena. (2006). *Solid state physics*. MacMillan Publishers.
- Blackmore, J.S. (1974). *Solid state physics*. Cambridge university press. 2nd Ed.).
- Ashcroft, N.W. and Mermin, N.D. (1988). *Solid state physics.* CBS publishing Asia Ltd.

e-Resources

- https://www.kobo.com/ww/en/ebook/solid-state-physics-37
- https://www.indiamart.com/proddetail/solid-state-physics-book-17811736391.html

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	State the semiconductors, dielectric, optical, Magnetic and superconducting Properties.	K1 & K2
CO-2	Distinguish the Paramagnetic materials, ferromagnetic materials and ferromagnetic materials.	K4
CO-3	Analyze and apply the concept of luminescence materials, Photoconductivity composites in day today life.	K3
CO-4	Adopt the employability skill to learn the concept of Fermi level, Charge carrier, piezo, pyro and ferroelectric crystals.	K6
CO-5	Develop the refractive index, Polarizability and Mossotti equation.	K3

CRYSTAL GROWTH AND THIN FILMS

PPHM405

Semester : IV **Credit : 4**
Category : Core XXI **Hours/Week : 6**
Class and Major: II M.Sc Physics **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Interpret different techniques of crystal growth.
CO-2	Apply the characterization in the single crystals.
CO-3	Analyze the different methods in thin film growth process.
CO-4	Prepare the deposition techniques of thin film.
CO-5	Measure the Thin Film Growth Process and Crystal Growth Process

UNIT–I NUCLEATION **15 Hour**

Nucleation concept – Kinds of nucleation – Classical theory of nucleation - Induction period – Measurement – Homogeneous Nucleation – Energy of formation of a critical spherical nucleus – critical radius – Nucleation rate.

UNIT-II CRYSTAL GROWTH FROM SOLUTION **15 Hour**

Low temperature solution growth – Solution and Solubility – Preparation of solution - Principle of low temperature solution growth - Mier's solubility diagram – Measurement of solubility – Achievement of super saturation**.**

Crystal Growth methods – Slow cooling method – Holden's rotary crystallizer - Slow evaporation method – Johnson's rotating crystal method - Temperature gradient method – Kruger and Fink U tube method.

UNIT- III MELT GROWTH, GEL GROWTH AND FLUX GROWTH 18 Hour

Growth of crystal from melt – Bridgman method – Czochralski method – LEC growth of III – V materials - Verneuil method. Gel growth – Different gel medium – Specific gravity – Silica gel – Agar gel – Basic growth procedure – Single diffusion technique – Double diffusion technique – Reaction method – Chemical reduction method.

Principle of flux growth – Slow cooling method – Slow evaporation method – Top seeded solution.

UNIT– IV PREPARATION AND DEPOSITION TECHNIQUES OF THIN FILM 15 Hour

Nature of Thin Film-Deposition Technology-Distribution of Deposit-Resistance Heating-Thermal Evaporation-Flash Evaporation.

Electron Beam Method-Cathodic Sputtering-Glow Discharge Sputtering-Low Pressure Sputtering-Reactive Sputtering-RF Sputtering-Chemical Vapour Deposition-Chemical Deposition.

UNIT - V THIN FILM GROWTH PROCESS 15 Hour

Epitaxy-Thin Film Structure-Substrate Effect-Epitaxial Deposit-Twinning and Multi twinning-Phase Transition-Dissociations-Film Thickness Effect-Crystal Growth Process

Text Books

- Santhana, P. Raghavan and Ramasamy, P. (2000). *Crystal Growth Processes and Methods*. KRU Publications.
- Chopra, K.L. (1969). *Thin film Phenomena.* McGraw-Hill.
- Chopra, K.L. (2012). *Thin film Device Applications*. Springer Science & Business Media.
- Meissel, L.T. & Glang, R. (2006). *Handbook of Thin film Technology*. McGraw Hill.

Reference Books

- Goswami, A. (2008). *Thinfilm Fundamentals*. New Age International – New Delhi.
- Komatsu, H. (1993). *Studies and Concepts in Crystal Growth*. Pergamon Press. Oxford.
- Chopra, K.L. Das, S.R. (1983). *Thinfilm Solar Cells*. Springer Science & Business Media.
- Hans Scheel, J. (2003). *Crystal Growth Technology Book*. Originally published.

e – Resources

- https://www.Handbook-Crystal-Growth-Films-Epitaxy-ebook/dp/B00PC556NE
- https://www.springer.com/gp/book/9781468491470
- https://www.elsevier.com/books/handbook-of-crystal-growth/kuech/978-0-444-63304-0

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Apply the nucleation concepts and nucleation types	K1
CO-2	Analyze the solution growth techniques and principles.	K1& K3
CO-3	Experiment the crystal growth process and principles	K2 & K3
CO-4	Predict the preparation of deposition techniques.	K5
CO-5	Simulate the thin film process	K6

III AND IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component-III	Component-IV
III	Core XI	PPHM301	Quantum Mechanics II	Assignment	Problem Solving
	Core XII	PPHM303	Microprocessor and Microcontroller	Oral Presentation	Seminar
	Core XIII	PPHM307	Statistical Mechanics	Assignment	Seminar
	Core XV	PRMC301	Research Methodology	Assignment	Seminar
	Core XVII	PIDM301	Sustainable Materials and Technologies	Poster Presentation	Seminar
IV	Core XVIII	PPHM406	Laser and Nonlinear Optics	Seminar	Poster Presentation
	Core XIX	PPHM402	Nuclear and Particle Physics	Seminar	Seminar
	Core XX	PPHM403	Solid State Physics-II	Poster Presentation	Seminar
	Core XXI	PPHM405	Crystal growth and Thin Films	Seminar	Poster Presentation

PG & RESEARCH DEPARTMENT OF MATHEMATICS

PREAMBLE

UG : Course Profile, list of courses offered to the other departments & the syllabi of courses offered in the III, IV semester (With effect from 2021-2024 batch onwards)

PROGRAMME PROFILE B.Sc. (MATHEMATICS)

PROGRAMME SPECIFIC OUTCOMES

PSO No.	Upon completion of these Courses the Students would have
PSO-1	Become an individual academic excellence to face eligibility exams.
PSO-2	Acquired knowledge for higher studies.
PSO-3	Summarise the effective written communication of mathematical concepts.
PSO-4	Organize skills and knowledge that is translate information presented verbally into Mathematical form
PSO-5	Pursue a Higher Studies and become a software professional.

Semester	Part	Category	Course Code	Course Title	Previous course code	Contact Hours/ week	Credit Min/ Max
I	I	Languages /	UTAL107/	Basic Tamil-I/	UTAL105/	5	3/4
		AECC – II Tamil /	UTAL108/	Advanced Tamil-I/	UTAL106/		
		Hindi/	UHIL102/	Hindi-I /	UHIL101/		
		French	UFRL102	French-I	UFRL101		
	II	Communicative English/ AECC – I	UENL109/ UENL110	English for Communicative (Stream – I) / English for Communicative (Stream –II)		5	3/4
	III	Major Core (I)/ DSC (I)	UMAM104	Differential Calculus	-	6	4
	III	Major Core (II)/ DSC (II)	UMAM108	Algebra and Trigonometry		6	4
	III	Allied – I (GE)	UMAA117	Mathematical Statistics - I	UMAA115	6	4
	III	PE	UPEM101	Professional English		6	4
	IV	Value Education (VE)				2	1
					TOTAL	**36**	**23/25**
II	I	Languages / AECC –II Tamil/ Hindi/ French	UTAL207/ UTAL208/ UHIL202/ UFRL202	Basic Tamil II/ Advanced Tamil-II/ Hindi-II / French-II	UTAL205/ UTAL206/ UHIL201/ UFRL201	5	3/4
	II	Communicative English / AECC – I	UENL209/ UENL210	English for Communicative (Stream – I) / English for Communicative (Stream –II)		5	3/4
	III	Major Core III / DSC (III)	UMAM207	Vector Calculus		6	5

	III	Major Core IV / DSC(IV)	UMAM208	Analytical Geometry	UMAM105 / UMAM106	5	5
	III	Allied – II (GE)	UMAA207	Mathematical Statistics - II		6	4
	III	PE	UPEM201	Professional English II		6	4
	IV	Non Major Elective				3	2
	V	Extension Programme/ Physical Education				-	1/2
				TOTAL		**36**	**27/30**
III	I	Languages / AECC –II Tamil/ Hindi/ French	UTAL307/ UTAL308/ UHIL302/ UFRL302	Basic Tamil II/ Advanced Tamil-II/Hindi-II / French-II	UTAL305/ UTAL306/ UHIL301/ UFRL301	5	3/4
	II	Communicative English / AECC – I	UENL309/ UENL310	English for Communicative (Stream – I) / English for Communicative (Stream –II)		5	3/4
	III	Major Core V / DSC (V)_	UMAM308	Discrete Mathematics	UMAM206 / UMAM606	5	4
	III	Major Core VI/ DSC(VI)	UMAM309	Differential Equation	UMAM306 /UMAM302/ UMAM301	5	4
	III	Allied – III (GE)	UCSA304	Mathematical Programming using C	-	3	2
	III	Allied - III (GE) Practical	UCSR307	Mathematical Programming using C Practical	-	3	2
	IV	Online Course (NPTEL)				3	1/2
	IV	Value Education (VE)				2	1
					TOTAL	**31**	**20/23**
IV	I	Languages / AECC –II Tamil/ Hindi/ French	UTAL407/ UTAL408/ UHIL402/ UFRL402	Basic Tamil II/ Advanced Tamil-II/ Hindi-II / French-II	UTAL405/ UTAL406/ UHIL401/ UFRL401	5	3/4
	II	Communicative English / AECC – I	UENL409/ UENL410	English for Communicative (Stream –I) / English for Communicative (Stream –II)		5	3/4
	III	Major Core VII / DSC(VII)	UMAM407	Integral Transforms	UMAM405	4	4
	III	Major Core VIII / DSC (VIII)	UMAM408	Mechanics	UMAM406 /UMAM401	5	4
	III	Allied – IV (GE)	UPHA402	Electronics for Mathematics	-	3	2
	III	Allied – IV Practical	UPHR402	Electronics for Mathematics Practical	-	3	2
	IV	Soft Skill				2	1
	IV	Non Major Elective				3	2
	V	Extension Programme/ Physical Education				-	-/2
				TOTAL		**30**	**21/25**
V	III	Major Core IX / DSC (IX)	UMAM507	Modern Algebra	UMAM501	6	5
	III	Major Core X / DSC(X)	UMAM512	Real Analysis I	UMAM508	6	5
	III	Major Core XI / DSC (XI)	UMAM506	Number Theory	UMAM502	6	5

		Major Core XII/ DSC (XII)	UMAM510	Numerical Methods	-	6	5
		Major Core XIII/ DSC (XIII)	UMAP501/ UMAR511	Project/ R Programming	-	5	5
	IV	Value Education (VE)				2	1
					TOTAL	**30**	**25**
VI	III	Major Core XIV/ DSC (XIV)	UMAM614	Linear Algebra	UMAM604 / UMAM610	6	5
		Major Core XV/DSC (XV)	UMAM615	Real Analysis II	UMAM607 / UMAM611	6	6
		Major Core XVI/ DSC(XVI)	UMAM602	Complex Analysis	UMAM509	6	6
		Major Core XVI/ DSC(XVI)	UMAM613	Operations Research	UMAM603 / UMAM608	6	6
		Major Elective	UMAO606	Mathematics for Construction Craft	--		
			UMAO607	Mathematics in SpaceScience	--		
		Comprehensive Viva	UMAM601			-	1
	IV	Soft Skill				2	1
	V	Extension Programme/ PhysicalEducation				-	-/2
					TOTAL	**31**	**29/31**
					GRAND TOTAL	**194**	**145/159**

COURSES OFFERED TO OTHER DEPARTMENTS-UG ALLIED

Class &Major	Semester	Category	Course Code	Course Title	Previous course code	Contact Hours/ week	Credit Min/ Max
I B Com & I BCom (CA)	I	Allied	UMAA112	Business Mathematics	-	6	4
I B.SC PHY			UMAA114	Allied Mathematics I	UMAA106	6	5
I BCA			UMAA110	Mathematical Methods I	-	6	4
I B.Sc (CS)			UMAA113	Statistical Methods	-	6	4
I B.Sc (CS)	II		UMAA218	Mathematics for computer Science	-	6	4
II BCA			UMAA216	Mathematical Methods II		6	4
I B.SC PHY			UMAA222	Allied Mathematics II	UMAA212	6	5
II B.Sc Chem	III	Allied	UMAA312	Allied Mathematics for Chemistry I	UMAA304	6	5
II B.Sc BIO			UMAA307	Bio-Statistics	UMAA305	6	4
II BBA/ II B.COM/ II B.COM CA			UMAA301	Business Statistics	UMAA211/ UMAA403/ UMAA107	6	4
II B.Sc Chem	IV		UMAA408	Allied Mathematics for Chemistry II	UMAA406	6	5
II BBA			UMAA410	Quantitative techniques for Business	UMAA505	6	4

NON-MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Previous course code	Contact Hours/ week	Credit
II	IV	Non Major Elective	UMAR201	Statistics using Excel	-	3	2
			UMAE204	Basic Mathematics for Science	-	3	2
			UMAE202	Mathematics for Business andDecision Making	-	3	2
			UIDE302/ UMAE302	Numerical Methods using C++	-	3	2
			UMAE306	Operations Research for Managers	UMAE402	3	2
			UMAA501/ UMAE305	Statistical Data Analysis throughSPSS	-	3	2
			UMAE308	Mathematics for Competitive Exams	UMAE502	3	2
IV	IV	Non Major Elective	UMAE404	Mathematics for Career Development	-	3	2

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Coursecode	Course Title	Contact Hours/ week	Credit	
						Min	Max
II	III	Self Study paper	UMAI201	Summer Internship	-	-	1
IV	III	Self Study paper	UMAI401	Summer Internship	-	-	1
VI	III	Self Study paper	UMAS601 UMAS602 UMAS603 UMAS604	Fourier Transforms Simulation Number Theory Project	2	-	2

DISCRETE MATHEMATICS

UMAM308

Semester : III **Credit : 4**

Category : Major Core V / DSC (V) **Hours/Week : 5**

Class & Major : II B.Sc Mathematics **Total Hour : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Understand the logic and its normal forms.
CO 2	Discuss about the Lattices and its properties.
CO 3	Apply Boolean functions and simplify expressions using the properties of Boolean algebra.
CO 4	Evaluate Permutations & Combinations.
CO 5	Construct Finite Automation and Non Finite Automation.

UNIT –I LOGIC **12 Hour**

Logic – Introduction - TF Statements – Connectives - Atomic and Compound Statements - Well formed (statement) formulae -Truth table of a formula – Tautology – tautological - Implications and Equivalence of Formulae - Normal Forms.

UNIT – II LATTICES **12 Hour**

Lattices- Some Properties of Lattices- New Lattices-Modular and Distributive Lattices.

UNIT – III BOOLEAN ALGEBRA **14 Hour**

Boolean algebra- Boolean Polynomials - Karnaugh Map - Switching Circuits.

UNIT – IV COMBINATORICS **13 Hour**

Introduction- Permutations & Combinations- Pascal`s Identity - Vandermonde`s Identity -Pigeonhole Principle – Principle of Inclusion and Exclusion.

UNIT – V AUTOMATA THEORY **14 Hour**

Automata - Introduction - Finite Automation – Definition - Representation of Finite Automation - Acceptability of a string by a Finite Automation - Languages accepted by a Finite automation - Non -Deterministic Finite automata - Acceptability of a String by Non - Deterministic Finite Automata - Equivalence of FA and NFA - Procedure for finding an FA equivalent to a given NFA.

Text Book

- Dr. Veerarajan.T. (2007). *Discrete Mathematics with Graph Theory and Combinatorics*.Tata McGraw Hill Education Pvt. Ltd.

Reference Books

- Sundaresan.V. Ganapathy Subramanian.K.S & Ganesan.K. (2000). *Discrete Mathematics*. A.R.Publications.
- Tremblay.J.P Manohar.R (2004). *Discrete Mathematical Structure with Applications toComputer Science.* Tata McGraw Hill Publishing Company Ltd.

Course Outcomes

CO No.	The student will be able to	Cognitive Level
CO 1	Recall the logic and its normal forms.	K1
CO 2	Describe the Lattices and its properties.	K2
CO 3	Apply Boolean algebra to circuits and gating networks.	K3
CO 4	Analyse Permutations & Combinations.	K4 & K5
CO 5	Construct Automata Formal Languages in Compiling and Complexity Theory	K6

DIFFERENTIAL EQUATIONS

UMAM309

Semester	**: III**	**Credit**	**: 4**
Category	**: Major Core V / DSC (V)**	**Hours/Week**	**: 5**
Class & Major	**: II B.Sc Mathematics**	**Total Hour**	**: 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Understand Linear, Non- Linear Ordinary Differential Equations.
CO 2	Explain the Concept of second order Differential Equation
CO 3	Demonstrate second order differential equations by repeated roots.
CO 4	Illustrate Linear and Non linear partial differential equations.
CO 5	Predict the Nonlinear Partial Differential Equation by standard forms.

UNIT – I FIRST ORDER DIFFERENTIAL EQUATIONS 13 Hour

Linear Equations with Variable Coefficients – Separable Equations – Differences between Linear and Non-linear Equations – Exact Equations and Integrating Factors.

UNIT – II SECOND ORDER DIFFERENTIAL EQUATIONS 13 Hour

Homogeneous Equations with Constant Co-efficient – Fundamental Solutions of Linear Homogeneous Equations – Linear Independence and the Wronskian - Complex roots of the Characteristic Equation.

UNIT – III SECOND ORDER DIFFERENTIAL EQUATIONS [CONTD] 13 Hour

Repeated roots; Reduction of Order – Non-Homogeneous Equations; Method of Undetermined Co-efficient – Variation of Parameters.

UNIT – IV LINEAR AND NON-LINEAR PARTIAL DIFFERENTIAL EQUATIONS **13 Hour**

Introduction – Elementary Arbitrary Functions – Complete Integral, Particular Integral, Singular Integral and General Integral – Special Methods of Solution applicable to certain Standard forms - Standard form I: only p and q present Standard form II – $z = px+qy+f(p,q)$.

UNIT – V NON-LINEAR PARTIAL DIFFERENTIAL EQUATIONS **13 Hour**

Standard form III: only p, q and z present – Standard form IV: Equations of the form $f_1(x,p) = f_2(y,p)$ – Charpit`s Method - Lagrange's Method – Working rule for Solving $Pp+Qq=R$ by Lagrange's Method.

Text Books

- Boyce-Diprima. (2008). *Elementary Differential Equations.* John Wiley & sons. Inc.New York.
- Vittal. P.R. (2010). *Differential Equations, Fourier & Laplace Transforms, Probability*. Margham Publications. Chennai.

Reference Books

- Grewal.B.S. (2002) *Higher Engineering Mathematics.* Khanna Publishers. New Delhi.
- Narayanan.S & Manickavachagom Pillay, T.K. (2006). *Differential Equations and itsApplications*. Vishwanathan.S Printers & Publishers Pvt Ltd., Chennai.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Define and Explain the concept of Linear Equations with Variable Coefficients	K1
CO 2	Solve the concept of second order differential equation with Complex roots of the Characteristic Equation.	K2
CO 3	Distinguish simple problems described by second order linear differential equations with constant coefficients.	K3
CO 4	Relate Linear and Non linear partial differential equations.	K4
CO 5	Formulate the Non linear Partial Differential Equation by standard forms.	K5

INTEGRAL TRANSFORMS

UMAM407

Semester	**: IV**	**Credit**	**:4**
Category	**: Major Core VII / DSC (VII)**	**Hours/Week**	**: 5**
Class & Major	**: II B.Sc Mathematics**	**Total Hour**	**: 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Understand the Fourier series.
CO 2	Describe the ideas of Laplace Transforms
CO 3	Use Fourier transforms for solving boundary value problems.
CO 4	Equip with the methods of finding Z transforms.
CO 5	Plan the methods of solving difference equations by using Z transforms.

UNIT- I FOURIER SERIES **13 Hour**

Fourier Series – Dirichlet's Conditions – Even and odd functions– Half-range Fourier series.

UNIT - II LAPLACE TRANSFORMS **13 Hour**

Laplace Transforms – Laplace Transforms Derivatives of Integrals – Periodic Functions Inverse Laplace Transforms - Solving Differential Equations using Laplace Transforms.

UNIT- III FOURIER TRANSFORMS **13 Hour**

Fourier Integral Theorem – Complex Fourier Transform – Inversion Theorem for Complex Fourier Transform – Properties of Fourier Transforms – Convolution Theorem – Parseval's Identity

UNIT-IV Z-TRANSFORMS **13 Hour**

Definition, Example and Properties of Z-transform – The Inverse Z-transform - Power Series Method.

UNIT-V SOLUTIONS OF DIFFERENCE EQUATIONS BY USING Z-TRANSFORM **13 Hour**

Partial Fraction Method, The Inverse Integral Method – Volterra Difference equation of Convolution type, Volterra Systems – Explicit Criteria for Stability of Volterra equation – Volterra Systems

Text Books

- Vittal. P.R. (2010). *Differential Equations, Fourier & Laplace Transforms*. Probability.Margham Publications. Chennai.
- Saber N. Elaydi. (2005). *An Introduction to Difference Equations.* Springer. Verlag NewYork.

Reference Book

- Kandasamy. P. & Thilagavathy. K. (2005). *Mathematics* Volume II, IV. S.Chand Publications.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Define the Fourier series.	K1
CO 2	Describe the Laplace transform and its properties.	K2
CO 3	Apply the Fourier Transforms and its real life application.	K3
CO 4	Solve problem using Z Transform.	K3
CO 5	Predict the methods of solving difference equations by using Z transforms.	K4

MECHANICS

UMAM408

Semester : IV **Credit :4**
Category : Major Core VIII / DSC (VIII) **Hours/Week :5**
Class & Major : II B.Sc Mathematics **Total Hour :65**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Recall the concept of forces.
CO 2	Describe the forces on a rigid body
CO 3	Apply the parallel forces, couple, resultant of couple.
CO 4	Analyse projectile and evaluation of its characteristics.
CO 5	Plan to find Law force and speed of a given orbit.

PART – I STATICS

UNIT-I FORCES **13 Hour**

Forces acting at a point – Parallelogram of forces – Triangle of forces – Lami's theorem.

UNIT-II FORCES ON A RIGID BODY **10 Hour**

Moment of a force – Moment of a Force about a Line – Scalar Moment, General Motion of a Rigid Body – Equations of Motions of a Rigid Body Kinetic energy of a Rigid Body.

UNIT-III FORCES ON A RIGID BODY (CONTINUATION) **12 Hour**

Parallel Forces – Point of application of Resultant of many Parallel Forces – Varignon's Theorem – Parallel Forces at the Vertices of a Triangle – Couples - Arm and Axis of a Couple – Resultant of several coplanar forces.

PART – II DYNAMICS

UNIT –IV PROJECTILES **15 Hour**

Forces on a Projectile, Nature of trajectory, Results Pertaining to the motion of the Projectile, Impulse force, Impact of Spheres, Impact of two smooth spheres, Impact of a smooth sphere on a plane.

UNIT - V CENTRAL ORBITS **15 Hour**

Central Orbit, Differential Equation of a Central Orbit, Finding Law Force and Speed of a given orbit the Law of Force.

Text Book

- Duraipandian. P. Laxmi Duraipandian and Muthamizh Jayapragasam. (2013).*Mechanics.* S.Chand & Co Pvt. Ltd. New Delhi.

Reference Book

- Joseph F. Shelley. (2005). Vector Mechanics for Engineers Volume - I: Dynamics. Tata MC Graw Hill edition. New Delhi.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Recall the concept of forces.	K1
CO 2	Recognize the forces on a rigid body	K2
CO 3	Apply the parallel forces, couple, resultant of couple.	K3
CO 4	Illustrate impulsive forces, & different types of impact.	K4
CO 5	Evaluate Simple Harmonic and Orbital Motions	K5

ALLIED PROGRAMMES OFFERED TO OTHER DEPARTMENT

ALLIED MATHEMATICS FOR CHEMISTRY- I

UMAA312

Semester : III **Credit : 4**
Category : Allied **Hours/Week : 6**
Class & Major : II B.Sc Chemistry **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Recall the Binomial, Exponential and Logarithmic series.
CO 2	Recognize the Skew-Hermitian matrices, Orthogonal and Unitary Matrices.
CO 3	Apply the techniques in Successive Differentiation.
CO 4	Expand the Trigonometric series and its applications.
CO 5	Evaluate hyperbolic function and their properties.

UNIT-I ALGEBRA **15 Hour**

Binomial Theorem for rational Index – Exponential and Logarithmic series – Summation and Sum of Co-efficients related to Binomial, Exponential and Logarithmic series. (Only Examples).

UNIT-II MATRICES **15 Hour**

Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian matrices, Orthogonal and Unitary Matrices. Characteristic roots and characteristic vectors-Cayley- Hamilton theorem (statement only) verification, to find the inverse using the above theorem.

UNIT-III DIFFERENTIAL CALCULUS **16 Hour**

Successive differentiation – Leibenitz theorem and its applications – Maxima and Minima – Roll's Theorem and Mean Value Theorem (Only examples).

UNIT-IV TRIGONOMETRIC SERIES **16 Hour**

Complex numbers-Applications of De-Moivre's theorem-Expansions of sinnθ, cosnθ, tannθ,-Expansions of $\sin^n\theta$, $\cos^n\theta$-Expansion of sinθ, cosθ, tanθ in powers of θ.

UNIT-V HYPERBOLIC FUNCTIONS **16 Hour**

Hyperbolic Functions-Inverse Hyperbolic Functions –relation between circular and hyperbolic functions, logarithm of complex numbers.

Text Books

- Narayanan and Manicavachagom Pillay,(1996). *Algebra Volume I.* Viswanathan.S Publishers & Printers Pvt. Ltd., Chennai.
- Kandasamy.P. and Thilagavathi. K. (1998*). Allied Mathematics Volume I&II*. S.Chand and Co.
- Narayanan and Manicavachagom Pillay, (1994.) *Calculus Volume I.* Viswanathan.S Publishers & Printers Pvt. Ltd., Chennai.
- Narayanan.S & Manicavachagom Pillay.T.K, (1994.)"*Trigonometry"*, Vishwanathan.S Printers & Publishers Pvt,Lltd., Chennai.

Reference Book

- Joseph F. Shelley. (2005). Vector Mechanics for Engineers Volume - I: Dynamics. Tata MC Graw Hill edition. New Delhi.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Define the binomial, Exponential and logarithmic series.	K1
CO 2	Describe the matrices such as Skew-Hermitian matrices, Orthogonal and Unitary Matrices.	K2
CO 3	Explain the techniques for Successive Differentiation.	K3
CO 4	Formulate the expansion of Trigonometric series.	K4
CO 5	Summarize hyperbolic function and their properties	K5

BIO-STATISTICS

UMAA307

Semester : III **Credit : 4**
Category : Allied **Hours/week : 6**
Class & Major : II B.Sc Bio-Chemistry **Total Hour : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Define the basic concept & related to statistics.
CO 2	Discuss the measures of Central tendency.
CO 3	Apply the Measures of Dispersion in various fields.
CO 4	Distinguish Knowledge about correlation coefficients and regression.
CO 5	Interpret data via probability, conditional probability.

UNIT–I STATISTICAL METHODS **15 Hour**

Importance of Statistical Methods and their limitations – Collection, Classification and Tabulation of Statistical data – Diagrammatic and Graphical representation ofstatistical data.

UNIT – II MEASURES OF CENTRAL TENDENCY **15 Hour**

Measures of Central tendency – Mean, Median, Mode, Geometric Mean, Harmonicmean.

UNIT – III DISPERSION, SKEWNESS AND MOMENTS **16 Hour**

Measures of Dispersion – Range, Quartile deviation, Mean Deviation, Standard Deviation - Co-efficient of Variation – Lorenz curve - Skewness – Karl Pearson's, Bowley's and Kelly's co-efficient of Skewness – Skewness and Kurtosis based on Moments.

UNIT – IV CORRELATION AND REGRESSION ANALYSIS **16 Hour**

Correlation Analysis – Scatter Diagram – Karl Pearson's Co-efficient of Correlation – Spearman's Rank Correlation Coefficient – Co-efficient of Concurrent Deviation- Fitting of Straight line of the form $Y = ax + b$ by the method of least squares - Regression Analysis – Regression Lines – Regression Equations

UNIT – V PROBABILITY, RANDOM VARIABLES AND EXPECTATION **16 Hour**

Concept of Probability – Addition and Multiplication theorem of probability – Baye's Theorem - Concept of random variable - Distribution function – Definition of probability function for Discrete and Continuous Random Variable.

Text Book

- Pillai R.S.N. (2010). *Statistics: Theory and Practice*. S.Chand & Company Ltd. New Delhi.

Reference Books

- Gupta S.P. (2011). Statistical Methods. S.Chand & Company Ltd. New Delhi.
- Gupta.S.C. and Kapoor.V.K. (2008). Elements of Mathematical Statistics. S.Chand & Company Ltd. New Delhi.
- Snedecor G.W and Cochran W.G. (2006). Statistical Methods. Oxford Press and IBH.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Recall the Concepts of Statistics.	K1
CO 2	Illustrate the various measures of central tendency.	K2
CO 3	Apply the Measures of Dispersion in various fields.	K3
CO 4	Analyse the correlation coefficients and regression.	K3
CO 5	Evaluate the probability, conditional probability.	K4

BUSINESS STATISTICS

UMAA301

Semester : III **Credit : 4**
Category : Allied **Hours/week : 6**
Class & Major : II BBA/ II B.Com / II B.Com- CA **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Understand the various method of data collection and its diagrammatic representation
CO 2	Describe the measures of dispersion, skewness and moments.
CO 3	Apply the concepts of Correlation and Regression and its properties.
CO 4	Analyse the index number using Laspeyre's, Fishers, Paasche's methods and lot of living index numbers.
CO 5	Evaluate the Time series using measures of trend and measure of seasonal variation.

UNIT- I STAGES OF STATISTICAL SURVEY AND AVERAGES 15 Hour

Introduction- Nature, Scope and limitations of Statistics in Business – Collection of Data - Classification and Tabulation of data - Diagrammatic and Graphical Representation of data - Measures of Central tendency – Mean, median, mode, Geometric mean, Harmonic mean, quartiles, deciles, percentiles.

UNIT- II DISPERSION, SKEWNESS AND MOMENTS 15 Hour

Measures of Dispersion – Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation, Lorenz Curve - Skewness – Definition - Types of Skeweness – Absolute and Relative Measure of Skewness - Karl Pearson's Coefficient of Skewness, Bowley's Coefficient of Skewness & Kelly's coefficient of Skewness - Moments – Measures of Skewness and Kurtosis based on Moments

UNIT- III CORRELATION AND REGRESSION ANALYSIS 16 Hour

Correlation Analysis - Types of Correlation - Methods of Measuring Correlation - Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation coefficient – Regression Analysis - Regression Lines - Regression Equations.

UNIT- IV INDEX NUMBERS 16 Hour

Index numbers – Unweighted index numbers – Simple Aggregate Method – Simple Average of Price Relatives Method- Weighted Index Numbers – Weighted Aggregate Method –

Weighted Average of Price relatives method – Time reversal and factor reversal test - cost of living index number.

UNIT- V ANALYSIS OF TIME SERIES **16 Hour**

Time series – Components of Time series – Trend, seasonal variation, cyclical variation , irregular variation – methods of measuring trend – graphical method, semi average method, moving average method, method of least squares- methods of measuring seasonal variation- simple average method, ratio to moving average method.

Text Book

- Gupta S.P. (2006). *Statistical Methods.* S.Chand & Company Ltd. NewDelhi.

Reference Books

- Agarwal B.L. (2006). Basic Statistics. New Age International Publishers. (4th edn).
- Pillai R.S.N. (2010). Statistics: Theory and Practice. S.Chand & Company Ltd. New Delhi.
- Elhance D.N and Veena Elhance and Agarwal B.M. (2018). Fundamental of statistics. Kitab Mahal.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Understand the various methods of collection of data and representing through diagrams and graphs.	K1
CO 2	Recognise the concepts of measures of dispersion.	K2
CO 3	Explain the Correlation and Regression.	K3
CO 4	Evaluate index number using Laspeyre's, Fishers, Paasche's methods and lot of living index numbers.	K4
CO 5	Discuss and evaluates time series using measures of trend and measure of seasonal variation.	K5

ALLIED MATHEMATICS FOR CHEMISTRY –II
UMAA408

Semester : IV **Credit : 4**
Category : Allied **Hours/Week : 6**
Class & Major : II B.Sc Chemistry **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Understand the concept of Integrals.
CO 2	Recognize the Integration by parts and its applications.
CO 3	Apply the Full range Fourier series and half range Fourier series.
CO 4	Analyse the Laplace transform and inverse Laplace transform for solving ordinary differential equation with constant coefficient
CO 5	Design the Homogeneous Linear Differential Equations of the Second Order with Variable co-efficient.

UNIT-I INTEGRALS **15 Hour**

Integration by Substitution, Integration of Rational and Irrational Function of the form - Properties of Definite Integrals.

UNIT-II INTEGRALS (CNTD) **15 Hour**

Integration by parts-Double integrals-Applications of double integrals - areas.

UNIT-III FOURIER SERIES **16 Hour**

Fourier series for functions in $[0, 2\pi]$ and $[-\pi, \pi]$

UNIT-IV LAPLACE TRANSFORMS **16 Hour**

Laplace transform of functions - Inverse Laplace transforms - Application of Laplace Transforms in solving Differential Equations.

UNIT-V DIFFERENTIAL EQUATIONS **13 Hour**

Formation of Partial Differential Equation - Second Order Differential equations with Constant co-efficient - Homogeneous Linear Differential Equations of the Second Order with Variable co-efficient.

Text Books

- Manicakavachagam Pillai *T.K* (2001). *Ancillary Mathematics Integral Calculus*, S.Viswanathan Publishers & Printers.

Reference Books

- Narayanan and Manichavaschagam Pillay. (2000). Ancillary Mathematics, S.Viswanathan (Publishers & Printers) Pvt, Ltd.
- Grewal.B.S. (2002) Higher Engineering Mathematics. Khanna Publishers. New Delhi.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Recall the Integrals.	K1
CO 2	Recognize the applications of double integrals.	K2
CO 3	Apply the Fourier series, half range Fourier series.	K3
CO 4	Analyse the Laplace transform and inverse Laplace transform	K4
CO 5	Evaluate the partial differential equation and finding its solution.	K5

QUANTITATIVE TECHNIQUES FOR BUSINESS

UMAA410

Semester : IV **Credits : 4**
Category : Allied **Hours/Week : 6**
Class & Major: II BBA **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Knowledge about the linear programming problem in industry.
CO 2	Understand the techniques in Transportation Problem.
CO 3	Apply the assignment Problem.
CO 4	Analyze Game theory problems in business situations.
CO 5	Create the Network scheduling by PERT/CPM.

UNIT-I LINEAR PROGRAMMING PROBLEM **15 Hour**

Mathematical Formulation of the Problem- Graphical Solution Method- Some Exceptional Cases- General Linear Programming Problem- The Computational Procedure- Use of Artificial Variable Techniques- Big- M Method. Simple problems.

UNIT-II TRANSPORTATION PROBLEM **15 Hour**

General Transportation Problem-The Transportation Table-Loops in Transportation Tables-Solution of a Transportation Problem-Finding an Initial Basic Feasible Solution-Test for Optimality-Degeneracy in Transportation Problem-Transportation Algorithm (MODI Method). Simple problems.

UNIT-III ASSIGNMENT PROBLEM **16 Hour**

Mathematical Formulation of the problem- the Assignment method- Special Cases in Assignment Problem. Simple problems.

UNIT-IV GAME THEORY **16 Hour**

Two-person Zero-sum Games- Some Basic Terms- The Maximin - Minimax Principle- Games Without Saddle Points-Mixed Strategies- Graphic Solution of 2xn and mx2 Games- Dominance Property Simple problems.

UNIT-V NETWORK SCHEDULING BY PERT/CPM **16 Hour**

Network and Basic Components- Logical Sequencing- Rules of Network Construction- Critical Path Analysis- Probability Considerations in PERT- Distinction between PERT and CPM. Simple problems.

Text Book:

- Kanti Swaroop. Gupta P.K. and Manmohan. (2003). *Operation Research.* Sultan Chand & Sons. Delhi.

Reference Books:

- Kapoor .V.K. (2018). Introduction to Operation Research. Sultan Chand & Sons. Delhi.
- Sharma S.D. (2012). Operation Research. Kedar Nath Ram Nath & Co.
- Taha.A Hamdy.(2000). Operation Research - An Introduction. (6th edn) Prentice Hall of India Pvt Ltd. New Delhi.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Recall the Linear Programming Problem in industry.	K1
CO 2	Recognise the techniques in Transportation Problem.	K2
CO 3	Formulate the assignment Problem.	K3
CO 4	Analyze Game theory problems in business situations.	K3
CO 5	Construct the Network scheduling by PERT/CPM.	K4

MATHEMATICS FOR CAREER DEVELOPMENT

UMAE404

Semester : IV **Credit : 2**
Category : Non Major Elective **Hours/Week : 3**
Class & Major : II UG **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO 1	Knowledge about the Number System, Simplification using Formula and Rule.
CO 2	Understand the averages and Percentage.
CO 3	Apply the Profit and loss in real life.
CO 4	Analyze the Time and Work Concept and its Application to Cisterns and Pipes.
CO 5	Evaluate the problems of time and distance & boats and streams.

UNIT I NUMBER SYSTEM **7 Hour**

Number System – Simplification using formulae and rules – L.C.M and H.C.F of 2 or more numbers

UNIT II AVERAGE AND PERCENTAGE **8 Hour**

Averages - Percentage

UNIT III PROFITAND RATIO **8 Hour**

Profit and Loss -Ratio and Proportion

UNIT IV TIME AND WORK **8 Hour**

Time and Work – Cisterns and Pipes

UNIT V TIME AND DISTANCE **8 Hour**

Time and Distance –Boats and Streams

Text Book

- Dr. Aggarwal R.S. (2017). *Quantitative Aptitude for Competitive Examinations.* Sultan Chand & Sons. Delhi.

Reference Books

- ParveenKumar. (2020). Arithmetic for Competitive Exam. S D Publications.
- Dinesh Khattar. (2019). Quantitative Aptitude for Competitive Examinations. Pearson. India.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Demonstrate Number System, Simplification using Formula and Rule.	K1
CO 2	Compute Averages, Percentage and Data Representation through Diagram.	K2
CO 3	Use the Profit and loss in real life situations..	K3
CO 4	Explain the concept of Time and Work	K4
CO 5	Construct the Time and Distance concept and Apply to Cisterns and Pipes.	K5

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course code	Course Title	Component III	Component IV
III	Core V	UMAM308	Discrete Mathematics	Term Paper	Problem Solving
	Core VI	UMAM309	Differential Equation	Term Paper	Problem Solving
IV	Core VII	UMAM407	Integral Transforms	Assignment	Problem Solving
	Core VIII	UMAM408	Mechanics	Model Building	Seminar

III &IV EVALUATION COMPONENTS OF CIA-Allied

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Allied	UMAA307	Bio-Statistics	Assignment	Problem Solving
		UMAA312	Allied Mathematics for Chemistry -I	Assignment	Problem Solving
		UMAA301/ UMAA211/ UMAA403/ UMAA107	Business Statistics	Assignment	Problem Solving
IV		UMAA408	Allied Mathematics for Chemistry – II	Assignment	Problem Solving
		UMAA410/ UMAA505	Quantitative techniques for Business	Assignment	Problem Solving

III & IV EVALUATION COMPONENTS OF CIA-NME

Semester	Category	Course code	Course Title	Component III	Component IV
IV	NME	UMAE404	Mathematics for Career Development	Assignment	Problem Solving

PROGRAMME PROFILE M.Sc. (MATHEMATICS)

PREAMBLE

PG : Programme Profile, list of Courses offered to the other Departments and the Syllabi ofCourses offered in the III and IV Semesters (With Effect From 2021-2023 Batch Onwards)

PSO 1 : Understanding of Advanced Concepts, Principles and Techniques from Pure & Applied Topics in Mathematics and Application of Problem -Solving Skills.

PSO 2 : Development of Abstract Mathematical Thinking and Mathematical Intuition.

PSO 3 : Assimilation and Communication of detailed Technical Arguments.

PSO4 : Proficiently to Construct and Formulate Logical Arguments, Conjectures and Construction of Rigorous Proof by Abstracting Principles.

PSO 5 : Ability to carry out extended Investigation of Mathematical Work as various Projects Independently.

Semester	Category	Course Code	Course Title	Previous course code	Contact Hrs/ Week	Credit Min/ Max
I	Major Core I / DSC I	PMAM108	Abstract Algebra	PMAM107	6	4
	Major Core II/ DSC II	PMAM102	Real Analysis	-	6	4
	Major Core III / DSC III	PMAM103	Ordinary Differential Equations	-	6	4
	Major Core IV / DSC IV	PMAM105	Calculus Of Variations And Integral Equations	-	6	4
	Major Core V / DSC V	PMAM106/ PMAM407	Fuzzy Analysis	-	6	4
			TOTAL		**30**	**20**
II	Major Core VI/ DSC VI	PMAM210	Linear Algebra	PMAM209	5	4
	Major Core VII / DSC VII	PMAM202	Measure and Integration	-	5	4
	Major Core VIII / DSC VIII	PMAM206	Partial Differential Equations	-	5	4
	Major Core IX / DSC IX	PMAM207	Classical Mechanics		5	4
	Major Core X / DSC X	PMAM208	Operations Research		5	4
	Non Major Elective				5	4
	Service Learning	PMAX201/ PMAX202	Mathematics for High School Students \Elementary Mathematics for Higher Secondary Students		-	1
	Online Course	PONL201	NPTEL		-	1 /2
	Internship	PMAI201	Internship / Field Work / Field Project (30 Hours)	-	-	- / 1
			TOTAL		**30**	**25 / 28**
	Major Core XI / DSC XI	PMAM305	Complex Analysis	-	6	4
	Major Core XII / DSC XII	PMAM310	Fluid Dynamics	-	6	4
	Major Core XIII / DSC XIII	PMAM314	Topology	PMAM311	6	4
	Major Core XIV / DSC XIV	PRMC301	Research Methodology	-	5	4

III	Major Core XV/DSC XV	PMAI312	Number Theory andCryptography	-	5	4
	Major Core XVI/ DSC XVI	PMAP401	Project	-	2	-
			TOTAL		**30**	**20**
IV	Major Core XVII / DSCXVII	PMAM405	Functional Analysis	-	6	5
	Major Core XVIII / DSCXVIII	PMAM410	Probability theory	-	6	5
	Major Core XIX / DSCXIX	PMAM409	Numerical Analysis	-	7	5
	Major Core XX / DSC XX	PMAM411	Differential Geometry	PMAM403	6	5
	Major Core XXI / DSCXXI	PMAP401	Project	-	4	5
	Internship	P MAI401	Internship / Field Work / FieldProject (30 Hours)	-	-	- / 1
	Library				1	-
			TOTAL		**30**	**25**
			GRAND TOTAL		**120**	**90/ 93**

PROGRAMMES OFFERED TO OTHER DEPARTMENTS – PG

Semester	Category	Course Code	Course Title	Contact Hrs/ Week	Credit Min/ Max
II	Non Major Elective	PMAE201	LaTeX and MaTLab	3	4
	Practical		LaTeX and MaTLab	2	
	Non Major Elective	PMAE202	Operations Research	5	4
		PMAE203	Discrete mathematics	5	4
		PMAE204	NET/SET/ Competitive Exam	5	5

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course code	Course Title	Hrs/ week	Credit Min /Max
III	Self-Study Paper	PMAS301/	Difference Equation	2	-/1
		PMAS302	Combinatorial Analysis	2	-/1

COMPLEX ANALYSIS

PMAM305

Semester : II **Credit : 4**
Category : Core XI **Hours/Week : 6**
Class & Major: II M. Sc. Mathematics **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the basics of complex line integral and Cauchy theorem.
CO-2	Recognize the Definite integrals and Schwarz theorem.
CO-3	Apply the Arzela's theorem.
CO-4	Analyse the Riemann Mapping Theorem.
CO-5	Create the fascinating world of elliptic functions which is markedly different from analyzing real variable.

UNIT-I THE GENERAL FORM OF CAUCHY THEOREM 15 Hour

Chains and cycles – Simple continuity – Homology – The General statement of Cauchy's Theorem – Proof of Cauchy's Theorem – Local exact differential – Multiply connected regions – Residue Theorem – The Argument Principle.

UNIT-II EVALUATION OF DEFINITE INTEGRALS AND HARMONIC FUNCTIONS AND POWER SERIES EXPANSIONS 16 Hour

Evaluation of Definite Integrals – Schwarz Theorem – Weierstras-p s Theorem – Taylor's Series –Laurent Series.

UNIT-III PARTIAL FRACTION AND ENTIRE FUNCTIONS 15 Hour

Gamma Function - Equicontinuity -Normality and compactness - Arzela's theorem-Families of analytic function-The Classical definition.

UNIT-IV RIEMANN MAPPING THEOREM 16 Hour

Statement and Proof - Behavior at an angle - Schwarz - Christoffel formula – Mapping on a rectangle - Functions with mean value property – Harnacks principle.

UNIT-V ELLIPTIC FUNCTIONS 16 Hour

Simply Periodic Functions - Doubly Periodic Functions.

Text Book

- Lars V. Ahlfors. (1979). *Complex Analysis.* [3rd Edn]. McGraw Hill. New York.

Reference Books

- Conway J.B. (1978). *Functions of one complex variables*. Springer – Verlag, International student Edition, Narosa Publishing Co.
- Hille E. (1959). *Analytic Function Theory* [2 vols]. Gonm & Co.
- Heins M. (1968). *Complex Function Theory*. New York, Acamedic Press.
- Presfly H.A. (1990). *Introduction to Complex Analysis*. Clarendon Press, Oxford.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Recognize good foundation on Cauchy theorem at advanced level.	K1
CO 2	Demonstrate the Definite Integrals of entire functions	K2
CO 3	Test in-depth understanding of Entire functions.	K3
CO 4	Analyse the Functions with mean value property.	K4
CO 5	Develop Insight into periodic functions.	K5

FLUID DYNAMICS

PMAM310

Semester : III **Credit : 4**
Category : Core XII **Hours/Week : 6**
Class &Major : II M.Sc Mathematics **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the physical properties of a fluid and the consequence of properties on fluid flow.
CO-2	Identify the equations of motions of a fluid element.
CO-3	State the Three Dimensional Flows.
CO-4	Analyse the two dimensional Flows.
CO-5	Create models of viscid, steady fluid flow over simple profiles and shapes.

UNIT – I KINEMATICS OF FLUIDS IN MOTION **16 Hour**

Real Fluids and ideal fluids – Velocity of a fluid at a point – Streamlines and Pathlines – Steady and Unsteady Flows – The Velocity Potential, the Vorticity vector – Local and particle rates of change – The Equations of Continuity – Conditions at a rigid boundary – General analysis of Fluid Motion.

UNIT- II EQUATIONS OF MOTION OF A FLUID **14 Hour**

Pressure at a point in a fluid at rest – pressure at appoint in a moving fluid – conditions at a boundary of two inviscid immiscible fluids - Euler's equations of motion – Bernoulli's equation

UNIT- III THREE DIMENSIONAL FLOWS **14 Hour**

Introduction- Sources sinks and doublets – Images in a rigid infinite plane – images in solid spheres – Axis - symmetric flows – strokes stream function – symmetric irrotational motions.

UNIT- IV TWO DIMENSIONAL FLOWS **18 Hour**

Meaning of two dimensional flow – Use of cylindrical polar coordinates – The stream function – The complex potential for two – Dimensional, irrotational, incompressible flow – Complex velocity potentials for standards two dimensional flows- uniform stream – Line sources and line sinks – Line doublets – Line votices, Mline Thomson circle theorem –The theorem of Blasius.

UNIT-V VISCOUS FLOW **16 Hour**

Stress components in real fluid – relations between Cartesian components of stress – translational motion of fluid element – the rate of strain quadric and principal stresses – some further properties of rate of strain quadric – stress analysis in fluid motion – the coefficient of viscosity and laminar flow – the navier – strokes equations of motion of a viscous fluid.

Text Book

- Chorlton .F. (2004). *Text book of Fluid Dynamics.* CBS Publishers & Distributors. New Delhi.

Reference Books

- Batcherlor.C.K. (2000). *An Introduction to fluid Mechanics.* Cambridge University Press.
- Miline and Thomson L.M.(2013). *Theoretical Hydrodynamic.* 1962.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Understand the fluids based on the physical properties of a fluid.	K1
CO 2	Descibe the kinematical properties of a fluid element.	K2
CO 3	Test in-depth understanding of three dimensional flows.	K3
CO 4	Analyse the two dimensional flows.	K4
CO 5	Construct models of viscous flow.	K5

TOPOLOGY

PMAM314

Semester : III **Credit : 4**
Category : Core XIII **Hours/Week : 6**
Class &Major: II M.Sc Mathematics **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Recall Metric space, Open set, Closed set theorems, completeness and Continuous Function
CO-2	Recognize the concept of continuous mappings between topological spaces.
CO-3	Explain the Urysohn metrization theorem and Tychonoff theorem
CO-4	Find the basics of connectedness and compactness of a topological space.
CO-5	Construct the Weierstrass Approximation Theorem.

UNIT-I METRIC SPACES **16 Hour**

Partially Ordered Set and Lattices – Metric Spaces – Definitions and Examples –Open Sets– Closed sets – Convergence, Completeness and Baire's theorem – Continuous Mappings – Spaces of Continuous Function – Euclidean and Unitary Spaces.

UNIT-II TOPOLOGICAL SPACES & COMPACTNESS **16 Hour**

Definitions and Examples – Elementary Concepts – Open base and Open Sub base – Weak Topologies – The Function Algebras – Compactness – Compact Spaces – Product Spaces – Tychonoff's Theorem and Locally Compact Spaces – Compactness for Metric Spaces – Ascolis Theorem.

UNIT-III SEPARATION **16 Hour**

T_1 spaces Hausdroff's spaces – Completely Regular Spaces and Normal Spaces – Urysohn's Lemma and Tietze Extension Theorem – The Urysohn's Embedding Theorem – The Stone-Cech Compactification.

UNIT-IV CONNECTEDNESS **14 Hour**

Connected Spaces – The Components of a Space – Totally Disconnected Spaces – Locally Connected Spaces.

UNIT-V APPROXIMATION **16 Hour**

The Weierstrass Approximation Theorem – The Stone -Weierstrass Theorem – Locally Compact Hausdorff Spaces – The Extended Stone - Weierstrass Theorem.

Text Book

- George F. Simmons. (1999). *Introduction to Topology and Modern Analysis*. McGraw Hill, New Delhi.

Reference Books

- Dugunji.J., (1975). *Topology.* Prentice Hall of India, New Delhi.
- Munkers R James. (2002). *A first course in Topology*. Pearson Education. Pvt.Ltd. New Delhi.

COURSE OUTCOMES

CO No.	**The student will be able to**	**Cognitive Level**
CO 1	Recognize terms, definitions and theorems related to metric spaces.	K1
CO 2	Demonstrate concepts such as open and closed sets, interior, closure and boundary.	K2
CO 3	Examine Urysohn's Lemma and Tietze Extension Theorem.	K3
CO 4	Describe the theoretical concepts of the Components of a Space.	K4
CO 5	Develop new topological spaces by using Weierstrass Theorem.	K4

RESEARCH METHODOLOGY
PRMC301

Semester	**: III**	**Credit**	**: 4**
Category	**: Core XIV**	**Hours/Week**	**: 5**
Class &Major	**: II M. Sc Mathematics**	**Total Hours**	**: 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the Basic Concepts of Research using various Methodologies
CO-2	Identify Appropriate Research Topics
CO-3	Select appropriate Research Problem and Parameters
CO-4	Prepare A Project Proposal (To Undertake A Project)
CO-5	Organize and Conduct Research (Advanced Project) in a more appropriate Manner and write a Research Report.

UNIT I INTRODUCTION TO RESEARCH METHODOLOGY 7 Hour

Meaning of research – Objective of Research – Motivation in Research – Types of Research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical – Research Approaches – Significance of Research – Research Methods versus Methodology – Research and Scientific Methods – Importance of Knowing How Research is Done – Research Process – Criteria for Good Research.

UNIT II RESEARCH PROBLEM AND RESEARCH DESIGN 15 Hour

Research Problem – Selecting Research Problem – Necessity of Defining A Problem – Techniques of Defining Problem – Formulation of Research Problem, Objectives of Research Problem. Meaning of Research Design – Need for Research Design – Important Concept Related to Research Design – Different Research Designs – Basic Principles of Experimental Design; Important Experimental Design.

UNIT III SAMPLING DESIGN, DATA COLLECTION AND ANALYSIS 18 Hour

Census And Sample Surveys – Characteristics of Good Sample Design – Different Types of Sample Designs – Techniques of Selecting a Random Sample-Accepts of Method Validation – Observation and Collection of Data – Methods of Data Collection – Sampling Methods – Data Processing and Analysis Strategies and Tools – Data Analysis with Statically Package (Sigma STAT,SPSS For Student T-Test, ANOVA, Etc.), Hypothesis Testing.

UNIT IV INTERPRETAION, REPORT WRITING, RESEARCH ETHICS AND IPR 15 Hour

Interpretation and Report Writing – Meaning of Interpretation; Techniques of Interpretation; Precautions in Interpretation; Significance of Report Writing, Layout of Research Report, Types of Reports; Presentation of Research Work-Oral, Poster and Writing Research Paper; Precautions for Writing Research Report, Conclusion.

Ethics-Ethical Issues, Related to Research, IPR-Intellectual Property Rights in Research and Development-Patents and Patent Laws: Objectives of the Patent System - Basic, Principles and General Requirements of Patent Law.

UNIT V INTRODUCTION AND TOOLS FOR TO LATEX **10 Hour**

Basic LaTex – Sample document and Key Concepts – Type style – Lists – Tables – vertical and horizontal spacing- Some common structures – mathematical symbols – arrays – space – change style – List - Defining commands and environment – Figures and tables – Tabular environment - sectioning – declaration – change the type style – accents – symbols.

Text books

- Kothari, C. R. (1980). Research Methodology: Research and techniques, New Delhi: New Age International Publishers
- Carlos, C.M.,2000.Intellectual property rights. the WTO and developing countries: the TRIPS agreement and policy options. ZedBooks, New York.
- Beier F.K, Crespi R.S and Straus T. Biotechnology and Patent protection, Oxford and IBH Publishing Co. New Delhi.
- Darren George and Paul Mallery – SPSS for Windows, Pearson Education
- David F Griffiths and Desmond J. Higham," *Learning LaTex",* SIAM (Society for Industrial and Applied Mathematics) Publishers, Phidel Phia, 1996.

References

- Kothari, C. R. (1990). Research Methodology: Research and techniques, New Delhi: New Age International Publishers.
- Singh, Y. K. (2006). Fundamental of Research Methodology and Statistics. New Delhi. New International (P) Limited, Publishers.
- Wallinman, N. (2006). Your Research Project: A step-by-step guide for the first-time researcher. London: Sage Publications
- Senthil Kumar Sadasivam and Mohammed Jaabir M. S. (2008). IPR, Biosafety andBiotechnology Management, Jasen Publications, India.
- Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

e-Books

- http:// www.ptt.ed/-super7/430114401/4391.ptt/.
- https://www.heacademy.ac.uk/system/files/msor.3.Is.pdf
- 164.100.133.129.81/econtent/uploads/research-methods.pdf

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Recall the concepts of research Methodology.	K1
CO 2	Recognise the Research problem and research design.	K2
CO 3	Apply some data in research questions to do better research.	K3
CO 4	Appraise a research proposal or industry project plan.	K4
CO 5	Design the documentation and ethics proposals.	K5

NUMBER THEORY AND CRYPTOGRAPHY
PMAI312

Semester : III **Credit : 4**
Category : Core XV **Hours/Week : 5**
Class &Major : II M.Sc Mathematics **Total Hours :65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Recall the Divisibility and congruences.
CO-2	Recognize the congruences and primitive roots.
CO-3	Relate security concepts of Cryptography.
CO-4	Analyse Symmetric Key Ciphers.
CO-5	Construct code in cryptographic hash functions.

UNIT - I DIVISIBILITY **13 Hour**

Introduction – Divisibility – Primes – The Binomial Theorem – Congruences – Euler's totient - Fermat's, Euler's and Wilson's Theorems – Solutions of congruences – The Chinese Remainder theorem.

UNIT - II CONGRUENCES **13 Hour**

Techniques of numerical calculations – Prime power Moduli – Primitive roots and Power Residues – Congruences of degree two - Number theory from an Algebraic Viewpoint

UNIT - III SECURITY CONCEPTS **13 Hour**

Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms. Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - IV SYMMETRIC KEY CIPHERS **13 Hour**

Block Cipher principles, DES, AES, Blowfish, Block cipher operation, Stream ciphers, Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman Key Exchange.

UNIT – V CRYPTOGRAPHIC HASH FUNCTIONS **13 Hour**

Message Authentication, Secure Hash Algorithm, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys.

Text Books

- Ivan Niven. Herbert S. Zuckerman and Hugh L. Montgomery.(2004). *An Introduction to the Theory of Numbers*, Fifth edn., John Wiley & Sons Inc.
- William Stallings,.(2017). *Cryptography and Network Security – Principles and*
- *Practice*. Pearson Education, 6th Edn.

Reference Books

- David M. Burton W.M.C. (1989). Elementary Number Theory. Brown Publishers. Dubuque, Lawa.
- George Andrews. (1994). Number Theory. Courier Dover Publications.
- William J. Leveque. (1977). Fundamentals of Number Theory. Addison-Wesley Publishing Company, Phillipines.
- C K Shyamala, N Harini, Dr T R Padmanabhan, (2011). Cryptography and Network Security. Wiley India, 1st Edition.
- Forouzan Mukhopadhyay ,.(2011). Cryptography and Network Security. Mc Graw Hill, 3rd Edition.
- Atul Kahate, (2017). Cryptography and Network Security. Mc Graw Hill, 3rd Edition.

COURSE OUTCOMES

CO No.	**The student will be able to**	**Cognitive Level**
CO 1	Recall the Divisibility and congruences.	K1
CO 2	Understand the Primitive Roots and power residues.	K2
CO 3	Test different types of security codes and their techniques.	K3
CO 4	Compare the algorithms required for public key cryptography.	K4
CO 5	Construct cryptographic and number-theoretic algorithms.	K5

FUNCTIONAL ANALYSIS
PMAM405

Semester : IV **Credit : 5**
Category : Core XVII **Hours/Week : 6**
Class &Major: II M. Sc. Mathematics **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Recall the topological-algebraical structures and properties of banach spaces.
CO-2	Recognize the Banach spaces, the spectral theorem and some of its applications.
CO-3	Apply the Hilbert Space in Normal and Unitary Operators.
CO-4	Find the fixed point theorem and spectral theorem of banach algebras.
CO-5	Evaluate the structure of commutative Banach algebras.

UNIT-I BANACH SPACES **16 Hour**

Definition –Some examples-Continous Linear Transformation –The Hahn-banach theorem-The natural embedding of N in N^{**}.

UNIT-II BANACH SPACES AND HILBERT SPACES **16 Hour**

Open Mapping Theorem-Conjucate of an operator-Definition and some simple properties-Orthogonal sets.

UNIT-III HILBERT SPACES **16 Hour**

Conjucate space H^*-Adjoint of operator-Self-adjoint operator-Normal and Unitary Operators-Projections.

UNIT-IV PRELIMINARIES ON BANACH ALGEBRAS **15 Hour**

Definition and some examples-Regular and single elements-Topological divisors of zero-Spectrum-The formula for the spectral radius-The radical and semi-simplicity.

UNIT-V STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS **15 Hour**

Gelfand Mappping-Application of the formula $r[x]=\lim \|x^n\|^{1/n}$-Involutions on Banach Algebras-Gelfand-Neumark Theorem.

Text Book

- G.F.Simmons, (1963). *Introduction to topology and Modern Analysis.* McGraw Hill international Book Company,New York.

Reference Books

- Bachman & L.Narici, (1966). *Functional Analysis.* Academic Press, New york.
- E.Kreyszig. (1978). *Introduction of Functional Analysis with Application.* Johu Wiley & Sons, New York.
- Goffman. H.C., Fredrick, G., (1987). *First course in Functional Analysis,* Prentice Hall of India, New Delhi.
- W.Rudin, (1963). *Functional Analysis,* Tata McGraw Hill Book Company , New Delhi.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Describe the fundamental properties of banach spaces.	K1
CO 2	Implement Operator theory of Operators on a Hilbert space.	K2
CO 3	Test the notions of dot product and Hilbert space.	K3
CO 4	Analyse the spectral theorem to the resolution of integral equations.	K4
CO 5	Create the fixed point theorem to solve differential equations and integral equations.	K5

PROBABILITY THEORY

PMAM410

Semester : IV **Credit : 5**
Category : Core XVIII **Hours/Week : 6**
Class &Major : II M.Sc Mathematics **Total Hours : 78**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Recall the concepts of Probability.
CO-2	Recognise the Conditional probability and expectation.
CO-3	Calculate discrete probability distributions by applying probability laws and theoretical results.
CO-4	Calculate and interpret joint distribution function.
CO-5	Evaluate moment generating Functions and weak law of large numbers..

UNIT-I **16 Hour**

Basic concepts – Sample space and events – Axioms of probability – Some simple propositions – equally likely outcomes – Probability as a continuous set function - Probability as a measure of belief.

UNIT- II **16 Hour**

Conditional probabilities – Baye‟s formula – Independent events – P(./F) is a probability – random variables – Expectation of a function of a random variable – Bernoulli, Binomial and Poisson random variables.

UNIT-III **15 Hour**

Discrete probability distributions – Geometric, Negative Binomial and Hypergeometric random variables – the zeta (z;pf) distribution – continuous random variables – the uniform and normal random variables – exponential random variables – other continuous distributions – the distribution of a function of a random variable.

UNIT-IV **15 Hour**

Joint Distribution functions – Independent random variables – Their sums – conditional distribution – Joint probability distribution of functions – expectation – variance – covariance – conditional expectation and prediction.

UNIT-V **15 Hour**

Moment generating function – general definition of expectation – limit theorems – Chebyshev‟s inequality – weak law of large numbers – central limit theorems – the strong law of large numbers – other inequalities.

Text Book

- Sheldon Ross, (2008). *A First Course in Probability*. Maxwell Macmillan International Edition, Maxmillar, New York, 6th Edition.

Reference Books

- K.L.Chun, (1974). A Course in Probability Academic Press, New York.
- R.B.Ash,(1972). Real Analysis and Probability. Academic Press, New York.
- R.Durrett, "Probability Theory and Examples", (2nd Edition) Duxbury press.
- V.K.Rohatgi, (1983). An Introduction to Probability Theory And Mathematical Statistics, (3rd Edition) Wiley Eastern LTd., New Delhi.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Discuss the formulation of modern Probability Theory.	K1
CO 2	Interpret conditional probability models and function of random variables based on single & multiples random variables.	K2
CO 3	Examine and apply the concept of discrete and continuous random variable.	K3
CO 4	Select the concept of joint distribution function.	K4
CO 5	Develop the specific applications to moments generating functions.	K5

NUMERICAL ANALYSIS
PMAM409

Semester : IV **Credit : 5**
Category : Core XVIII **Hours/Week : 7**
Class &Major: II M.Sc Mathematics **Total Hours : 91**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Recall the concepts of Transcendental and polynomial equations.
CO-2	Recognise the system of linear algebraic equations and eigen value problems.
CO-3	Calculate interpolation and approximation.
CO-4	Find the concept of differentiation and integration through numerical methods
CO-5	Evaluate the concept of integration for solving ordinary differential equations. .

UNIT – I TRANSCENDENTAL AND POLYNOMIAL EQUATIONS 18 Hour

Rate of convergence – Secant Method – Regula Falsi Method – Muller Method – Chebyshev Method. Polynomial equations: Descartes' Rule of Signs – Iterative Methods: Birge-Vieta method – Bairstow's method Direct Method – Graeffe's root squaring method.

UNIT - II SYSTEM OF LINEAR ALGEBRAIC EQUATIONS AND EIGEN VALUE PROBLEMS 19 Hour

Error Analysis of Direct methods – Operational count of Gauss elimination, Vector norm, Matrix norm, Error Estimate. Iteration methods - Jacobi iteration method – Gauss Seidel Iteration method – Successive Over Relaxation method – Convergence analysis – iterative methods for A^{-1} – Optimal Relaxation parameter for the SOR method. Eigen values and Eigen vectors – Jacobi method for symmetric matrices – Power methods only.

UNIT - III INTERPOLATION AND APPROXIMATION 18 Hour

Hermite Interpolations – Piecewise and Spline Interpolation – Piecewise Linear Interpolation – Piecewise Quadratic Interpolation – Piecewise Cubic Interpolation – Spline Interpolation- Quadratics Spline Interpolation – Cubic Spline Interpolation. Bivariate Interpolation – Lagrange Bivariate Interpolation. Least Square Approximation.

UNIT - IV DIFFERENTIATION AND INTEGRATION 18 Hour

Numerical Differentiation – Optimum Choice of Step-length – Extrapolation methods – Partial Differentiation – Numerical Integration – Methods based on undetermined coefficients : Gauss Legendre Integration method and Lobatto Integration Methods only.

UNIT - V ORDINARY DIFFERENTIAL EQUATIONS 18 Hour

Single Step Methods: Local Truncation Error or Discretization Error – Order of a Method – Runge-Kutta Methods – Explicit Runge–Kutta Methods – Minimization of Local Truncation Error – System of Equations – Implicit Runge-Kutta Methods. Stability Analysis of Single Step Methods (RK Methods Only).

Text Book

- M.K. Jain, S.R.K. Iyengar and R.K. Jain, (2012). *Numerical Methods for Scientific and Engineering Computation*, New Age International (p) Limited Publishers, New Delhi, Sixth Edition.

Reference Books

- Kendall E. Atkinson, (1988). An Introduction to Numerical Analysis, II Edn., John Wiley & Sons.
- M.K. Jain, (1983). Numerical Solution of Differential Equations, II Edn., New Age International Pvt Ltd.
- Samuel. D. Conte, Carl. De Boor, (1983). Elementary Numerical Analysis, Mc Graw-Hill International Edn.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Identify the Transcendental and Polynomial equations.	K1
CO 2	Describe the error analysis, error estimate and Power method.	K2
CO 3	Examine and apply the concept of least square approximation.	K3
CO 4	Select the concept of Numerical integration and numerical differentiation for research.	K4
CO 5	Develop the applications on ordinary differential equations.	K5

DIFFERENTIAL GEOMETRY

PMAM411

Semester : IV **Credit : 5**
Category : Major Core XX / DSC XX **Hours/Week : 6**
Class &Major: II M.Sc Mathematics **Total Hour :78**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the concept of curvature of a space curve and signed curvature of a plane curve, fundamental theorem for plane curves, space curves.
CO-2	Recognise the intrinsic properties of a surface.
CO-3	Discuss the geodesics on a surface and their Characterization.
CO-4	Analyse the Second Fundamental Form and curvature.
CO-5	Formulate the Fundamental Equations of Surface Theory.

UNIT-I SPACE CURVES **16 Hour**

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 curves – Helices.

UNIT-II INTRINSIC PROPERTIES OF A SURFACE **16 Hour**

Definition of a Surface – Curves on a Surface – Surface of Revolution – Helicoids – Metric – Direction Coefficients – Families of Curves – Isometric Correspondence – Intrinsic properties.

UNIT-III GEODESICS **16 Hour**

Geodesics – Canonical Geodesic Equations – Normal Property of Geodesics – Existence Theorems – Geodesic Parallels – Geodesics Curvature – Gauss Bonnet Theorem – Gaussian Curvature – Surface of Constant Curvature.

UNIT-IV NON INTRINSIC PROPERTIES OF A SURFACE **15 Hour**

The Second Fundamental Form – Principal Curvature – Lines of Curvature – Developable – Developable associated with Space Curves and with curves on surface – Minimal surfaces – Ruled surfaces.

UNIT-V FUNDAMENTAL EQUATIONS OF SURFACE THEORY **15 Hour**

Fundamental Equations of Surface Theory – Tensor Notations- Gauss Equations – Weingarten Equations - Mainardi – Codazzi Equations - Fundamental Existence theorem for Surfaces.

Text Book

- Somasundaram D. (2005). *Differential Geometry*, A First Course. Narosa Publishing House. New Delhi.

Reference Books

- Willmore. T.J. (2002). An Introuduction to Differential Geometry. Oxford University Press. (17th impression) New Delhi
- Thorpe J.A.(1979). Elementary topics in Differential Geometry Under graduate Texts in Mathematics. Springer – Verlag.
- Wilhelm Klingenberg. (1978). A course in Differential Geometry. Graduate Texts in Mathematics. Springer – Verlag.

COURSE OUTCOMES

CO No.	The student will be able to	Cognitive Level
CO 1	Recall the Fundamental Existence theorem for Space curves.	K1
CO 2	Explain the fundamentals of differential geometry primarily by focusing on the surfaces.	K2
CO 3	Examine and apply the concept of Geodesics.	K3
CO 4	Analyse the concept of Non intrinsic properties of a surface.	K4
CO 5	Develop arguments in the geometric description of curves and surfaces	K5

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course code	Course Title	Component III	Component IV
III	CoreXI	PMAM305	Complex Analysis	Term Paper	Seminar
	Core XII	PMAM310	Fluid Dynamics	Poster Presentation	Seminar
	Core XIII	PMAM311	Topology	Term Paper	Seminar
	Core XIV	PRMC301	Research Methodology	Term Paper	Seminar
	Core XV	PMAI312	Number Theory and Cryptography	Term Paper	Seminar
IV	Core XVII	PMAM405	Functional Analysis	Poster Presentation	Seminar
	Core XVIII	PMAM410	Probability Theory	Assignment	Seminar
	Core XIX	PMAM409	Numerical Analysis	Problem Solving	Seminar
	Core XX	PMAM411	Differential Geometry	Term Paper	Seminar

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

PREAMBLE

UG : Programme Profile- List of Courses offered to other Departments and Syllabi of Courses in the III and IV Semesters along with Evaluation Components III and IV (With effect from 2021-2024 Batch Onwards) and

PG : Programme Profile- List of Courses offered and Syllabi of Courses in the III and IV Semesters along with Evaluation Components III and IV (With effect from 2021-2023 Batch Onwards).

PROGRAMME PROFILE B.Sc. (COMPUTER SCIENCE)

(LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK)

PSO 1: Understood the appropriate techniques to design, implement, and evaluate computer-based system process, & component to get results on desired needs.

PSO 2: Learnt to engage in development of current technical concepts and Broadest context of technological change.

PSO 3: Ability to have the required skills of IT industries as well as software developer, database administrator, programmer, system analyst, data scientist, web application developer, system programmer, software testing, expert system designer.

PSO 4: Inculcate effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PSO 5: Identified solutions for complex problems and design system components or processes that meet the specified needs for the societal and environmental Considerations.

PSO 6: Gained the ethical principles of legal, security, social issues and responsibilities.

PSO 7: Generate the impact of the professional techniques solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/ Week	Credit Min/Max
I	I	Language	UTAL107/ UTAL108	Languages/ AECC-II Tamil-I/ Hindi-I/ French-I (2 Levels)	UTAL105/ UTAL106/ UHIL101/ UFRL101	5	3/4
	II	English	UENL109/ UENL110	English for Communication (Stream-I) / English for Communication (Stream-II)	UENL107/ UENL108	5	3/4
	III	Major Core (DSC) - I	UCSM110/ UCAM110	Principles of Information Technology	UCSM108	5	4
	III	Major Core (DSC) - II	UCSM109/ UCAM111	Programming Methodology	-	4	4
	III	Major Core (DSC) - III	UCSR110/ UCAR106	Programming Methodology – Practical	-	3	2
	III	Allied (GE) - I	UMAA114	Mathematics for Computer Science	-	6	4
	III	Professional English	UPEM101	Professional English I	-	6	4
	IV	Value Education (SEC)				2	1
					Total	**36**	**25/27**
II	I	Language	UTAL207/ UTAL208	Languages/ AECC-II Tamil-II/ Hindi-II/ French-II (2 Levels)	UTAL205/ UTAL206/ UHIL201/ UFRL201	5	3 /4
	II	English	UENL209/ UENL210	English for Communication (Stream-I)/ English for Communication (Stream-II)/	UENL207/ UENL208	5	3/4
	III	Major Core (DSC) - IV	UCSM207/ UCAM206	Data Structures	UCSM206	4	4
	III	Major Core (DSC) - V	UCSM208/ UCAM207	Python Programming	-	4	4
	III	Major Core (DSC) - VI	UCSR207/ UCAR205	Data Structures using Python – Practical	UCSR206	3	2
	III	Allied (GE) - II	UMAA218	Mathematics for Computer Science	-	6	4
	III	Professional English	UPEM201	Professional English II	-	6	4
	IV	NME (Skill Enhancement Course)					
		Internship	UCSI201	Internship/ Field work/ Field Project		-	-/1 (Extra Credit)

	V	Extension Programme / Physical Education/ NCC				-	1/2
					Total	**33**	**25/29**
III	I	Language	UTAL307/ UTAL308	Languages/ AECC-II Tamil-III/ Hindi-III/ French-III(2 Levels)	UTAL305/ UTAL306 UHIL301/ UFRL301	5	3 /4
	II	English	UENL309/ UENL310	English for Communication (Stream-I)/ English for Communication (Stream-II)	UENL307/ UENL308	5	3 /4
	III	Major Core (DSC) - VII	UCSM305	Java Programming	UCSM304	5	5
	III	Major Core (DSC) - VIII	UCSM307	Software Engineering	UCSM511	4	4
	III	Major Core (DSC) - IX	UCSR308	Java Programming – Practical	UCSR305	3	2
	III	Allied (GE) – V	UPHA304	Electronics for Computer Science	-	3	3
	III	Allied (GE) –VI	UPHR304	Electronics for Computer Science– Practical	-	3	2
	IV	Value Education (SEC)				2	1
					Total	**30**	**23/25**
IV	I	Language	UTAL407/ UTAL408	Languages/ AECC-II Tamil-IV/ Hindi-IV/ French-IV(2 Levels)	UTAL405/ UTAL406/ UHIL401/ UFRL401	5	3 /4
	II	English	UENL409/ UENL410	English for Communication (Stream-I)/ English for Communication (Stream-II)	UENL407/ UENL408	5	3/ 4
	III	Major Core (DSC) - X	UCSM409	Operating Systems		5	5
	III	Major Core (DSC) - XI	UCSR412	Operating System Practical	UCSR411	4	3
	III	Allied (GE) – IX	UPHA403	Digital Electronics for Computer Science	UPHA303	3	3
	III	Allied (GE) - X	UPHR403	Digital Electronics for Computer Science – Practical	UPHR303	3	2

	IV	NME (Skill Enhancement Course)				3	2
	IV	Online Courses		NPTEL/SPOKEN TUTORIAL/SWAYAM		3	1/2
	IV	Soft Skill (SEC)				2	1
		Internship	UCSI401	Internship/ Field work/ Field Project		-	-/1 (Extra Credit)
	V	Extension Programme / Physical Education				-	0/2
					Total	**33**	**23/28**
V	III	Major Core (DSC) - XII	UCSM506	Middleware Technologies	-	5	5
	III	Major Core (DSC) - XIII	UCSM510	Computer Networks		**5**	**4**
	III	Major Core (DSC) - XIV	UCSM512	Database Management System	UCSM509	4	4
	III	Major Core (DSC) - XV	UCSR512	Middleware Technologies – Practical	UCSR509	4	3
	III	MAJOR ELECTIVE (Discipline Specific Elective)– XVI	UCSO501/ UCSO502/ UCSO503	Computer Ethics/ Computer Graphics/ Data Mining	-	5	4
	III	Major Core (DSC) - XVII	UCSP501	Project	UCSP601	5	5
	IV	Value Education				2	1
					Total	**30**	**26**
VI	III	Major Core (DSC) - Core XVIII	UCSM612	Cloud Computing	-	**5**	**5**
	III	Major Core (DSC) - XIX	UCSM614	Bigdata Tools	UCSM610	5	4
	III	Major Core (DSC) - XX	UCSM615	Internet of Things	UCSO608	5	4
	III	Major Core (DSC) - XXI	UCSR608	Bigdata Tools Practical	-	4	4
	III	Major Core (DSC) - XXII	UCSR609	Cloud Computing- Practical	UCSR508	4	3
	III	MAJOR ELECTIVE	UCSO609/ (UCSO610/	Artificial Intelligence/ Open Source Technology/	-	5	4

		(Discipline Specific Elective)– XXIII	UCSM613)/ UCSO606	Network Security			
	III	Viva – Voce	UCSM611	Comprehensive Viva Voce	-	-	1
	IV	Soft Skill (SEC)				2	1
		Internship	UCSI601	Internship/ Field work/ Field Project		-	-/1 (Extra Credit)
					Total	**30**	**26/27**
					Grand Total	**192**	**148/162**

ALLIED COURSES OFFERED TO OTHER DEPARTMENTS

Class & Major	Semester	Category	Course Code	New Course Title	Previous Course Code	Contact Hour/ Week	Credit Min/Max
B.Com with Computer Applications	I	Allied	UCSA105	Multimedia	UCSA303	3	3
	I	Allied Practical	UCSR111	Multimedia Lab	UCSR306	3	2
	II	Allied	UCSA205	C Programming	UCSA104	3	3
	II	Allied Practical	UCSR208	C Programming Lab	UCSR110	3	2
	III	Allied	UCSA307	Object Oriented Programming	UCSA204	3	3
	III	Allied Practical	UCSR311	Object Oriented Programming – Lab	UCSR207	3	2
	IV	Allied	UCSA408	Fundamentals of Blockchain Technology	UCSA305	3	3
	IV	Allied Practical	UCSR414	Blockchain Technology Using Solidity – Lab	UCSR309	3	2
	V	Allied	UCSA510	Digital Marketing Analytics	UCSA406	3	3
	V	Allied Practical	UCSR513	Web Design using Microsoft Expression Web4 – Lab	UCSR412	3	2
BBA, B.Com and B.COM (IAT)	IV	Allied	UCSA409	Business Analytics and Intelligence.	UCSA509	3	3
	IV	Allied Practical	UCSR415	Business Analytics and Intelligence - Lab	UCSR512	3	2
Tamil	V	Allied	UCSA505	Tamil Kanini	-	3T + 2P	5
Maths	III	Allied	UCSA304	Mathematical Programming using C	-	3	3
	III	Allied Practical	UCSR307	Mathematical Programming using C – Lab	-	3	2

	V	Allied	UCSA507	Object Oriented Programming using Java	-	3	3
	V	Allied Practical	UCSR508	Object Oriented Programming using Java - Lab	-	3	2
Physics	III	Allied	UCSA306	Computational Physics with Python	-	3	3
	III	Allied Practical	UCSR310	Computational Physics with Python – Lab	-	3	3

NON-MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/week	Credit Min/Max
II	IV	Non Major Elective	UCSE206	Tableau Programming	UCSE202	2T+2P	2
			UCSE207	Python Programming	UCSE203	4P	2
			UCSE208	R Programming	UCSE204	4P	2
			UCSE209	Arduino Programming	UCSE205	4P	2
			UCSE210	Go Programming	-	4P	2
IV	IV	Non Major Elective	UCSE406	DIGITAL DESIGN	-	4P	2
			UCSE407	DATA VISUALIZATION	-	4P	2

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Course Code	Course Title	Contact Hour/week	Credit	
						Min	Max
V	III	Self Study Paper	UCSS501	Python Programming	2	1	1
V	III	Self Study Paper	UCSS502/ UCAS502	Android Applications	2	1	1
VI	III	Self Study Paper	UCSS601/ UCAS601	Angular JS	2	1	1
VI	III	Self Study Paper	UCSS602/ UCAS602	Green Computing	2	1	1

JAVA PROGRAMMING

UCSM305/ UCAM310

Semester : III **Credit : 5**
Category : Core VII **Hour/Week : 5**
Class & Major : II B.Sc. CS **Total Hour : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Acquire the knowledge of OOPs.
CO-2	Understand the concepts of class and methods.
CO-3	Learn java's exception handling mechanism, multithreading, packages and interfaces.
CO-4	Analyze different string function
CO-5	Develop Graphical User Interface (GUI) or windows-based applications in java.

UNIT -I INTRODUCTION **10 Hour**

Fundamentals of Object Oriented Programming: Java Evolution – Overview of Java Language – Data Types, variables, arrays – Operators – Control statements.

UNIT –II CLASSES AND METHODS **15 Hour**

Introduction to classes – class fundamentals – Declaring objects – Constructors – Methods and Classes – Overloading methods – static - final - Nested and Inner classes – Inheritance – Method Overriding – Abstract Classes – Packages – Interfaces.

UNIT – III EXCEPTION HANDLING AND FILES **15 Hour**

Exception handling – Types of Exception – try and catch – nested try – throw and throws – Multithreading Programming –I/O Streams – Reading and Writing files – Reading and writing Console I/O.

UNIT – IV STRING HANDLING AND APPLETS **15 Hour**

String Handling- String Operations: Comparison – Modifying String – String Buffer - Applet Class – Applet Architecture – The HTML Applet Tag – Passing parameters in Applets – Applet Context – Improving the Banner Applet – get() Method - JDBC Concepts.

UNIT – V AWT **10 Hour**

AWT classes – Window fundamentals – Working with Frame windows, Graphics – Controls – Layout Managers - Java Swing.

Text Books

- Herbert Schildt, Java - The Complete Reference, Tata McGraw Hill, 10th Edition,Nov 2017.

Reference Books

- E. Balagurusamy , Programming with Java A Primer, Tata McGraw Hill, FourthEdition, 2010.
- Cay S. Horst Mann & Gary Cornell, *Core java*, Volume II (9th ed.), Sun Microsystems Press Java Series, 2012.

e-Resources

- https://nptel.ac.in/courses/106105191
- http://www.w3schools.com/html/
- https://www.youtube.com/watch?v=oqJy4e6Aa0M
- https://www.youtube.com/watch?v=7r3Vln4bGLk

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand object oriented programming features and concept	K1,K2
CO-2	Learn different types of inheritance, polymorphism, interfaces and packages.	K3
CO-3	Identify the concepts of Multithreading and Exception handling to develop efficient and error free codes.	K4
CO-4	Compare different string function.	K5
CO-5	Implement windows based application in java	K6

SOFTWARE ENGINEERING
UCSM307

Semester : III **Credit : 4**
Category : Major Core (DSC) - VIII **Hour/Week : 4**
Class & Major : III B.Sc. Computer Science **Total Hour : 52**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the significance of various process models.
CO-2	Familiarize on system engineering and data modeling concepts
CO-3	Explore the various design processes
CO-4	Analyze the project management, estimation, software quality and testing strategies
CO-5	Express the flow of any Software Project

UNIT-I SOFTWARE PROCESS AND AGILE DEVELOPMENT 10 Hour

Introduction to Software Engineering-Software Process-Perspective and Specialized Process Models-Introduction to Agility-Agile Process-Extreme Programming-XP Process

UNIT-II REQUIREMENTS ANALYSIS AND SPECIFICATION 10 Hour

Software Requirements: Functional and Non-Functional - User Requirements - System Requirements - Software Requirements Document - Requirement Engineering Process - Feasibility Study - Requirement Elicitation and Analysis – Requirements – Validation - Requirements Validation - Require Management - Classical Analysis - Structured System Analysis-Petri Nets, Data Dictionary.

UNIT-III SOFTWARE DESIGN 11 Hour

Design Process:Design Concepts-Design Models-Architectural Design: Architectural Design – Defining Archetypes-Refining the Architecture components – Architectural Design for Web Apps and Mobile Apps -User Interface Design-Interface Analysis-Component Level Design-Designing Class based Components-Traditional Components. Web-app Design: Design goals – WebApp Interface Design –Content Design – Architecture Design – Navigation Design. Mobile app Design: Developing MobileApps – MobileApp Design.

UNIT-IV TESTING AND MAINTENANACE 10 Hour

Software Testing Strategies: Strategic Approach – Testing Strategies for Conventional Software – WebApps – MobileApps. Validation Testing-System Testing and Debugging. Software Implementation Techniques-Coding Practices-Refactoring. Maintenance and Reengineering: BPR model-Reengineering Process Model-Reverse and Forward Engineering

UNIT-V PROJECT MANAGEMENT **11 Hour**

Project Management: 4P's. Estimation for Software Projects: Software Project Estimation- Decomposition Techniques – LOC-FP based estimation. Empirical Estimation Models: COCOMO II Model. Project Scheduling: Project Scheduling-Earned Value Analysis-Planning-Project Plan-Planning Process. Risk Management: Risk Identification-RMMM plan-CASE TOOLS.

Text Books:

- Roger S.Pressman, Bruce R. Maxim(2014),*Software Engineering-A Practitioners Approach*. McGraw-hill International (8th Ed.)
- Richard E. Fairley (2016),*Principles of Software Engineering*, Wiley–Blackwell

Reference Books:

- Rajib Mall.(2009),*Fundamentals of Software Engineering*,.PHI learning private limited. -(3rd Ed.).
- Ian Sommerville.(2011), *Software Engineering*, Pearson Publication,(9th Ed.)

e-Resources:

- http://vlabs.iitkgp.ernet.in/se/
- http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/sw_engg/labs/index.php
- https://nptel.ac.in/courses/106105182

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Recall and understand various software processing models and requirement engineering	K1,K2
CO-2	Determine the requirements and design the process	K3
CO-3	Analyze project estimation, scheduling and software quality.	K4
CO-4	Evaluate various models and post development activities.	K5
CO-5	Design a software application that satisfies user requirements	K6

JAVA PROGRAMMING – PRACTICAL
UCSR308 / UCAR304

Semester	**: III**	**Credit**	**: 2**
Category	**: Core IX**	**Hour/Week**	**: 3**
Class & Major	**: II B.Sc. Computer Science**	**Total Hour**	**: 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Acquire knowledge of designing process.
CO-2	Understand the 3D image objects
CO-3	Develop the visual image & messages.
CO-4	Create graphic design in Greetings with corel draw.
CO-5	Design the party invitation card & a story board.

Lab Exercises

1. Classes and Objects
2. Constructors
3. Method Overloading
4. Implementing Single and Multiple Inheritance concepts.
5. Method Overriding
6. Implementing Package Concepts.
7. Implementing Interfaces Concepts.
8. Implementing Exception Handling.
9. Implementing Thread Synchronization
10. Implementing String manipulation using string and string buffer classes
11. Implementing Graphics using Applet.
12. Implementing Swing Concepts.
13. JDBC Connectivity

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Recall and understand various software processing models and requirement engineering	K1,K2
CO-2	Determine the requirements and design the process	K3
CO-3	Analyze project estimation, scheduling and software quality.	K4
CO-4	Evaluate various models and post development activities.	K5
CO-5	Design a software application that satisfies user requirements	K6

OPERATING SYSTEM
UCSM409/UCSM609

Semester	**: IV**	**Credit**	**: 5**
Category	**: Core X**	**Hour/Week**	**: 5**
Class & Major	**: III B.Sc. Computer Science**	**Total Hour**	**: 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand different types and services of Operating Systems.
CO-2	Explain the process, memory and various scheduling algorithms
CO-3	Analyze the Memory management algorithms, allocation methods and virtual memory implementations.
CO-4	Determine the various algorithms using file organization techniques
CO-5	Improve various issues in Inter Process Communication (IPC) and their security in Linux operating system.

UNIT – I OVERVIEW OF OPERATING SYSTEM **13 Hour**

Operating system – Types of Computer Systems Computer-system operation – I/O structure – System components – System calls – System programs – Process concept – Process scheduling – Operations on processes –Interprocess communication – Multithreading models – Threading issues.

UNIT – II PROCESS MANAGEMENT **13 Hour**

Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation – Process Scheduling Models - Synchronization hardware – Semaphores – Classic problems of synchronization – Deadlock characterization – Methods for handling deadlocks – Recovery from deadlock

UNIT – III MEMORY MANAGEMENT **13 Hour**

Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing.

UNIT – IV FILE CONCEPT **13 Hour**

Access methods – Directory structure – File-System Mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management.

UNIT – V LINUX SYSTEM **13 Hour**

History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Security

Text Books

- Silberschatz, Galvin and Gagne, Operating System Concepts, Sixth Edition, John Wiley & Sons Inc, New Delhi, 2012.

- Richard Fox, Linux with Operating System Concepts, Second Edition, Pearson Education, 2014.

Reference Books

- Andrew S. Tanenbaum , Operating system Design and Implementation, Fourth Edition, PHI, New Delhi, 2010.
- H M Deital, P J Deital and D R Choffnes, Operating Systems, Pearson Education, New Delhi, 2013.

e-Resources

- http://www.w3schools.com
- http://www.youtube.com

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the basic structure of Operating Systems	K1
CO-2	Apply various scheduling algorithms in process management	K2,K3
CO-3	Compare the various memory management techniques.	K4
CO-4	Classify the different disk scheduling and allocation methods.	K5
CO-5	Formulate Linux Kernel modules.	K6

OPERATING SYSTEM -PRACTICAL
UCSR412

Semester : IV **Credit : 3**
Category : Major Core (DSC) – XI **Hour/Week: 4**
Class &Major : II B.Sc Computer Science **Total Hour : 52**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	State and Understand the concepts, structure and design of operating systems
CO-2	Describe the memory management process.
CO-3	Classify the scheduling concepts.
CO-4	Determine the concept of String operations
CO-5	Develop skills of file handling operations& Process Management

LAB EXERCISES

1. Programs using the following system calls of UNIX operating system fork, getpid, exit,close, opendir, readdir.
2. Implement the concepts
   a. Priority Scheduling Algorithm
   b. Round Robin Scheduling Algorithm
   c. FCFS Scheduling Algorithm

3. Producer-Consumer Problem Using Semaphores
4. Dead Lock
    a. Avoidance
    b. Prevention
5. Memory Management Techniques
    a. Multi Programming with Fixed Number of Tasks(MFT)
    b. Multi Programming with Variable Number of Tasks(MVT)
6. File Organization Techniques
    a. Single Level Directory
    b. Two Level Directory
7. File Allocation Strategies
    a. Sequential
    b. Indexed
    c. Linked
8. Develop a shell program to
    a. Check the given number is odd or even.
    b. Find the factorial of a given number.
    c. Swap two integer numbers.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Examine knowledge about Operating System, Memory Management and scheduling concepts.	K1
CO-2	Recall & Relate the concepts, structure and design of operating systems	K2
CO-3	Discuss and compare the differing structures of operating systems	K4
CO-4	Investigate the features of Unix Operating System to implement, Memory Management and scheduling concepts	K6
CO-5	Compare the performance of various CPU Scheduling Algorithms & IPC, Process Management	K4/K5

OBJECT ORIENTED PROGRAMMING
UCSA307

Semester : III **Credit : 3**
Category : Allied **Hour/Week : 3**
Class &Major: II B.com CA **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand Object Oriented Programming concepts and basic characteristics of Java
CO-2	Explain the concepts of exceptions and use of virtual Functions
CO-3	Apply Constructors and overloading for java applications.
CO-4	Develop a java application with interfaces and generics classes
CO-5	Design and build simple Graphical User Interfaces

UNIT- I BASICS OF OOPS **7 Hour**

Principles of Object Oriented Programming - Basic concepts of OOP - Benefits of OOP - Object Oriented Language Applications of OOP. Classes and Objects - Constructors and Destructors - Type Conversions.

UNIT- II INHERITANCE AND POLYMORPHISM **8 Hour**

Inheritance - Polymorphism - Function and Operator Overloading - Virtual Functions – Arrays, Pointers and References – Exception Handling.

UNIT- III FUNDAMENTALS OF JAVA **8 Hour**

Introduction : Data Types - Literals - Variables - Type Conversion and Casting – Operators and Expressions – Arrays – Strings. **Class Fundamentals:** Declaring Class Objects Constructors - Garbage Collection – The finalize () Method - Overloading Methods - Argument Passing – Recursion.

UNIT- IV INHERITANCE AND INTERFACES **8 Hour**

Inheritance: Using Super - Method Overriding - Abstract Classes - The final Keyword. **Interfaces:** -Structure of an Interface – Interface Inheritance.

UNIT- V APPLET **8 Hour**

The Java Applet Class and Interfaces – Sample Programs.

Text Books

- Herbert Schildt, "*The Complete Reference C++*", 5th edition, Tata McGraw-Hill Publishing, New Delhi, 2015
- Balagursamy E - "Object Oriented Programming with C++", Tata McGraw Hill Publications, 6th Edition, 2013.

- Patric Naughtonand Herbert Schildt, "*The Complete Reference Java 2",* TataMcGraw Hill Publishers, 2017.
- E. Balagurusamy, *"Programming with Java - A Primer",* Tata McGraw-Hill Publish., 5th Edition, 2013.

Reference Books

- Barbara Johnston, C++ Programming Today, Pearson education/Prentice-Hall of India, ISBN 81-317-1079-3, 2011.
- C. Xavier, "Programming with Java 2", Scitech Publications., 2005.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand the basics of object-oriented programming concepts.	K1&K2
CO-2	Apply the concepts of inheritance.	K3
CO-3	Analyze the concepts of classes and objects.	K4
CO-4	Compare the difference between overloading and overriding	K5
CO-5	Develop Simple Java Programs using Applet	K6

OBJECT ORIENTED PROGRAMMING LAB
UCSR311

Semester : III **Credit : 2**
Category : Allied **Hour/Week : 3**
Class &Major: II B.com CA **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand and apply the concepts of classes, Constructors and Destructors in C++ and Java
CO-2	Apply the concepts of Inheritance, Overloading and exception handling in C++ and Java
CO-3	Analyze the concepts of Abstract classes and Interfaces in C++ and Java
CO-4	Devise applications using generic programming and event handling in java
CO-5	Develop software development skills using java programming for real-world applications.

Lab Exercise

(FINANCE ORIENTED CONCEPTS)

C++:

1. Classes and Objects
2. Constructors and Destructors.
3. Function and Operator overloading
4. Inheritance
5. Exceptions.

Java:

1. Classes and Objects
2. Constructors
3. Method Overloading and Method Overriding
4. Abstract Class and Interface
5. Applet

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand the concepts of class, constructor and destructor in c++ and Java.	K1,K2
CO-2	Apply overloading concepts in oops.	K3
CO-3	Construct simple applications that make use of classes, packages and interfaces.	K4
CO-4	Develop and implement Java programs with array list, exception handling and multithreading.	K5
CO-5	Design applications using file processing, generic programming and event handling.	K6

FUNDAMENTALS OF BLOCKCHAIN TECHNOLOGY

UCSA408

Semester : IV **Credit : 3**
Category : Allied **Hour/Week : 3**
Class &Major: II B.com CA **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the concepts of block chain and its architecture.
CO-2	Discuss the concepts of digital signatures.
CO-3	Acquire the knowledge of Bitcoin and block Mining.
CO-4	Analyze multicoin stream and explorer.
CO-5	Build applications on Hyperledger Fabric

UNIT – I INTRODUCTION TO BLOCKCHAIN – I (BASICS) 8 Hour

Block chain – History of Block chain 2.0 - Architecture : Block in a Block chain Transactions – How to create and connect to a Block chain - Concepts and benefits of block chain- Components in Blockchain design.

UNIT – II BLOCKCHAIN – II (BASICS) 8 Hour

Conceptualization - Cryptographic Hash Function - Properties of a Hash Function - Wallets - Digital Signature - Public Key Cryptography - Blockchain-as-a-Service (BaaS) – Decentralized Autonomous Organization (DAO) - DAO Structure – Smart Contract.

UNIT – III BITCOIN BASICS 7 Hour

Creation of Coins - Bitcoin scripting - Bitcoin P2P Network - Transaction in Bitcoin Network - Block Mining - Block propagation and block relay.

UNIT – IV MULTICHAIN 8 Hour

Multichain - Compatibility & Differences with Bitcoin Core - Working with Multichain Streams - Multichain Explorer - Checking PoE in using Multichain.

UNIT – V HYPERLEDGER FABRIC 8 Hour

Hyperledger Fabric - Comparison between Fabric & Other Technologies - Fabric Architecture - Components - Advantages - Goals of Hyperledger - Hyperledger Fabric Network Setup.

Case Study: Blockchain Applications Blockchain in Healthcare ,Blockchain in Energy Markets,Blockchain in Media

Text Books

- AndreasAntonopoulos,"Mastering Bitcoin: Unlocking Digital Cryptocurrencies",Published December 27th 2014 by O'Reilly Media (first published July 1st 2014)
- Melanie Swan, "Blockchain", O'Reilly media, February- 2015

Reference Books

- Andreas M. Antonopoulos, "Mastering Bitcoin: Programming the Open Blockchain", 2nd Edition, June, 2017.
- Alan T.Norman , "Blockchain Technology Explained: The Ultimate Beginner's Guide", Dec 12, 2017

e-Recourses

- https://www.amazon.com/Hands-Blockchain-Hyperledger-decentralized-applications/dp/1788994523
- https://github.com/HyperledgerHandsOn/trade-finance-logistics
- The Basics of Blockchain
- Hyperledger Fabric - https://www.hyperledger.org/projects/fabric

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand the concepts of block chain fundamental and its components.	K1,K2
CO-2	Demonstrate the application of hashing and public key cryptography in protecting the blockchain	K3
CO-3	Perform a transaction in bitcoin P2P Network	K4
CO-4	Explain the elements of trust in a Blockchain: validation, verification, and consensus.	K5
CO-5	Develop smart contracts in Hyperledger framework	K6

BLOCKCHAIN TECHNOLOGY USING SOLIDITY LAB

UCSR414

Semester : IV **Credit : 2**
Category : Allied **Hour/Week : 3**
Class &Major: II B.com CA **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand primary principles of Blockchain technology
CO-2	Apply the Blockchain concepts in real time
CO-3	Analyze the concept of mapping used in block chain.
CO-4	Importing other source files
CO-5	Working with Ethereum Blockchain

Lab Exercises

1. Smart Contracts in Ethereum
2. Importing other Source Files
3. Value or Data Types
4. Strings & Operators
5. Arrays
6. Data Structures
7. Mappings
8. Control Structures
9. Functions
10. Inheritance

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand block chain technology	K1,K2
CO-2	Integrate ideas from various domains and implement them using block chain technology in different perspectives.	K3
CO-3	Analyze control structure and inheritance.	K4
CO-4	Compare different data structures used in block chain.	K5
CO-5	Develop block chain based solutions and write smart contract using Ethereum frameworks	K6

BUSINESS ANALYTICS AND INTELLIGENCE

UCSA409

Semester : IV **Credit : 3**
Category : Allied **Hour/Week : 3**
Class &Major: II B.com, B.com (IAT), BBA **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the concepts of business problems and its solutions.
CO-2	Apply Excel and Excel add-instructions to solve business problems
CO-3	Analyze different strategy level
CO-4	Summarize data mining process
CO-5	Develop business intelligent system.

UNIT-I INTRODUCTION **7 Hour**

Business Intelligence: overview-need for Business Intelligence-information and knowledge- Role of Mathematical models- characteristics of business intelligence -structure and componentsof business intelligence.

UNIT- II ANALYTICS STRATEGY **8 Hour**

Business Analytics at the strategic level: Strategy and BA-Link between strategy and Business Analytics-BA supporting strategy at functional level-Functions-information as strategic resource.

UNIT -III DATA VISUALIZATION **8 Hour**

Data visualization-Online Analytical Processing (OLAP)-Reports and Queries - Multidimensionality Advanced Business Analytics.

UNIT -IV DATA MINING **8 Hour**

Data Mining definition, objetives and benefits Methods-Applications of DM -Data Mining Software Tools-Data Mining Process-Text and Web DM. Business Analytics at Analytical level : Statistical data mining-descriptive Statistical methods-data mining with target variables.

UNIT-V BUSINESS INTELLIGENCE **8 Hour**

Business Intelligence Architectures: Cycle of Business Intelligence Analysis-Development of Business Intelligence System- spread sheets. BI Tools: Concept of dashboard.BI Applications in different domains- CRM, HR.

Text Book

- Turban, Sharda. (2014). *Decision Support and Business Intelligence Systems.* (4^{th}ed).Delen, Pearson.

Reference Books

- Olivia Parr Rud. (2009). Business Intelligence Success Factors Tools for aligning your business in the global economy. John Wiley and Sons.
- Steve Williams and Nancy Williams. (2007). The Profit impact of Business Intelligence. Morgan Kauffman Publishers Elsevier.
- Gert H.N. Laursen & Jesper Thorlund. (2010). Business Analytics for Managers: Taking Business Intelligence beyond reporting. Wiley and SAS Business Series.

E-Resources

- http://www.w3schools.com/html/
- https://www.tutorialspoint.com/management_information_system/business_intel ligence_system.h tm

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand and critically apply the concepts and methods of business analytics	K1,K2
CO-2	Identify, model and solve decision problems is different areas.	K3
CO-3	Analyze different analytical processing	K4
CO-4	Interpret data mining tools	K5
CO-5	Develop business application in different domains	K6

BUSINESS ANALYTICS AND INTELLIGENCE USING SAS LAB
UCSR415

Semester : IV **Credit : 2**
Category : Allied **Hour/Week : 3**
Class &Major: II B.com, B.com (IAT), BBA **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the concepts of SAS platform for alter, manage and retrieve data
CO-2	Apply filtering methods
CO-3	Analyze the SAS provides of graphical point-and-click user interface.
CO-4	Import Excel to SAS
CO-5	Implement the statistical data for non-technical users

Lab Exercise

1. Logging on to the SAS platform via SAS Enterprise Guide
2. Creating and saving a project SAS Enterprise Guide
3. Importing an Excel File into SAS.
4. Output Formats.
5. Expression builder to create variable using query.
6. Exploring Output Formats and Setting Default
7. Exploring the Data and Creating a Basic Report
8. Summary statistics.
9. Filtering
10. Graphical Exploration

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand the concept of a SAS Enterprise Guide.	K1,K2
CO-2	Identify, model and solve decision problems is different areas.	K3
CO-3	Analyze different analytical processing	K4
CO-4	Interpret the numerical and pictorial summaries of data for Distribution Analysis.	K5
CO-5	Develop the various applications for statistical analysis of data.	K6

MATHEMATICAL PROGRAMMING USING C
UCSA304

Semester : III **Credit : 3**
Category : Allied **Hour/Week : 3**
Class &Major: II B.Sc Maths **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the concept of Structured Programming Language.
CO-2	Apply the different operators in c programming language
CO-3	Analyze the control statements.
CO-4	Explain functions and pointers
CO-5	Implement structure and union in c

UNIT - I INTRODUCTION **7 Hour**

Basic Structure of C programs - Executing C program -C fundamentals: character set – Identifiers and keywords – data types – constants – variables – declaration – expression – statements.

UNIT - II OPERATORS AND EXPRESSION **8 Hour**

Operators and Expression: arithmetic operators – unary operators – relational and logical operators – assignment operators – conditional operators. Data input and Output statements: getchar and putchar functions – scanf and printf function – more about scanf and printf functions.

UNIT - III CONTROL STATEMENTS & ARRAY **8 Hour**

Control statements: if-else, while, do-while, for-nested control structure – switch – break – continue- comma operator – goto statement. Arrays: definition of array – processing array- passing array to function – multidimensional arrays – arrays and strings.

UNIT - IV FUNCTIONS & POINTERS **8 Hour**

Functions: definition – accessing and function – function prototype –passing argument to a function – recursion. Pointers: Fundamentals – pointer declaration – passing pointer to a function – array of pointers.

UNIT - V STRUCTURE AND UNIONS **8 Hour**

Structure and Unions: Definition of structure – processing structure – user defined data types- Structure and pointers - passing structure to function – self referential structure- Unions - Bit wise operations. Data files: opening and Closing a data file – creating data file – processing a data file – unformatted data file.

Text Books

- Balagurusamy E., Programming in ANSI C, 6th Edition, TMH Publishers, New Delhi, 2004.
- Ashok N. Kamthane, Programing in ANSI C and Turbo C, 3rd Edition, Pearson Education, New Delhi, 2006.

Reference books

- Byron S. Gottfried, Theory and Problems of Programming with C, 2nd Edition, Tata Mcgraw-Hill Ltd, New Delhi, 2008
- Pradip Dey and Ghosh Manas, Programming in C, Oxford University Press USA, 2009.

e-Resources

- http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical- programming-in-c-january-iap-2010/lecture-notes/
- http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures/2
- http://www.powershow.com/view/d7c5Y2Y2N/OBJECT_ORIENTED_PROGRAMMING_powe rpoint_ppt_presentation

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand the basic concept of Procedural language	K1,K2
CO-2	Examine input and output statement.	K3
CO-3	Compare different dimension array.	K4
CO-4	Interpret functions and pointers in c.	K5
CO-5	Categorize user defined data types.	K6

MATHEMATICAL PROGRAMMING USING C - LAB
UCSR307

Semester : III **Credit : 2**
Category : Allied **Hour/Week : 3**
Class &Major : II B.Sc Maths **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Acquire knowledge on Structured Programming Language
CO-2	Solve the real time problems using c programming.
CO-3	Analyze string manipulation
CO-4	Interpret matrix manipulation
CO-5	Design c program for different sorting algorithm

I ARITHMETIC AND TRIGONOMETRIC OPERATIONS **9 Hour**

1. Solve Quadratic Equations.
2. Solve Taylor' Series for sin, cos and tan.

II STRING MANIPULATION **6 Hour**

3. Counting the no. of vowels, consonants, words, white spaces in a line of text and array of lines.
4. Reverse a string & check for palindrome.

III RECURSION **9 Hour**

5. nPr,nCr
6. GCD of two numbers
7. Fibonacci series

IV MATRIX MANIPULATION **9 Hour**

8. Addition & Subtraction
9. Multiplication
10. Transpose, of a matrix

V SORTING AND SEARCHING **6 Hour**

11. Bubble Sort
12. Linear Search

COURSE OUTCOMES

CO No.	**On completion of the course the student will be able to**	**Bloom's level**
CO-1	Understand the concept of procedural language and structure.	K1,K2
CO-2	Apply string function and check the string is palindrome or not	K3
CO-3	Differentiate sorting and searching algorithm	K4
CO-4	Evaluate matrix manipulation.	K5
CO-5	Develop GCD and Fibonacci series using Recursion concept	K6

COMPUTATIONAL PHYSICS WITH PYTHON

UCSA306

Semester : III **Credit : 3**

Category : Allied **Hour/Week : 3**

Class &Major : II B.Sc Physics **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand the basics of algorithmic problem solving
CO-2	Interpret Python data structures –- lists, tuples, dictionaries
CO-3	Analyze the concept of different conditional statements.
CO-4	Explain least squares fitting.
CO-5	Develop Python programs with partial differential equations

UNIT- I ALGORITHMIC PROBLEM SOLVING **7 Hour**

Algorithms - Building blocks of algorithms(Statements, State, Control Flow, Functions). -Notation (pseudo code, Flow chart) - Algorithmic problem solving- Iteration,Recursion(Towers of Hanoi).

UNIT- II DATA,EXPRESSIONS,STATEMENTS **9 Hour**

Python interpreter and interactive mode: values and types: - int, float, Boolean, string, and list - variables - expressions - statements - tuple assignment - precedence of operators comments; modules and functions - function definition and use - flow of execution

UNIT- III CONTROL , FUNCTIONS **8 Hour**

Conditionals: Boolean values and operators - conditional (if) - alternative (if-else - chained conditional (if-elif-else) - Iteration: state, while, for, break, continue, pass.

Functions: return values - parameters - local and global scope - function composition

UNIT- IV-LEAST-SQUARES FITTING **8 Hour**

Least-Squares Fitting -Derivation --Non-linear fitting .- Python curve-fitting libraries-Euler's Method -Standard Method for Solving ODE's -Problems with Euler's Method -Euler-Cromer Method -Visual Python- VPython Coordinates -VPython Controls and Parameters

UNIT- VPARTIAL DIFFERENTIAL EQUATIONS **7 Hour**

Partial Differential Equations -Laplace's Equation -Wave Equation -Schrodinger's Equation-Monte Carlo Techniques - Random Numbers -Integration-Chaos - The Real Pendulum-Phase Space- Poincar´e Plots

Text Books

- Allen B. Downey, "*Think Python: How to Think Like a Computer Scientist*", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
- Guido van Rossum and Fred L. Drake Jr, *An Introduction to Python – Revised and updated for Python 3.2*, Network Theory Ltd., 2011.

Reference Books

- John V Guttag, Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
- Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python, 2013

e-References

- http://greenteapress.com/wp/think- python
- http://www.fizika.unios.hr/rf/wp-content/uploads/sites

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand basic algorithmic problem solving.	K1,K2
CO-2	Apply data, expression statement in python	K3
CO-3	Analyze the concept of control statement.	K4
CO-4	Compare different VPython control and parameters.	K5
CO-5	Formulate partial differential equations.	K6

COMPUTATIONALPHYSICS WITH PYTHON LAB
UCSR310

Semester : III **Credit : 2**
Category : Allied **Hour/Week : 3**
Class &Major: II B.Sc Physics **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understand basic concepts of using data types in python
CO-2	Compute towers of Hanoi
CO-3	Analyze local and global variable in python.
CO-4	Compare different sorting algorithm.
CO-5	Create bouncing ball program using TRINKET

Lab Exercises

1. Compute the Towers of Hanoi.
2. Find the square root of a number (Newton‘s method)
3. To define an integer, floating point number, Strings are defined either with a singlequote or double quotes and Assignments can be done on more than one variable "simultaneously".
4. Find the maximum of a list of numbers.
5. Find the semester marks using Elif condition.
6. Find the Global and Local variable program using function.
7. Programs that take command line arguments (word count).
8. Find the most frequent words in a text read from a file.
9. Selection sort, Merge sort.
10. Simulate bouncing ball using TRINKET.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Understand block chain technology	K1,K2
CO-2	Integrate Towers of Hanoi in python	K3
CO-3	Analyze control structure and statement.	K4
CO-4	Compare different sorting algorithm in python	K5
CO-5	Develop creative software applications in python	K6

DIGITAL DESIGN- PRACTICAL
UCSE406

Semester : IV **Credit : 2**
Category : NME **Hour/Week : 4**
Class &Major : II UG **Total Hour : 52**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Acquire knowledge of designing process.
CO-2	Understand the 3D image objects
CO-3	Develop the visual image & messages.
CO-4	Create graphic design in Greetings with corel draw.
CO-5	Design the party invitation card & a story board.

LAB EXERCISES

GIMP

1. Develop an application for LOGO creation for any business purpose.
2. Develop Simple Text Animation

Audacity

3. Create an application to do Silencing, Trimming and duplicating the audio signal
4. Develop the application to give the advanced effect to the Audio signal

Windows Movie Maker

5. Create a video and Apply effect to video.
6. Develop an application to Create Titles in video

Swish

7. Develop Text Effects using swish.
8. Develop an application for Pre Loader

Flash

9. Implement the program for Changing the shape of the object
10. Implement the Imaging viewing using mask.
    a. Apply various Text effects to an image or photo
    b. Implement Image slicing

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Solve communication problems.	K1 /K2
CO-2	Gained graphic design in Greetings with coral draw.	K3
CO-3	Apply tools and technology in creation, reproduction, and distribution of visual messages.	K4
CO-4	Determine the party invitation card & a story board.	K5
CO-5	Create & demonstrate the 3D image objects using digital design.	K6

DATA VISUALIZATION -PRACTICAL
UCSE407

Semester : IV **Credit : 2**
Category : NME **Hour/Week : 4**
Class &Major: II UG **Total Hour : 52**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Acquire knowledge in data analytics in visualization.
CO-2	Understand the mathematical and statistical models and concepts to detect patterns in data.
CO-3	Create a bar chart in seaborn functions
CO-4	Design venn diagram with tree map.
CO-5	Develop the matplotlib in python

LAB EXERCISES

To implement the below programs in python Matplotlib

1.Create a Bar Chart, Grouped Bar Chart using Matplotlib in Python
2.Create a Pie Chart, Area Chart using using Matplotlib in Python
3.Create a Column Chart using matplotlib in python
4.Create a Stacked Bar chart using seaborn
5.Create a Scatter Plot using python Matplotlib in Python
6.Create a Bubble Chart for your dataset Matplotlib in Python
7.Create a Box Plot and Water Fall Chart Matplotlib in Python
8.Create a Venn Diagram and Tree Map Matplotlib in Python
9.Create a Marginal Plots with open data set Matplotlib in Python
10. Create a 100% Stacked Bar Chart Matplotlib in Python

e-Resource :

- Data Visualization and Matplotlib | by Dilara Şahan | Analytics Vidhya | Medium https://www.analyticsvidhya.com/blog/2021/08/effective-data-visualization-techniques-in-data-science-using-python/

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's level
CO-1	Define & understand data analytics in visualization.	K1&K2
CO-2	Apply & differentiate the matplotlibin python.	K2
CO-3	Determine the mathematical and statistical models and concepts to detect patterns in data.	K3
CO-4	Create the bar chat in sea born functions.	K5
CO-5	Demonstrate the venn diagram with tree map.	K6

III and IV Evaluation Components of CIA

Semester	Part	Category	Course code	Course title	Component III	Component IV
III	III	Major core(DSC)-VIII	UCSM307	Software Engineering	Case Study	Seminar
	IV	Major Core (DSC) - XI	UCSR412	Operating System Practical	DPA	Viva Voce

ALLIED COURSES OFFERED TO OTHER DEPARTMENT

Semester	Part	Category	Course code	Course title	Component III	Component IV
III	III	Allied	UCA307	Object Oriented Programming	Assignment	Problem Solving
	III	Allied	UCSR311	Object Oriented Programming	DPA	Viva Voce
IV	IV	Allied	UCSA408	Fundamentals of Blockchain Technology	Assignment	Seminar
	IV	Allied	UCSR414	Blockchain Technology Using Solidity – Lab	DPA	Viva Voce
IV	IV	Allied	UCSA409	Business Analytics and Intelligence	Assignment	Seminar
	IV	Allied	UCSR415	Business Analytics and Intelligence - LAb	DPA	Viva Voce

III	III	Allied	UCSA304	Mathematical Programming using C	Assignment	Seminar
	III	Allied	UCSR307	Mathematical Programming using C Lab	DPA	Viva Voce
III	III	Allied	UCSA306	Computational Physics with Python	Assignment	Seminar
	III	Allied	UCSR310	Computational Physics with Python - Lab	DPA	Viva Voce

NON-MAJOR ELECTIVES

Semester	**Part**	**Category**	**Course code**	**Course title**	**Component III**	**Component IV**
IV	IV	NME	UCSE406	Digital Design	DPA	Viva Voce
	IV	NME	UCSE407	Data Visualization	DPA	Viva Voce

M.Sc. (COMPUTER SCIENCE)
PROGRAMME PROFILE

PSO 1: Learnt the theoretical aspects of modern techniques in computing systems.

PSO 2: Gained fundamental knowledge in computational methods and tools for solving real-time problems and implanting the quest for continual learning of novel and in-demand skills.

PSO 3: Apply the industry oriented concepts and practical knowledge of computer science design, development and management of information processing systems and applications in the interdisciplinary domain.

PSO 4: Recognized the ability to act as a leader, or as a part of a team to create multifunctional Software Solutions.

PSO 5: Demonstrated appropriate techniques, skills, and tools necessary for computing practice.

PSO 6: Motivated the students to accept new challenges for multi-disciplinary projects.

PSO 7: Directed the individual and societal professionals in the development of computing in lifelong that benefits everyone.

Semester	Category	Course Code	Course Title	Previous Course Code	Contact Hour/ Week	Credit Min/Max
I	Core I	PCSM113	Principles of Concurrent Programming	-	5	4
	Core II	PCSM116	Digital Image Processing	PCSM404	4	4
	Core III	PCSM117	TCP / IP Networks	PCSM213	5	4
	Core IV	PCSM118	Compiler Design	-	4	3
	Core V	PCSM119	Mobile Computing	-	4	3
	Core VI	PCSR107	Digital Image Processing – Practical	-	4	3
	Core VII	PCSR108	TCP/IP Networks – Practical	-	3	2
	Extra Credit		Online Course (NPTEL/SWAYAM)		-	1/2
			Library		1	-
				Total	**30**	**24/25**

II	Core VIII	PCSM214	Big Data Analytics	PCSM315	4	3
	Core IX	PCSM215	Machine Learning	-	4	4
	Core X	PCSM216	Blockchain Technology	-	4	3
	Core XI	PCSM217	Software Testing	PCSM211	4	3
	Core XII	PCSR208	Big Data Analytics – Practical	PCSR306	4	3
	Core XIII	PCSR209	Machine Learning using Google CoLab – Practical	-	4	3
	Non Major Elective	PALE201/ PALE301		-	5	4
	Service Learning	PCSX201/ PCAX201		-	-	1
			Library	-	1	-
				Total	**30**	**24**
III	Core XIV	PCSM314	Cyber Security	-	4	4
	Core XV	PCSM316	Augmented Virtual Reality	-	4	4
	Core XVI	PCSM317	Artificial Intelligence and Robotics	PCSM406	4	3
	Core XVII	PCSM313	Research Methodology	-	4	4
	Core XVIII	PCSI301	Fuzzy Set and Systems	-	5	4
	Core XIX	PCSR307	Cyber Security Practical	-	3	2
	Core XX	PCSR308	Artificial Intelligence – Practical	-	3	3
	Core XXI	PCSR303	Project	-	2	2
			Library	-	1	-
				Total	**30**	**26**
IV	Core XXII	PCSM407	Fog Computing	-	5	4
	Core XXIII	PCSM408	Natural Language Processing	-	4	3
	Core XIV	PCSP402	Project		20	10
			Library		1	-
				Total	**30**	**17**
				Grand Total	**120**	**91/92**

Minimum one MOOC (Compulsory Audit Course) has to complete during the first year.

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course Code	Course Title	Hour/Week	Credit	
					Min	Max
III	Self Study Paper	PCSS301/PCAS502	R-Programming	2	-	2
III	Self Study Paper	PCSS302/PCAS503	Rich Internet Applications	2	-	2
IV	Self Study Paper	PCSS401/PCAS601	Silver Light Applications	2	-	2
IV	Self Study Paper	PCSS402/PCAS602	Extreme Programming	2	-	2

EXPERIENTIAL LEARNING (Mandatory)

Course Mapping				Collaborating Agency		
Sem	Course Code	Course Title	Assessment	Course Title	Hour/Days /Month	Mode of Evaluation
III	PCSM316	Augmented Virtual Reality	Component IV	Augmented Virtual Reality certification	10 Days	Reflection

COURSES OFFERED TO OTHER DEPARTMENTS (Major and Major Elective)

Course	Semester	Category	Course Code	Course Title	Contact Hour/Week	Credit
M.Sc Tamil	IV	Major Elective	PTAM406	KaniniPayanpattiyal	5	3

CYBER SECURITY

PCSM314

Semester : III **Credits :4**
Category : Core XIV **Hour/weeks :4**
Class & Major: II M.Sc Computer Science **Total Hour :52**

COURSE OBJECTIVES

CO No.	To enable the students
CO -1	Remember the difference between threat, harms, attack and vulnerability.
CO -2	Understand how Design of Operating Systems in Rootkit.
CO -3	Apply information about Reliability and Integrity, Data Mining and Big Data.
CO -4	Analyze the Authentication and Privacy and the motivations behind them
CO -5	Create difference between The Internet of Things and cyber warfare

UNIT - I INTRODUCTION TO CYBER SECURITY **10 Hour**

Introduction -Computer Security - Threats -Harm - Vulnerabilities – Controls. Authentication - Access Control - Cryptography. Web - User Side: Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks.

UNIT - II SECURITY IN OPERATING SYSTEM & NETWORKS **10 Hour**

Security in Operating Systems - Security in the Design of Operating Systems –Rootkit. Network security attack: Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.

UNIT - III DEFENCES: SECURITY COUNTERMEASURES **10 Hour**

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

UNIT - IV PRIVACY IN CYBERSPACE **10 Hour**

Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining -Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies.

UNIT - V MANAGEMENT AND INCIDENTS **12 Hour**

Security Planning – Business Continuity Planning – Handling Incidents – Risk Analysis – Dealing with Disaster. Emerging Technologies: The Internet of Things – Economics – Electronic Voting – Cyber Warfare. **IT Act:** Salient Feature of IT Act 2000, Legal Provisions under the Information Technology Act, Recent amendments by the IT (Amendment Act) 2008, Act Section66(A, B, C, D, E, F), ITAct Section 67(A,B,C).

Text Book

- Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies – *Security in Computing* – 5th Edition – Pearson Education – 2015.

Reference Books

- George K.Kostopoulous – Cyber Space and Cyber Security – CRC Press – 2013.
- Martti Lehto - Pekka Neittaanmäki - Cyber Security: Analytics - Technology andAutomation edited – Springer International Publishing Switzerland 2015.
- Nelson Phillips and Enfinger Steuart – Computer Forensics and Investigations – Cengage Learning – New Delhi – 2009.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	State the cyber security needs of an organization.	K1
CO-2	Discuss software vulnerabilities and security solutions to reduce the risk of exploitation.	K2,K3
CO-3	Classify security issues in networks and computer systems to secure an IT infrastructure.	K4
CO-4	Decide policies and procedures to manage enterprise security risks.	K5
CO-5	Develop secure software.	K6

AUGMENTED VIRTUAL REALITY
PCSM316

Semester : III **Credit : 4**
Category :Core XV **Hour/Week : 4**
Class & Major : II M.SC Computer Science **Total Hour :52**

COURSE OBJECTIVES

CO No.	To enable the students
CO -1	Understand virtual reality, augmented reality and using them to build Biomedical applications
CO -2	Interpret virtual reality, augmented reality and using them to build Biomedical engineering applications
CO -3	Analyze and understand the working of various state of the art AR devices.
CO -4	Develop PDA applications with better optimality.
CO -5	Demonstrate case studies and applications with a futuristic vision along with socio-economic impact and issues.

UNIT-I INTRODUCTION TO VIRTUAL REALITY 10 Hour

Virtual Reality & Virtual Environment: Computer Graphics- Real-time computer graphics-Flight simulation-Virtual environments-Requirements for VR- benefits of Virtual reality. **The historical development of VR:** Scientific landmarks **Virtual Reality Applications**: Science, Medical, Education.

UNIT-II HARDWARE TECHNOLOGIES FOR 3D USER INTERFACES 11 Hour

3D User Interface Output Hardware: Visual Displays – Auditory Displays – Haptic Displays**. Design Guidelines:** Choosing Output Devices for 3D User Interfaces. **3D User Interface Input Hardware:** Input device characteristics- Desktop input devices – Tracking Devices- 3D Mice – Special Purpose Input Devices – Direct Human Input –Home Brewed Input Devices- Choosing Input Devices for 3D Interfaces.

UNIT-III 3D INTERACTION TECHNIQUES 11 Hour

Selection and Manipulation: 3D Manipulation tasks – Manipulation Techniques and Input Devices – Interaction Techniques for 3D Manipulation – Design Guidelines. **Travel:** 3D Travel Tasks – Travel Techniques – Design Guidelines. **WayFindings:** Theoretical Foundations of Wayfinding – User Centered Wayfinding Support – Environment Centered Wayfinding Support – Evaluating Wayfinding Aids – Design Guidelines. **System Control:** Classification – Graphical

Menus – Voice Commands – Gestural Commands – Tools – Mutimodal System Control Techniques.

Case Study: Mixing System Control Methods, Symbolic Input Tasks, symbolic Input Techniques, Design Guidelines, Beyond Text and Number entry.

UNIT-IV AR TECHNIQUES- MARKER BASED & MARKERLESS TRACKING **10 Hour**

Marker-based approach: Introduction to marker-based tracking – types of markers – marker camera pose and identification – visual tracking. **Marker types:** Template markers – 2D barcode markers – imperceptible markers. **Marker-less approach:** Localization based augmentation – real world examples. **Tracking methods:** Visual tracking – feature based tracking – hybrid tracking – initialization and recovery.

UNIT-V AR – MIXED REALITY **10 Hour**

Augmented and Mixed Reality: Taxonomy – technology and features of augmented reality- difference between AR and VR – Challenges with AR – AR systems and functionality – Augmented reality methods – visualization techniques for augmented reality. **Augmented Reality Software:** Introduction, Major Software Components for Augmented Reality Systems, Software used to Create Content for the Augmented Reality Application.

Case Study: Design real-time models in vrml such as car, house, globe, 3d helix, etc., to submit it for Component III.

Text Books:

- Alan B Craig, William R Sherman and Jeffrey D Will,(2009). *Developing Virtual Reality Applications: Foundations of Effective Design,* Morgan Kaufmann, (Unit-5: Chapter-4,5,6)
- Gerard Jounghyun Kim,(2005). *Designing Virtual Systems: The Structured Approach*, .
- Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev,(2005).*3D User Interfaces, Theory and Practice*, Addison Wesley, USA, (Unit-2: Chapter-3,4 ; Unit-3: Chapter-5,6,7,8 ; Unit-4: Chapter-10).

Reference Books:

- Kharis O'Connell .(2016).*Designing for Mixed Reality*, Published by O'Reilly Media, Inc., ISBN: 9781491962381
- Sanni Siltanen- *Theory and applications of marker-based augmented reality*. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0

- John Vince, (1995).*Virtual Reality Systems*, Addison Wesley.
- Howard Rheingold,(1991). *Virtual Reality: The Revolutionary Technology and how it Promises to Transform Society*, Simon and Schuster.
- William R Sherman and Alan B Craig,(2002). *Understanding Virtual Reality: Interface, Application and Design (The Morgan Kaufmann Series in Computer Graphics).* Morgan Kaufmann Publishers, San Francisco, CA.
- Alan B. Craig,(2013). *Understanding Augmented Reality, Concepts and Applications*, Morgan Kaufmann.

e-Resource:

- http://lavalle.pl/vr/book.html
- https://www.vttresearch.com/sites/default/files/pdf/science/2012/S3.pdf
- https://docs.microsoft.com/en-us/windows/mixed-reality/

MOOC Courses:

- https://www.coursera.org/learn/ar
- https://www.udemy.com/share/101Xpi/
- https://nptel.ac.in/courses/106/106/106106138/
- https://www.coursera.org/learn/introduction-virtual-reality

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Demonstrate a system or process to meet given specifications with realistic constraints.	K1,K2
CO-2	Discover problem statements and function as a member of design team.	K3
CO-3	Analyze technical resources	K4
CO-4	Summarize technical documents and technical oral presentations related to design mini project results	K5
CO-5	Formulate virtual reality, augmented reality and using them to build Biomedical engineering applications	K6

ARTIFICIAL INTELLIGENCE & ROBOTICS
PCSM317

Semester	**: III**	**Credit**	**: 3**
Category	**:Core XVI**	**Hour/Week**	**: 4**
Class & Major	**: II M.SC Computer Science**	**Total Hour**	**:52**

COURSE OBJECTIVES

CO No.	To enable the students
CO -1	Study the concepts of Artificial Intelligence.
CO -2	Learn to represent knowledge in solving AI problems
CO -3	Determine general-purpose problem solving agents, logical reasoning agents, and agents that reason under uncertainty.
CO -4	Characterize planning agent.
CO -5	Design the path planning and navigation of Robots.

UNIT I INTRODUCTION TO ARTIFICIAL INTELLIGENCE **10 Hour**

Introduction: Intelligent Agents-Search Strategies-Solving Problems by Searching – Breadth – First Depth-First- Depth-Limited –Iterative Deepening –Bidirectional- Informed Search Methods –A* -AO* -Games as Search Problems –Alpha-Beta Pruning.

UNIT II REPRESENTATION **10 Hour**

Representation: Propositional Logic – First – Order Logic – Frame Systems and Semantic Networks.

UNIT III REASONING **10 Hour**

Reasoning: Inference in First-Order Logic – Forward and Backward Chaining –Resolution Unification-Logical Reasoning Systems.

UNIT IV PLANNING **10 Hour**

Planning: Simple Planning Agent – From Problem Solving to Planning – Basic Representations for Planning – Practical Planners – Hierarchical Decomposition – Resource Constraints – Uncertainty – Probabilistic Reasoning Systems.

UNIT V LEARNING & ROBOTICS **12 Hour**

Learning: General Model of Learning Agents – Inductive Learning – Computational

Learning Theory – Learning in Neural and Belief Networks – Reinforcement Learning – Types of Communicating Agents – Robotics: Tasks – Parts – Configurations Spaces – Navigation and Motion Planning.

Text Book

- StuartJ.Russell and Peter Norvig – Artificial Intelligence – Tata Mc Graw Hill Publisher3rd Edition 2017.

Reference Books

- Elaine Rich and Kevin Knight – Artificial Intelligence – Tata Mc Graw Hill Publisher – 3rdEdition 2017.
- Dan W.Patterson – Introduction to Artificial Intelligence and Expert Systems – Prentice Hall of India -2009.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the concept of Artificial Intelligence.	K1,K2
CO-2	Represent a problem using first order and predicate logic	K3
CO-3	Provide the apt agent strategy to solve a given problem	K4
CO-4	Interpret plan to solve a problem	K5
CO-5	Devise path planning method for navigation	K6

RESEARCH METHODOLOGY
PCSM313

Semester	**: III**	**Credit**	**: 4**
Category	**:Core XVII**	**Hour/Week**	**: 4**
Class & Major	**: II M.SC Computer Science**	**Total Hour**	**:52**

COURSE OBJECTIVES

CO No.	To enable the students
CO -1	understand the concepts of Research and its types
CO -2	Discuss Problem formulation, analysis and solutions
CO -3	Analyze data collection tools and packages.
CO -4	Technical paper writing / presentation without violating professional ethics
CO -5	Devise techniques for research and uses of tools

UNIT-I INTRODUCTION TO RESEARCH METHODOLOGY 10 Hour

Meaning of research; objective of research; motivation in research; types of research-Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical- research approaches; significance of research, research methods versus methodology; Research and scientific methods; Importance of knowing how research is done; Research process; Criteria for good research.

UNIT-II RESEARCH PROBLEM AND RESEARCH DESIGN 10 Hour

Research problem: Selecting research problem; necessity of defining a problem; techniques of defining problem; formulation of research problem, objectives of research problem. Meaning of research design; need for research design; important concept related to research design; different research designs; basic principles of experimental design; important experimental design.

UNIT-III SAMPLING DESIGN, DATA COLLECTION AND ANALYSIS 12 Hour

Census and sample surveys, Characteristics of good sample design Different types of sample designs, Techniques of selecting a random sample-Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma

STAT,SPSS for student t-test, ANOVA, etc.), hypothesis testing.

UNIT-IV INTERPRETAION, REPORT WRITING, RESEARCH ETHICS AND IPR **10 Hour**

Interpretation and report writing; Meaning of interpretation; techniques of interpretation; precautions in interpretation; significance of report writing, layout of research report, types of reports; Presentation of research work-oral, poster and writing research paper; Precautions for writing research report, conclusion. Ethics-ethical issues, related to research, IPR-Intellectual Property Rights in Research and Development-Patents and Patent Laws: Objectives of the patent system – Basic, principles and general requirements of patent law.

UNIT-V TOOLS FOR ANALYSIS **10 Hour**

Interpretation of data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish ? Ethical issues related to publishing, Plagiarism and Self-Plagiarism, Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism.

Text Books

- Kothari, C. R. (1980). *Research Methodology: Research and techniques*, New Delhi:New Age International Publishers.
- Carlos, C.M. (2000) *Intellectual property rights. The WTO and developing countries: theTRIPS agreement and policy options.* Zed Books. New York.
- Beier F.K, Crespi R.S and Straus T. *Biotechnology and Patent protection.* Oxfordand IBH Publishing Co. New Delhi.
- Darren George and Paul Mallery – *SPSS for Windows.* Pearson Education.
- Darren George & Paul Mallery . *SPSS for Windows.* Pearson Education

References

- Singh, Y. K. (2006). Fundamental of Research Methodology and Statistics. New Delhi. New International (P) Limited. Publishers.
- Wallinman,N. (2006). Your Research Project: A step-by-step guide for the first-time
- researcher. London: Sage Publications.
- Senthil Kumar Sadasivam and Mohammed Jaabir M. S. (2008). IPR. Bio safety and

Biotechnology Management. Jasen Publications. India.
- Wilkilson , T.S. & Bhandarkar . P.L., (2000). Methodology and Techniques of Social Research. Mumbai. Himalaya Publishing House.
- Leslie Lamport. LaTeX: A Document Preparation System. Second Edition.

E-Resources

- http:// www.ptt.ed/-super7/430114401/4391.ptt/.
- https://www.heacademy.ac.uk/system/files/msor.3.Is.pdf
- 164.100.133.129.81/econtent/uploads/research-methods.pdf

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understanding research and its goals, Critical thinking, Techniques for generating research topics	K1
CO-2	Compare different research design.	K2
CO-3	Apply and analyze different methods of data collection	K3,K4
CO-4	Justifying the interpretation and report writing.	K5
CO-5	Summarize the techniques for research.	K6

FUZZY SET AND SYSTEMS

PCSI301

Semester	**: III**	**Credit**	**: 4**
Category	**:Core XVIII**	**Hour/Week**	**: 5**
Class & Major	**: II M.SC Computer Science**	**Total Hour**	**:65**

COURSE OBJECTIVES

CO No.	To enable the students
CO -1	Acquire the knowledge of fundamental concepts such as fuzzy sets, operations and fuzzy relations.
CO -2	Describe fuzzy relations and classical relations
CO -3	Learn about the fuzzification of scalar variables and the defuzzification of membership functions.
CO -4	Analyze fuzzy arithmetic and fuzzy logics
CO -5	Categorize different fuzzy classification methods.

UNIT –I INTRODUCTION **13 Hour**

Introduction – Background – Uncertainty and Imprecision – Statistics and Random Processes – Uncertainly and Information – Fuzzy Sets and Membership – Chance versus Ambiguity – Sets as Points in Hypercubes – Classical Sets and Fuzzy Sets: Classical Sets – Fuzzy Sets.

UNIT –II CLASSICAL RELATIONS AND FUZZY RELATIONS **13 Hour**

Cartesian product – Crisp Relations – Fuzzy Relations – Tolerance and Equivalence Relations –Fuzzy Tolerance and Equivalence Relations – Value Assignments.

UNIT –III MEMBERSHIP FUNCTIONS **13 Hour**

Features of the Membership Functions – Standard Forms and Boundaries – Fuzzification – Lambda(λ) Cut for Fuzzy Relations – Defuzzification to scalars – Membership Value Assignments – Fuzzy to Crisp Conversions.

UNIT- IV FUZZY ARITHMETIC AND EXTENSION PRINCIPLE **13 Hour**

Fuzzy Arithmetic – Numbers - Vectors and the Extension Principle – Extension Principle – Fuzzy Numbers – Interval Analysis in Arithmetic – Approximate Methods of Extension.Classical Logic and Fuzzy logic: Fuzzy Tautologies – contradictions – Equivalence

– and Logical Proofs – Classical Predicate Logic – Fuzzy Logic – Approximate Reasoning — other Forms of the Implication Operation – Other Forms of the Composition Operation.

UNIT V FUZZY SYSTEMS AND CLASSIFICATION **13 Hour**

Fuzzy Rule Based systems: Natural Language – Linguistic Hedges – Rules Based Systems – Graphical Techniques of Inference. Fuzzy Classification: Classification by Equivalence Relations – Cluster Analysis – cluster Validity – c-Means Clustering – Classification Metric – Hardening the Fuzzy c-Partition – Similarity Relations from Clustering.

Text Books

- Timothy J Ross – "*Fuzzy Logic with Engineering Applications*" – McGraw – Hill – Inc – 4thEdition – 2016.
- Timothy J. Ross, *Fuzzy Logic with Engineering Applications*, Wiley India, II Edition, 2010reprint. Chapters 1,2,3,4,5,6,Chapter 11 (Part I only), 12

Reference Books

- John Yen, Reza Langari, Fuzzy Logic- Intelligence, Control, and information, Pearson Education, 2004.
- George J.Klir , Bo Yuan, Fuzzy Sets and Fuzzy Logic-Theory and Applications, Prentice Hall of India, 2000.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the basic ideas of fuzzy sets, operations and properties of fuzzy sets and also about fuzzy relations.	K1,K2
CO-2	Demonstrate the concepts of fuzzy relations.	K3
CO-3	Analyze the features of membership functions, fuzzification process and defuzzification process.	K4
CO-4	Compare different forms of fuzzy logic operation	K5
CO-5	Summarize about fuzzy C-Means clustering.	K6

CYBER SECURITY PRACTICAL

PCSR307

Semester : III **Credit : 2**
Category : Core XIX **Hour/Week : 3**
Class &Major: II M.Sc Computer Science **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO -1	Understand the concepts of Breadth First Search
CO -2	Develop Programming skills by algorithm using Depth First Search.
CO -3	Apply the Design Concept to various intelligent agents as Robot Traversal Problem using Means End Analysis
CO -4	Demonstrate intellectual tasks using Water-Jug problem
CO -5	Develop human Robotics agent as Tower of Hanoi.

LAB EXERCISES

1. Develop an application for creating a Virtual Environment.
2. Develop an application that uses Linux terminal basics.
3. Write an application for Linux command line interface.
4. Develop an application for proxy chains.
5. Develop an application for Virtual Private Networks
6. Develop a application which changes the mac address with mac changer
7. Implement an application SSL Strip
8. Implement an application that cracks a password using Brute force method
9. Develop an application to crack windows software with john the ripper
10. Develop an application to upload a reverse shell on to a web server

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Demonstrate the models, and algorithms of AI	K2
CO-2	Analysis and design of information systems using sensors	K3
CO-3	Develop the structures and algorithms of a selection of techniques.	K4
CO-4	Create several applications using sensors and actuators	K5
CO-5	Quantify uncertainties to make the best decisions for the company.	K6

ARTIFICIAL INTELLIGENCE – Practical

PCSR308

Semester : III **Credit : 3**
Core : Core XX **Hour/Week : 3**
Class & Major: II M.Sc Computer Science **Total Hour : 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO -1	Understand the components and structure of cyber security.
CO -2	Understand how to work with various Linux commands
CO -3	Learn the basic and important design concepts and issues of cyber security
CO -4	Protect and defend computer systems and networks
CO -5	Monitor cyber security mechanisms to help and ensure the protection of information technology assets.

LAB EXERCISES:

Develop a Program using Prolog or Python

1. Implement Breadth First Search.
2. Implement Depth First Search.
3. Implement Robot Traversal Problem using Means End Analysis.
4. Implement Water-Jug problem.
5. Implement Tic-Tac-Toe game.
6. Implement 8-Puzzle problem.
7. Implement Tower of Hanoi.
8. Implement Monkey Banana Problem.
9. Create a Bi-directional Associative Memory (BAM) for ID and telephone number.
10. Implement simple Chatbot.

e-Resource:

- https://www.studocu.com/row/document/national-university-of-modern-languages/artificial-intelligence/ai-lab-manual-fall-2018/13242207

COURSE OUTCOMES

CO No.	**On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Describe the cyber security needs of an organization.	K1,K2
CO-2	Illustrate software vulnerabilities and security solutions to reduce the risk of exploitation.	K3
CO-3	Classify security issues in networks and computer systems to secure an IT infrastructure.	K4
CO-4	Decide policies and procedures to manage enterprise security risks.	K5
CO-5	Develop secure software.	K6

FOG COMPUTING

PCSM407

Semester	**: IV**	**Credit**	**:4**
Core	**:Core XXII**	**Hour/Week**	**:5**
Class & Major: II M.Sc Computer Science		**Total Hour**	**:65**

COURSE OBJECTIVES:

CO No.	To enable the students about
CO-1	Remember the fundamental concepts of Fog and Application Scenarios
CO-2	Understand the Clusters for Lightweight Edge Cloud
CO-3	Design and develop Scalability, Interoperability ,Fog, IOT
CO-4	Analyze the conceptual framework for IoT Based System with Fog Computing.
CO-5	Discuss the protocols of Fog.

UNIT- I INTRODUCTION TO FOG COMPUTING 13 Hour

Fog Computing – Characteristics – Application Scenarios – Issues and challenges. **Fog Computing Architecture:** Communication and Network Model – Programming Models – Fog Architecture for Smart Cities – Healthcare and Vehicles. **Fog Computing Communication Technologies**: Introduction – IEEE 802.11 - 4G - 5G standards - WPAN - Short-Range Technologies - LPWAN and other medium and Long-Range Technologies.

UNIT- II MANAGEMENT AND ORCHESTRATION OF NETWORK SLICES IN 5G - FOG - EDGE - AND CLOUDS 13 Hour

Introduction - Background - Network Slicing in 5G - Network Slicing in Software-Defined Clouds - Network Slicing Management in Edge and Fog - Middleware for Fog and Edge Computing - Need for Fog and Edge Computing Middleware - Clusters for Lightweight Edge Clouds - IOT Integration - Security Management for Edge Cloud Architectures. **Fog Computing Realization for Big Data Analytics:** Introduction to Big Data Analytics – Data Analytics in the Fog – Prototypes and Evaluation.

UNIT- III FOG COMPUTING REQUIREMENTS WHEN APPLIED TO IOT 13 Hour

Scalability - Interoperability - Fog-IOT architectural model - Challenges on IOT Stack Model via TCP/IP Architecture - Data Management - Filtering - Event Management - Device

Management - Cloudification - Virtualization - Security and Privacy Issues. Integrating IoT. **Fog - Cloud Infrastructures:** Methodology - Integrated C2F2T Literature by Modeling Technique – Integrated C2F2T Literature by Use-Case Scenarios - Integrated C2F2T Literature by Metrics.

UNIT- IV HEALTH MONITORING AND APPLICATIONS IN FOG COMPUTING

13 Hour

An Architecture of a Health Monitoring: IoT Based System with Fog Computing – Fog Computing Services in Smart E-Health Gateways – Discussion of Connected Components. **Fog Computing Model for Evolving Smart Transportation Applications:** Introduction – Data-Driven Intelligent Transportation Systems – Fog Computing for Smart Transportation Applications. Case Study: Intelligent Traffic Lights Management (ITLM) System

UNIT –V SOFTWARE DEFINED NETWORKING AND APPLICATION IN FOG COMPUTING **13 Hour**

Open Flow Protocol – Open Flow Switch – SDN in Fog Computing – Home Network using SDN. **Security and Privacy Issues**: Trust and Privacy Issues in IoT Network – Web Semantics and trust Management for Fog Computing – Machine Learning based Security in Fog Computing – Cyber Physical Energy Systems over Fog Computing.

Text Books:

- Samee U. Khan, Albert Y. Zomaya .(2017). *Fog Computing: Theory and Practice by Assad Abbas*. (Unit -1 chapter 1,Unit-5 chapter 16)
- Rajkumar Buyya, Satish Narayana Srirama .(2019).*Fog and Edge Computing*. Wiley Publications. (Unit-2 Chapter 4,Unit-3 chapter 11, Unit-4 chapter 12,14)

Reference Books:

- Amir Vahid Dastjerdi and RajkumarBuyya.Fog Computing: Helping the Internet of Things Realize its Potential. University of Melbourne.
- SudipMisra , Subhadeep Sarkar , Subarna Chatterjee. (2019).Sensors, Cloud, and Fog: The Enabling Technologies for the Internet of Things Paperback.CRC Press.

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe and Explore research, frameworks, applications in edge and fog computing.	K1
CO-2	Explain underlying technologies, limitations, and challenges along with future Research Direction and Discuss generic Conceptual Framework for Optimization Problems in Fog Computing.	K2
CO-3	Apply the General Data Protection Regulation (GDPR), and discuss how these legal constraints affect the design and Operation of IOT Applications in fog and Cloud Environments.	K3
CO-4	Evaluate and analyze the Protocols related to Fog.	K4,K5
CO-5	Construct the Data Management and Security Principles.	K6

NATURAL LANGUAGE PROCESSING
PCSM408

Semester : IV **Credit : 3**
Category : CoreXXIII **Hour/Week : 4**
Class & Major : II M.Sc Computer Science **Total Hour :52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Learn the fundamentals of Language Modeling: Grammar-based LM
CO-2	Understand the use Smoothing, Interpolation and Backoff Word Classes
CO-3	Apply the Treebanks, Normal Forms for grammar.
CO-4	Discover approaches to syntax and semantics .
CO-5	Construct current methods for statistical approaches to Tagger, WordNet, PropBank

UNIT-I INTRODUCTION **09 Hour**

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for

lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT-II WORD LEVEL ANALYSIS 11 Hour

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT-III SYNTACTIC ANALYSIS 11 Hour

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures, Unification of feature structures.

UNIT-IV SEMANTICS AND PRAGMATICS 11 Hour

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, Selectional Restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT-V DISCOURSE ANALYSIS AND LEXICAL RESOURCES 10 Hour

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Co-reference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC).

Text Books:

- Daniel Jurafsky, James H. Martin―(2014).*Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech*, Pearson Publication.
- Steven Bird, Ewan Klein and Edward Loper, ―(2009).*Natural Language Processing with Python*, , Oreilly Media, (1st Ed.)

Reference Books:

- Breck Baldwin.(2015). ―Language Processing with Java and LingPipe Cookbook, Atlantic Publisher.
- Richard M Reese .(2015).Natural Language Processing with Java, Oreilly Media.
- Nitin Indurkhya and Fred J. Damera.(2010).Handbook of Natural Language Processing, 2nd Ed., Chapman and Hall/CRC Press.
- Tanveer Siddiqui, U.S. Tiwary, (2008).Natural Language Processing and Information Retrieval, Oxford University Press.

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the fundamental of natural language processing	K1,K2
CO-2	Apply innovative application using NLP components.	K3
CO-3	Analyze NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.	K4
CO-4	Estimate a rule based system to tackle morphology/syntax of a language	K5
CO-5	Formulate the problems and their solutions using appropriate descriptions, visualizations, and statistics.	K6

III and IV Evaluation Components of CIA

Semester	Part	Category	Course code	Course title	Component III	Component IV
III	III	Core XIV	PCSM314	Cyber Security	Assignment	Seminar
	III	Core XV	PCSM316	Augmented Virtual Reality	Design a real time model using VRML	Experiential Learning
	III	Core XVI	PCSM317	Artificial Intelligence and Robotics	Assignment	Seminar
	III	Core XVII	PCM313	Research Methodology	Case Study	Seminar
	III	Core XVIII	PCS1301	Fuzzy Set and Systems	Assignment	Seminar
	III	Core XIX	PCSR307	Cyber Security Practical	DPA	Viva-voce
	III	Core XX	PCSR308	Artificial Intelligence – Practical	DPA	Viva-voce
IV	III	Core XXIII	PCSM408	Natural Language Processing	Assignment	Problem Solving
	III	Core XXII	PCSM407	Fog Computing	Case Study	Seminar

DEPARTMENT OF COMPUTER APPLICATION

Preamble

UG: Programme profile, list of courses offered to the other departments and the syllabi of courses in the III&IV semesters along with evaluation components III & IV (with effect from 2021-2024 batch onwards)

PROGRAMME PROFILE BCA
(LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK)

PSO1: Understanding of the key concepts and principles of programming languages.

PSO2: Capacity to analyze a problem, identify the computing requirements and using Procedures find a solution.

PSO3: Development of practical skills to solve problems and provide solutions using current trends in the discipline of Computer Applications.

PSO4: Ability to apply the algorithmic principles, mathematical foundations and computer science theory for designing computer-based systems.

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hour/ Week	Credit Min/Max
I	I	Language	UTAL107/UTAL108	Languages/ AECC-II Tamil-I/ Hindi-I/French-I (2 Levels)	UTAL105/ UTAL106/ UHIL101/ UFRL101	5	3/4
	II	English	UCEL101/UCEL102	Communicative English-/ English/AECC-I (2 Levels)	UENL107/ UENL108	5	3/4
	III	Major Core (DSC) - I	UCAM110	Principles of Information Technology	-	5	4
	III	Major Core (DSC) - II	UCAM111/ UCSM109	Programming Methodology	-	4	4
	III	Major Core (DSC) - III	UCAR106/ UCSR110	Programming Methodology - Practical	-	3	2

	III	Allied (GE) - I	UMAA110	Mathematical Methods I	-	6	4
	III	Professional English	UPEM101	Professional English I	-	6	4
	IV	Value Education (SEC)				2	1
				Total		**36**	**25/27**
II	I	Language	UTAL207/UTAL208	Languages/ AECC-II Tamil-II/ Hindi-II/French-II (2 Levels)	UTAL205/ UTAL206/ UHIL201/ UFRL201	5	3/4
	II	English	UCEL201/UCEL202	Communicative English-/ English/AECC-I (2 Levels)	UENL207/ UENL208	5	3/4
	III	Major Core (DSC) - IV	UCAM206/ UCSM207	Data Structures	UCAM205	4	4
	III	Major Core (DSC) - V	UCAM207/ UCSM208	Python Programming	UCAM407	4	4
		Major Core (DSC) - VI	UCAR205/ UCSR207	Data Structures using Python - Practical	-	3	2
	III	Allied (GE) - II	UMAA216	Mathematical Methods-II	-	6	4
	III	Professional English	UPEM201	Professional English II	-	6	4
	III	Internship	UCAI201	Internship/ Field work/ Field Project		-	-/1 (Extra Credit)
	IV	Non-Major Elective (Skill Enhancement Course)				3	2
	IV	Soft skill				2	1
	V	Extension Programme / Physical Education/NCC				-	1/2
				Total		**38**	**28/32**
III	III	Major Core (DSC) - VII	UCAM310/ UCSM305	Java Programming	UCAM307	5	4
	III	Major Core (DSC) - VIII	UCAM312	Object Oriented Analysis and Design	UCAM403	5	4
	III	Major Core (DSC) - IX	UCAM311	Data Communication Networks	UCAM309/ UCAM405	5	4
	III	Major Core (DSC) - X	UCAR304/ UCSR308	Java Programming - Practical	UCAR303	4	2

	III	Allied (GE) - III	UCOA303	Financial Accounting	-	6	4
	IV	Online course		NPTEL/Spoken Tutorial/Swayam		3	1/2
	IV	Value Education				2	1
				Total		**30**	**20/21**
IV	III	Major Core (DSC) - XI	UCAM404	Database Management System	-	4	4
	III	Major Core (DSC) - XII	UCAM408	Operating System	UCAM507	5	4
	III	Major Core (DSC) - XIII	UCAM409	Software Engineering	UCAM509	4	4
	III	Major Core (DSC) - XIV	UCAR405	Database Modeling - Practical	UCAR402	3	2
	III	Major Core (DSC) - XV	UCAR406	Operating System- Practical	-	3	2
	III	Allied (GE) - V	UCOA403	Accounting Package	-	3	2
	III	Allied (GE) - VI	UCOR403	Accounting Package - LAB	-	3	2
	III	Internship	UCAI401	Internship/ Field work/ Field Project		-	-/1 (Extra Credit)
	IV	Non-Major Elective (Skill Enhancement Course)				3	2
	IV	Soft skill				2	1
	V	Extension Programme/ Physical Education				-	1/2
				Total		**30**	**24/26**
V	III	Major Core (DSC) - XVI	UCAM510	Cloud Computing	UCAO604	4	4
	III	Major Core (DSC) - XVII	UCAM511	R Programming	-	4	4
	III	Major Core (DSC) - XVIII	UCAM508	Open Source Technology	UCAM501	4	4
	III	Major Core (DSC) - XIX	UCAR506	Open Source Technology - Practical	UCAR504	3	2
	III	Major Core (DSC) - XX	UCAR507	R Programming - Practical	-	3	2
	III	MAJOR ELECTIVE (Discipline	UCAO501/ UCAO502/ UCAO503	Computer Ethics/ Artificial Intelligence / Software Testing	-	5	4

		Major Core (DSC) - XXII	UCAP501	Project	UCAP601	5	5
	IV	Value Education				2	1
Total						**30**	**26**
VI	III	Major Core (DSC) - XXIII	UCAM609	Data Mining	UCAM606	5	4
	III	Major Core (DSC) - XXIV	UCAM612	Computer Graphics and Image Processing	UCAM610	5	5
	III	Major Core (DSC) - XXV	UCAM613	Internet of Things	UCAM611	5	4
	III	Major Core (DSC) - XXVI	UCAR603	Data Mining - Practical	UCAR602	4	3
	III	Major Core (DSC) - XXVII	UCAR604	Computer Graphics and Image Processing - Practical	-	4	3
	III	MAJOR ELECTIVE (Discipline Specific Elective) - XXVIII	UCAO607/ UCAO608/ UCAO609/ UCAO610	Data Analytics/ Mobile Computing / Network Security/ Machine Learning	-	5	4
	III	Viva-Voce	UCAM601	Comprehensive Viva Voce	-	-	1
	III	Internship	UCAI601	Internship/ Field work/ Field Project		-	-/1 (Extra Credit)
	IV	Soft Skill				2	1
VI	V	Extension Programme/ Physical Education/NCC				-	0/2
Total						**30**	**25/28**
Grand Total						**194**	**148/160**

NON-MAJOR ELECTIVES-UG

Semester	Part	Category	Course Code	Course Title	Contact / Week	Credit
II	IV	NME	UCAE207	Data Science using R	4P	2
			UCAE208	Cyber Forensics	4P	2
			UCAE209	PyMOL	4P	2
			UCAE210	Qlik View	4P	2
			UCAE211	Internet Lab	4P	2
			UCAE212	Data Analytics Tools	4P	2
IV	IV	NME	UCAE401	Multimedia Techniques	4P	2
			UCAE402	Web Programming	4P	2
			UCAE403	Mobile App Development	4P	2

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Course Code	Course Title	Contact / Week	Credit	
						Min	Max
II	III	Summer Internship	UCAI201	Summer Internship	-	-	1
IV	III	Summer Internship	UCAI401	Summer Internship	-	-	1
V	III	Self Study	UCAS503	IOT Projects	2	-	2
V	III	Self Study	UCSS502/ UCAS502	Android Applications	2	-	2
VI	III	Self Study	UCSS601/ UCAS601	Angular JS	2	-	2
VI	III	Self Study	UCSS602/ UCAS602	Green Computing	2	-	2

Inclusion of Experiential Learning

A. Experiential Learning (Mandatory)

Course Mapping				Collaborating Agency - MSME		
Semester	**Course Code**	**Course Title**	**Assessment**	**Course Title**	**Hour/Days/Month**	**Mode of Evaluation**
II	UCAM310	Java Programming	Component III	Java Programming	4 Days	Reflection
II	UCAM407	Python Programming	Component III	Python Programming Training	4 Days	Reflection
III	UCAM505	Web Programming	Component III	Web designing Certification	4 Days	Reflection
III	UCAM610	Computer Graphics	Component III	Computer Graphics Certification	4 Days	Reflection

B. Skill Orientation Programme (Only for Interested students) – Extra Credit Earning Provision

Semester	Category	Course Code	Course Title	Collaborating Agency	Hour/ Days/Month	Mode of Evaluation	Credits (Min/Max)
V	Core	UCAT501	Excel Analytics with R-Language	MSME	4 Days	Reflection	1

JAVA PROGRAMMING

UCAM305/ UCSM310

Semester : III **Credit : 4**
Category : Core VII **Hour/Week : 5**
Class & Major : II BCA **Total Hour : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Acquire the knowledge of OOPs.
CO-2	Understand the concepts of class and methods.
CO-3	Learn java's exception handling mechanism, multithreading, packages and interfaces.
CO-4	Analyze different string function
CO-5	Develop Graphical User Interface (GUI) or windows-based applications in java.

UNIT -I INTRODUCTION **10 Hour**

Fundamentals of Object Oriented Programming: Java Evolution – Overview of Java Language – Data Types, variables, arrays – Operators – Control statements.

UNIT –II CLASSES AND METHODS **15 Hour**

Introduction to classes – class fundamentals – Declaring objects – Constructors – Methods and Classes – Overloading methods – static - final - Nested and Inner classes – Inheritance – Method Overriding – Abstract Classes – Packages – Interfaces.

UNIT – III EXCEPTION HANDLING AND FILES **15 Hour**

Exception handling – Types of Exception – try and catch – nested try – throw and throws – Multithreading Programming –I/O Streams – Reading and Writing files – Reading and writing Console I/O.

UNIT – IV STRING HANDLING AND APPLETS **15 Hour**

String Handling- String Operations: Comparison – Modifying String – String Buffer - Applet Class – Applet Architecture – The HTML Applet Tag – Passing parameters in Applets – Applet Context – Improving the Banner Applet – get() Method - JDBC Concepts.

UNIT – V AWT **10 Hour**

AWT classes – Window fundamentals – Working with Frame windows, Graphics – Controls – Layout Managers - Java Swing.

Text Books

- Herbert Schildt, Java - The Complete Reference, Tata McGraw Hill, 10th Edition,Nov 2017.

Reference Books

- E. Balagurusamy , Programmingwith Java A Primer, Tata McGraw Hill, FourthEdition, 2010.
- Cay S. Horst Mann & Gary Cornell, *Core java*, Volume II (9th ed.), Sun Microsystems Press Java Series, 2012.

e-Resources

- http://www.w3schools.com/html/
- https://www.youtube.com/watch?v=oqJy4e6Aa0M
- https://www.youtube.com/watch?v=7r3Vln4bGLk

COURSE OUTCOMES

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand object oriented programming features and concept	K1,K2
CO-2	Learn different types of inheritance, polymorphism, interfaces and packages.	K3
CO-3	Identify the concepts of Multithreading and Exception handling to develop efficient and error free codes.	K4
CO-4	Compare different string function.	K5
CO-5	Implement windows based application in java	K6

OBJECT ORIENTED ANALYSIS AND DESIGN
UCAM312

Semester : III **Credit : 4**
Category : Core VIII **Hour/Week : 5**
Class & Major : II BCA **Total Hour : 65**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the class based object oriented systems.
CO-2	Design the recurring problems by various methods.
CO-3	Develop robust object-based models for Systems
CO-4	Inculcate necessary skills to handle complexity in software design
CO-5	Apply the various design in object-Oriented solutions for Real-World Problems.

UNIT- I INTRODUCTION **13 Hour**

An overview – Object basics – Object state and properties – Behavior – Methods - Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle.

UNIT - II UML **13 Hour**

Introduction – Survey – Rambough, Booch, Jacobson methods – Patterns –Frameworks - Unified approach – Unified modeling language – Static and Dynamic models – UML diagrams – Class diagram – Use case diagrams – Dynamic modeling – Model organization – Extensibility-UML Meta model.

UNIT - III USE CASE APPROACH **13 Hour**

Identifying Use case – Business object analysis – Use case driven object oriented analysis – Use case model – Documentation – Classification – Identifying object, relationships, attributes, methods – Super-sub class – A part of relationships Identifying attributes and methods – Object responsibility.

Case Study: Library Management System, Mark Analysis System, Ticket Reservation System, Banking Transaction.

UNIT - IV UML DESIGN PROCESS **13 Hour**

Design process – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface-- Multidatabase System.

UNIT - V TESTING STRATEGIES **13 Hour**

Quality assurance – Testing strategies – Object Orientation Testing – Test cases – Test Plan – Debugging principles – Usability – Satisfaction – Usability testing – Satisfaction Testing.

Text Book:

- Ali Bahrami,(2017). Object Oriented System Development. McGraw Hill International Edition.

Reference Book:

- Grady Booch, Robert Maksimchuk,(2007). Object Oriented Analysis and Design. Pearson Education.
- Satzinger, Jackson and Burd(2007), “Object oriented Analysis and design with the Unified Process”, CENGAGE Learning.
- Michael Blaha and J. Rumbugh(2019), “Object oriented Modeling and design with UML”, Pearson Education
- O’Docherty (2005), “Object Oriented Analysis and Design Understanding, System Development with UML2.0”, Wiley India.

e-Resource:

- https://nptel.ac.in/courses/106105153
- http://vlabs.iitkgp.ac.in/se/3/references/

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the class based object-oriented methods.	K1
CO-2	Sketch the various methods in use case driven approach.	K2
CO-3	Analyze the basic object-oriented design patterns for problems.	K3.K4
CO-4	Create an application by various UML diagrams.	K5
CO-5	Apply the applications using object oriented methods.	K6

DATA COMMUNICATION NETWORKS
UCAM311

Semester : III **Credit : 4**
Category : Core IX **Hour/Week : 5**
Class & Major : II BCA **Total Hour : 65**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Learn the basic concepts of data communications.
CO-2	Interpret types of error.
CO-3	Classify different types of switching techniques.
CO-4	Justifying the packet layer protocol.
CO-5	Devise network and application layer.

UNIT - I INTRODUCTION **15 Hour**

Introduction to Data Communication, Network. Protocols & standards and standards organizations - Line Configuration - Topology - Transmission node - Classification of Network OSI Model - Layers of OSI Model.

UNIT - II TRANSMISSIONS **15 Hour**

Parallel and Serial Transmission - Modems - Guided Media Unguided Media - Performance - Types of Error - Error Detection - Error Corrections.

UNIT – III MULTIPLEXING APPLICATIONS **15 Hour**

Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone systems project 802 - Ethernet - Token Bus - Token Ring FDD IEEE 802.6 - SMDS - Circuit Switching - Packet switching.

UNIT – IV LAYERS **15 Hour**

History of Analog and Digital Network - Access to ISDN - ISDN Layers - Broadband ISDN X.25 Layers - Packet Layer Protocol - ATM - ATM Architecture - ATM Applications.

UNIT – V NETWORKS **15 Hour**

Repeaters –Bridges- Routers - Gateway - Routing algorithms - TCP/IP Network, Transport and Application Layers of TCP/IP- SMTP - SNMP - World Wide Web- Frame relay- ATM- ATM LANs –X.25 - relay.

Text Books

- B. Forouzan, Introduction to Data Communications in Networking, Fourth Edition,TataMcGraw-Hill, New Delhi, 2017
  - Unit I : Chapter 1,2,3
  - Unit II : Chapter 6,7,9
  - Unit III : Chapter 8,12,14
  - Unit IV : Chapter 16,19
  - Unit V : Chapter 21,24,25
- William Stallings, Data and Computer Communication, Tenth Edition, Prentice Hallof India, Sep 2013

Reference Books

- A. S.Tanenbaum, Computer Networks, Fourth Edition, Pearson Education, (Prenticehall of India Ltd), New Delhi, 2011.

E-Resources

- http://www.w3schools.com/dcn.html/
- http://freevideolectures.com/Course/2278/Data-Communication

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand and Contrast the concept of Signals, OSI & TCP/IP reference models and discuss the functionalities of each layer in these models.	K1,K2
CO-2	Determine the various modulation and error detection and correction techniques and their application in communication systems.	K3
CO-3	Compare different multiplexing techniques.	K4
CO-4	Explain layered architecture of communication protocols.	K5
CO-5	Developing the common networking & Application Protocols.	K6

JAVA PROGRAMMING - PRACTICAL
UCAR304/UCSR308

Semester : III **Credit : 2**
Category : Core X **Hour/Week : 4**
Class & Major : II BCA **Total Hour : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Write programs using abstract classes.
CO-2	Implement the multithreaded programs.
CO-3	Develop programs for solving real world problems using java collection frame work
CO-4	Design GUI programs using swing controls in Java.
CO-5	Construct and access using JDBC in Java.

Lab Exercises

1. Classes and Objects
2. Constructors
3. Method Overloading
4. Implementing Single and Multiple Inheritance concepts.
5. Method Overriding

6. Implementing Package Concepts.
7. Implementing Interfaces Concepts.
8. Implementing Exception Handling.
9. Implementing Thread Synchronization
10. Implementing String manipulation using string and string buffer classes
11. Implementing Graphics using Applet.
12. Implementing Swing Concepts.
13. JDBC Connectivity

COURSE OUTCOMES:

CO No.	**On completion of the course the student will be able to**	**Bloom's Level**
CO-1	write programs for solving real world problems using java collection frame work.	K1
CO-2	Apply multithreaded concepts in java programs.	K2
CO-3	Analyze GUI programs using swing controls in Java.	K3.K4
CO-4	Implement Exception Handling.	K5
CO-5	Develop programs using graphics and applet.	K6

DATABASE MANAGEMENT SYSTEM
UCAM404

Semester : IV **Credit : 4**
Category : Core XI **Hour/Week : 4**
Class & Major : II BCA **Total Hour :52**

COURSE OBJECTIVES:

CO No.	**To enable the students**
CO-1	Understand the basic concepts and the applications of database systems.
CO-2	Describe the fundamentals of database systems and data models and apply the E-R model for several practical examples.
CO-3	Construct and access database using normal forms
CO-4	Create a database using SQL queries.
CO-5	Demonstrate and design the various database software's (SQL/PL-SQL) in order to manage large complex database systems.

UNIT – I DATABASES AND DATABASE USERS 10 Hour

Introduction –Characteristics of the database approach –Database Actors – Advantages of using DBMS approach - Database Applications - Database System Concepts and Architecture: Data models, schemas and Instances- three schema architecture and data independence - Data Base Languages and interfaces – Database architecture.

UNIT – II DATA MODELING USING ENTITY RELATIONSHIP MODEL 10 Hour

Conceptual data models – Entity types, Entity sets, Attributes and key – Relationship types, Relationship sets, Roles & Structural constraints – ER diagrams. Relational model: Relational model concepts – Relational model constraints & Relational database schemas –Update operations & Dealing with constraint violations. Relational Algebra & Calculus: Unary Relational operations – Relational Algebra operations from set theory – Binary relation operations.

UNIT – III RELATIONAL DATABASE DESIGN & TRANSACTION PROCESSING CONCEPTS 12 Hour

Informal Design guidelines for relational schemas – Functional Dependencies – Normal forms based on primary keys – second & third Normal forms – Boyce-Codd Normal Form.Introduction – Transaction & System concepts – Characterizing schedules – Concurrency control techniques – Database Recovery concepts. Database Security & Authorization: Introduction to Database security issues – Discretionary Access control based on Granting & Revoking privileges.

UNIT – IV SCHEMA DEFINITION, BASIC CONSTRAINTS & QUERIES 10 Hour

SQL Data Definition – specifying Basic Constraints in SQL – Schema change statements in SQL – Basic queries in SQL – More complex SQL queries – insert, delete and update statements in SQL – Views in SQL – Embedded SQL, Dynamic SQL.

UNIT – V PL/SQL 10 Hour

Introduction to PL/SQL- Creating and running PL/SQL Code- Navigating the Database- Creating and Editing the source code- SQL* Plus- Running a SQL statement- Running a PL/SQL- Running a script

Text Books

- Shamkant B.Navathe, Ramez Elmasri, Fundamentals of Database Systems, Sixth Edition, Pearson Education, New Delhi, 2011.

  Unit I : Chapter 1 to Chapter 2
  Unit II : Chapter 3,4,5
  Unit III : Chapter 8,11,12

Unit IV : Chapter 7

- Steven Feuerstein & Bill Pribyl, Oracle PL/SQL programming, Sixth Edition, O'Reilly Media, 2014.

Unit V : Chapter 1 & 2

Reference Books

- Silberschatz, Korth and Sudarshan, Database System Concepts, Sixth Edition, McGraw Hill, New Delhi, 2010.
- Raghu Ramakrishnan, Database Management System, Third Edition, Tata McGraw-Hill Publishing Company, New Delhi, 2012.

E-Resources

- http://www.w3schools.com/dbms.html/
- https://www.youtube.com/watch?v=aR44FbeeFH8
- https://www.youtube.com/watch?v=1057YmExs

COURSE OUTCOMES:

CO No.	**On completion of the course the student will be able to**	**Bloom's Level**
CO-1	Acquire Knowledge and Discuss relational database theory.	K1
CO-2	Understand and design ER-models based on scenarios which represent in database application	K2
CO-3	Demonstrate the normalization for the development of application software.	K3.K4
CO-4	Select the SQL queries based on the commercial database system.	K5
CO-5	Design the various database software's PL-SQL	K6

OPERATING SYSTEM
UCAM408

Semester : IV **Credit : 4**
Category : Major Core (DSC) – XII **Hour/Week : 5**
Class &Major: II BCA **Total Hour : 65**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Define the layouts of the Operating Systems.
CO-2	Understand the operations and services provided by the Operating System.
CO-3	Acquire the basic knowledge of Scheduling and Deadlock.
CO-4	Evaluate the various memory allocation methods and free space management.
CO-5	Apply the various algorithms for creation of the file organization.

UNIT-I INTRODUCTION **13 Hour**

Operating System – Mainframe Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems - Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments. COMPUTER-SYSTEM STRUCTURES: Computer-System Operation – I/O Structure – Storage Structure – Storage Hierarchy – Hardware Protection –Network Structure. OPERATING-SYSTEM STRUCTURES: System Components – Operating-System Services – System Calls – System Programs – System Structure – Virtual Machines.

UNIT-II PROCESSES **13 Hour**

PROCESS: Process Concept – Process Scheduling – Operation on Processes – Cooperating Processes – Interprocess Communication. THREADS: Overview – Multithreading Models - Threading Issues. CPU SCHEDULING: Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple–Processor Scheduling – Real-Time Scheduling – Algorithm Evaluation.

UNIT-III PROCESS SYNCHRONIZATION **13 Hour**

Background - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic Problems of Synchronization. DEADLOCKS: System Model–Deadlock Characterization – Methods for Handling. Deadlocks – Deadlock Prevention–Deadlock Avoidance–Deadlock Detection–Recovery from Deadlock.

UNIT-IV MEMORY MANAGEMENT **13 Hour**

Background – Swapping – Contiguous Memory Allocation – Paging - Segmentation – Segmentation with Paging. VIRTUAL MEMORY: Background - Demand Paging – Process Creation - Page Replacement – Allocation of Frames – Thrashing.

UNIT-V FILE-SYSTEM INTERFACE AND THE LINUX SYSTEM **13 Hour**

File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection – Free-Space Management –THE LINUX SYSTEM: History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – Input and Output – Inter-process Communication –Security.

Text Book:

- Abraham SilberSchatz and Peter Baer Galvin,(2018). *Operating System.* Addison Wesley Longman Inc. (10^{th} Ed.).

Reference Book:

- William Stallings, (2006). *Operating Systems – Internals and Design Principles.* Pearson Education Publications. Singapore.

e-Resources:

- https://nptel.ac.in/courses/106105214
- http://edclap.com/pluginfile.php/13305/mod_resource/content/1/OS%20Book%20Galvin.pdf
- http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/CRUX/labs/index.html

COURSE OUTCOMES:

CO No	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the basic structure of Operating Systems	K1
CO-2	Apply various scheduling algorithms in process management	K2,K3
CO-3	Compare the Prevention & Avoidance algorithms in Deadlock	K4
CO-4	Classify the various memory management techniques.	K5
CO-5	Create the file using file system management	K6

SOFTWARE ENGINEERING
UCAM409

Semester : IV **Credit : 4**
Category : Major Core (DSC) - XIII **Hour/Week : 4**
Class &Major: II BCA **Total Hour : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Discuss the significance of process models.
CO-2	Familiarize on system engineering and data modeling concepts.
CO-3	Explore the various design process in software life cycle.
CO-4	Analyze the project management, software quality and testing strategies.
CO-5	Evaluate the process of Project management, formal technical reviews.

UNIT–I INTRODUCTION TO EVOLVING SOFTWARE 10 Hour

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 PROCESS 10 Hour

Establishing the Groundwork – Initiating the Requirements Engineering Process – Eliciting Requirements – Collaborative Requirements Gathering – Quality Function – Building the Requirements Model – Elements of Requirements Model – Analysis Pattern – Requirements Analysis – Data Modeling Concepts.

UNIT–III DATA PROCESS 10 Hour

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 10 Hour

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 **12 Hour**

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:

- Richard Fairley (2011). *Software Engineering Concepts.* Tata McGraw–Hill Education.
- Roger S Pressman,(2014). *Software Engineering – A Practitioner's Approach.* McGraw Hill International Edition. New York.(8th Ed.).

Reference Book:

- Ian Somerville,(2006). *Software Engineering.* Pearson Education. (7th Ed.).

e-Resources:

- http://vlabs.iitkgp.ernet.in/se/
- http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/sw_engg/labs/index.php
- https://nptel.ac.in/courses/106105182

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the nature of software, software process and software engineering practice and various models.	K1,K2
CO-2	Demonstrate the current theories, models, and techniques that provide a basis for the software life cycle	K3
CO-3	Analyze the techniques and tools for engineering practice	K4
CO-4	Summarize the concepts of quality, Software Quality Assurance tasks, strategies and types of testing	K5
CO-5	Develop the Product, process, project estimation modeling and emerging trends using recent applications	K6

DATABASE MODELLING
UCAR405

Semester : IV **Credit : 2**
Category : Major Core (DSC) – XIV **Hour/Week : 3**
Class &Major:II BCA **Total Hour : 39**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Understand the concepts of table creations, aggregate functions, set operators using queries
CO-2	Examine the partition table using nested queries
CO-3	Sketch the E-R diagrams using relational database modeling
CO-4	Analyze the relations by applying normalization techniques.
CO-5	Apply PL/SQL queries using functions, procedures, cursors and triggers

LAB EXERCISES

1. Concept design with ER Model.
2. Creation of Relational Model.
3. Apply Normalization to given Application
4. Using SQL commands for
   a. Data Definition and
   b. Data Manipulation.
5. Using SQL Queries
   a. Sub Query,
   b. Nested Query,
   c. SET Operators
   d. Constraints.
6. Using SQL Queries Group Functions
   a. Aggregate functions,
   b. GROUP BY,
   c. HAVING

7. Creation and dropping of Views.
8. Creation of Triggers – insert, delete and update.
9. Creation of Procedures.
10. Usage of Cursors.

Note: Models to be trained in Real time Application minimum 5 to be present.

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand database schema for a given problem-domain	K1,K2
CO-2	Construct and maintain tables using PL/SQL	K3
CO-3	Select SQL queries to access the data for data processing.	K4
CO-4	Evaluate the SQL queries using aggregate and group function	K5
CO-5	Develop PL/SQL queries using procedures, functions, cursors and triggers.	K6

OPERATING SYSTEM -PRACTICAL
UCAR406

Semester : IV **Credit : 2**
Category : Major Core (DSC) – XV **Hour/Week : 3**
Class &Major:II BCA **Total Hour : 39**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Identify the main components and services of Operating Systems.
CO-2	Explain the process, memory, file management and various scheduling algorithms
CO-3	Analyze various issues in Inter Process Communication (IPC) and their solutions.
CO-4	Evaluate the Memory management algorithms, allocation methods and virtual memory implementations.
CO-5	Create the various algorithms using file organization techniques

LAB EXERCISES

1. Programs using the following system calls of UNIX operating system fork, getpid, exit,close, opendir, readdir.
2. Develop shell simple programs.
3. Develop a menu driven shell program to copy ,edit, rename and delete a file
4. Implement the concepts
    a. Priority scheduling algorithm
    b. Round robin scheduling algorithm
    c. FCFS scheduling algorithm
5. Producer-Consumer Problem Using Semaphores
6. Dead Lock
    a. Avoidance
    b. Prevention
7. File Organization Techniques
    a. Single Level Directory
    b. Two Level Directory

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understand the processes, resource control, physical and virtual memory, scheduling, I/O and files.	K1,K2
CO-2	Calculate waiting time, response time, turnaround time and disk seeks time in disk scheduling.	K3
CO-3	Analyze the best CPU scheduling algorithm for a given problem instance	K4
CO-4	Summarize the performance of various page replacement algorithms	K5
CO-5	Develop the algorithm for deadlock avoidance, detection and file allocation strategies.	K6

MULTIMEDIA TECHNIQUES
UCAE401

Semester : IV | **Credit : 2**
Category : NME | **Hour/Week : 4**
Class &Major: II UG | **Total Hour : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Explore the basic tools and components of a multimedia
CO-2	Understand the basic tools found in Adobe Photoshop to create and edit images.
CO-3	Create time-based and interactive multimedia components
CO-4	Discuss about multimedia scripting and programming
CO-5	Demonstrate proficiency in developing the multimedia presentations.

LAB EXERCISES

Using Photo Editing Software,

1. Design a visiting card containing at least one graphic and text information.
2. Given a picture of a garden as background. Extract the image of a butterfly from another picture and organize it on the background.
3. Make three copies of .jpeg picture. On one of these pictures, adjust the brightness and contrast, so that it gives an elegant look. On the second picture, change it to gray scale and the third is the original one.
4. Convert an image imported from My Pictures, to a pencil sketch.
5. Mask the background image given through your name.
6. Import two pictures, one that of sea and another of clouds. Morph, merge and overlap these images.

Using Animation Software

7. Shows the gradual conversion of a square to a circle.

8. Highlight a neatly formatted text by a spotlight from left to right.
9. Show the effect of a Virtual Drumbeat with suitable audio and visual effects.
10. Simulate a Raindrop with a splash effect.

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	State the techniques of photo editing.	K1,K2
CO-2	Apply layer masks, filters and blending modes, share and save your images in various formats.	K3
CO-3	Compare various retouching and repairing techniques to correct images.	K4
CO-4	Summarize a range of concepts, techniques and tools for creating and editing the interactive multimedia applications.	K5
CO-5	Prepare multimedia applications in several areas	K6

WEB PROGRAMMING

UCAE402

Semester : IV **Credit : 2**
Category : NME **Hour/Week : 4**
Class &Major: II UG **Total Hour : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Explain the tags of HTML and scripting language
CO-2	Apply the SCRIPT element and CSS for creating dynamic web pages
CO-3	Develop the basic handling of tables, executing queries using Javascript
CO-4	Formulate planning and designing syntactically correct effective web pages.
CO-5	Evaluate the techniques behind responsive web design

LAB EXERCISES

HTML

1. Create an HTML Documents, and establish adequate formatting for presentation purposes
2. Managing images in HTML document.
3. Insert and manipulate tables
4. Establish and maintain internal and external link to available resources
5. Frames
6. Forms
7. Special Effects in HTML Documents (eg: Marquee)

CASCADING STYLE SHEET

1. CSS Background
2. CSS text and fonts
3. CSS Links
4. CSS Lists
5. CSS tables

JAVASCRIPT

1. Basic Syntax.
2. Control Structures.
3. Writing Functions.
4. Working with Arrays.
5. Events Handling.

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	List out the steps in the creation of static webpage using HTML	K1,K2
CO-2	Construct a web page and identify its elements and attributes	K3
CO-3	Analyze the SCRIPT element and CSS for creating dynamic web pages	K4
CO-4	Summarize XML documents and Schemas	K5
CO-5	Compose a Rich Internet Application	K6

MOBILE APP DEVELOPMENT
UCAE403

Semester : IV **Credit : 2**
Category : NME **Hour/Week : 4**
Class &Major: II UG **Total Hour : 52**

COURSE OBJECTIVES:

CO No.	To enable the students
CO-1	Create the components and structure of mobile application development frameworks for Microsoft and windows OS based mobiles.
CO-2	Learn the basic and important design concepts and issues of development of mobile applications.
CO-3	Develop the capabilities and limitations of mobile devices.
CO-4	Design the skills in creating draw tables and animation
CO-5	Acquire knowledge on user interface design to develop frameworks

LAB EXERCISES

1. Install the mobile development app using Microsoft power apps.
2. Create Development of Hello World Application
3. Design a mobile app for calendar control using popular items.
4. Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.
5. Design a mobile app for blank page using add icon.
6. Create a search icon and search the products.
7. Design the mobile app with radio buttons, check box and list box.
8. Design a mobile app with media item.
9. Design a mobile app and create a different shapes using shapes item.
10. Develop a Simple App like calculator/feedback/MCQ etc.,

e-Resources:

- https://powerapps.microsoft.com/en-us/
- https://make.powerapps.com/e/Default-0e623c6d-eeaf-473e-8245-ec72dd3c7e5d/canvas/?ScenarioId=signup&action=new-blank&form-factor=phone&name=demo

COURSE OUTCOMES:

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Identify the basic knowledge on mobile application environment and technology.	K1
CO-2	Explain and apply the concepts of mobile application development.	K2,K3
CO-3	Point out the design and development issues specific to mobile applications.	K4
CO-4	Evaluate mobile applications, using development tools and environments.	K5
CO-5	Develop applications to the Android marketplace for distribution.	K6

III and IV Evaluation Components of CIA

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
III	III	Major Core (DSC) - VII	UCAM310 / UCSM305	Java Programming	Assignment	Presentation using ICT Technique
		Major Core (DSC) - VIII	UCAM312	Object Oriented Analysis and Design	Assignment	Problem solving in Rationale rose tool
		Major Core (DSC) - IX	UCAM311	Data Communication Networks	Assignment	Presentation using ICT Technique
		Major Core (DSC) - X	UCAR304/ UCSR308	Java Programming - Practical	DPA	Viva-voce

IV	III	Core VII	UCAM404	Database Management System	Assignment	Presentation using ICT Technique
	III	Major Core (DSC) - VIII	UCAM408	Operating System	Assignment	Seminar
	III	Major Core (DSC) - XII	UCAM409	Software Engineering	Assignment	System Modeling
	III	Major Core (DSC) - XIV	UCAR405	Database Modeling - Practical	DPA	Viva-voce
	III	Major Core (DSC) - XV	UCAR406	Operating System- Practical	DPA	Viva-voce

NON-MAJOR ELECTIVES

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
IV	IV	Non Major Elective	UCAE401	Multimedia Techniques	DPA	Viva-voce
			UCAE402	Web	DPA	Viva-voce
			UCAE403	Mobile App Development	DPA	Viva-voce

DEPARTMENT OF PSYCHOLOGY

PREAMBLE

UG: Programme Profile and the Syllabi of Courses Offered in the III and IV Semesters along with Evaluation Components III & IV (**With effect from 2021 - 2024 Batch Onwards)**.

PROGRAMME SPECIFIC OUTCOMES

PSO No.	Programme Specific Outcomes Upon completion of these courses the student would be able to
PSO-1	Identify the Psychological Processes, Human Behaviour and Develop the Critical Thinking Ability.
PSO-2	Execute the Major Concepts, Theoretical Perspectives, and Fields in Psychology.
PSO-3	Demonstrate the Essence of Human Values through Acts of Social Commitment, and Develop Professional Ethics and Responsibilities.
PSO-4	Distinguish Psychological Principles to Physical, Cognitive, and Psycho-Social Interventions.
PSO-5	Design the Knowledge of Theories and Practice Model in the Disciplinary Domain for Community Development, Interventions with Individuals, Community-Based Knowledge and to Pursue Higher Education and Enhance Competitive Spirits.

PROGRAMME PROFILE B.Sc. Psychology

Semester	Part	Category	Course code	Course Title	Previous Course Code	Contact Hrs/ week	Credit Min/ Max
I	I	Languages / AECC - II Tamil / Hindi / French	UTAL107/ UTAL108/ UHIL102/ UFRL102	Basic Tamil- I/ Advanced Tamil- I/ Hindi -I / French- I	UTAL105/ UTAL106/ UHIL101/ UFRL 101	5	3/4
	II	Communicative English / AECC – 1	UENL109/ UENL110	English for Communication (Stream – I)/English for Communication (Stream – II)	---	5	3/4
	III	Major Core I / DSC	UPSM101	General Psychology- I	---	6	5
		Major Core II / DAC	UPSM102	Developmental Psychology- I	---	6	5
		Allied – I / (GE)	UPSA101	Human Physiology	---	6	4
		PE	UPEM101	Professional English	---	6	4
	IV	Value Education			---	2	1
				TOTAL		**36**	**25/27**

II	I	Languages / AECC - II Tamil / Hindi / French	UTAL207/ UTAL208/ UHIL202/ UFRL202	Basic Tamil II/ Advanced Tamil II/ Hindi II/ French II	UTAL205/ UTAL206/ UHIL 201/ UFRL 201	5	3/4
	II	Communicative / English / AECC-1	UENL209/ UENL210	English for Communication (Stream – I)/English for Communication (Stream – II)		5	3/4
	III	Major Core III / DSC	UPSM201	General Psychology-II		6	5
		Major Core IV / DSC	UPSM202	Developmental Psychology- II		5	5
		Allied – II / (GE)	UPSA201	Elementary Statistics		6	4
		PE	UPEM201	Professional English II		6	4
		Internship	UPSI201	Internship / Field work / Field Project		-	-/1 (Extra Credit)
	IV	Non-Major Elective				3	2
	V	Extension activity/ Physical Education/NCC				-	1/2
				TOTAL		**36**	**27/31**
III	I	Languages / AECC – II Tamil / Hindi / French	UTAL307/ UTAL308/ UHIL302/ UFRL302	Basic Tamil I / Advanced Tamil I / Hindi I / French I	UTAL 305/ UTAL 306/ UHIL 302/ UFRL 301	5	3/4
	II	Communicative English / AECC – 1	UENL309/ UENL310	English for Communication (Stream – I)/English for Communication (Stream – II)		5	3/4
	III	Major Core V / DSC	UPSM303	Social Psychology – I	UPSM 103	5	5
		Major Core VI / DSC	UPSR302	Experimental Psychology-I		5	5
		Allied-III / (GE)	UPSA301	Principles of Management		5	4
	IV	Online Course		NPTEL/ Spoken Tutorial		3	1/2
		Value Education				2	1
				TOTAL		**30**	**22/25**
IV	I	Languages / AECC – II Tamil / Hindi / French	UTAL407/ UTAL408/ UHIL402/ UFRL402	Basic Tamil II/Advanced Tamil II/ Hindi II / French II	UTAL403/ UTAL 404	5	3/4
	II	Communicative English / AECC - I	UENL409/ UENL410	English for Communication (Stream – I)/English for Communication (Stream – II)	UENL 406	5	3/4
	III	Major Core VII / DSC	UPSM403	Social Psychology – II	UPSM 203	5	5
		Major Core VIII / DSC	UPSR402	Experimental Psychology-II		5	5

		Allied – IV / (GE)	UPSA401	Research Methodology	UPSM 402	5	4
		Internship	UPSI401	Internship / Fieldwork / Field Project		-	-/1 (Extra Credit)
	IV	Non-Major Elective				3	2
	IV	Soft Skill				2	1
	V	Extension activity/ Physical Education/NCC				-	-/2
					TOTAL	**30**	**23/28**
V	III	Major Core XI / DSC	UPSM501	Abnormal Psychology		6	5
		Major Core X / DSC	UPSM504	Educational Psychology		6	5
		Major Core X / DSC	UPSM506	Theories of Personality	UPSM 303	6	5
		Major Elective / (DSE)	UPSO501	Consumer Behaviour	UPSM 505	5	4
			UPSO502	Human Resource Development	UPSM 603		
		Major Core XII / DSC	UPSP501	Project	UPSP 601	5	5
	IV	Value Education				2	1
					TOTAL	**30**	**25**
VI	III	Major Core XIII / DSC	UPSM601	Clinical Psychology		6	5
		Major Core XIV / DSC	UPSM602	Counselling Psychology		5	4
		Major Core XV /DSC	UPSM604	Health Psychology		6	5
		Major Core XVI	UPSM605	Positive Psychology	UPSM 503	6	6
		Major Elective / (DSE)	UPSO601	Psychological Testing & Case Conceptualization		5	4
			UPSO602	Rehabilitation Psychology			
		Comprehensive Viva Voce	UPSM606				1
		Internship	UPSI601	Internship / Field Work / Field Project (30 Hours)	-	-	- /1 (Extra Credit)
	IV	Soft Skill				2	1
	V	Extension Programme/ Physical Education/NCC				-	-/2
		Extension Programme	UROX601	Rural Outreach Programme (30 Hours)	-	-	- / 1 (Extra Credit)
					TOTAL	**30**	**26/30**
					GRAND TOTAL	**192**	**148/166**

COURSES OFFERED TO OTHER DEPARTMENTS

NON–MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Contact Hour/Week	Credit
						Min/ Max
II	IV	Non-Major Elective / SEC	UPSE201	Psychology for Effective Living	3	2
IV	IV	Non-Major Elective / SEC	UPSE401	Guidance and Counselling	3	2

EXPERIENTIAL LEARNING (Only for Interested Students)

Course Mapping				Collaborating Agency – E.S. Hospital		
Semester	Course Code	Course Title	Assessment	Course Title	Hour/Days /Month	Mode of Evaluation
V	UPSM504	Organizational Psychology	Component III	Organizational Psychology	2 Days	Reflection
VI	UPSM601	Clinical Psychology	Component IV	Clinical Psychology	2 Days	Reflection

SOCIAL PSYCHOLOGY I

UPSM 303

Semester : III **Credit : 5**
Category : Major Core **Hours/Week : 5**
Class & Major : II B.Sc. Psychology **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Demonstrate and Identify the Causes of Social Behaviour and Methods of Social Psychology
CO-2	Develop different skills to cooperate than compete while working in a Group.
CO-3	Illustrate with Social Influence and Interpersonal Attraction
CO-4	Explain Social Perspectives of Prejudice
CO-5	Explain the Theories of Attribution and Attitude Formation

UNIT - I INTRODUCTION 13 Hour

Definition - Scientific in Nature – A Model for Understanding Social Behaviour - Social Psychology and Related Fields - Research in Social Psychology - Settings for Social Psychological Research - Ethics and Social Psychological Research.

UNIT - II THE SOCIAL SELF **13 Hour**

Self-concept – Self-Knowledge: How We Know the Self? - The Influence of Groups and Culture on the Self - Self-Esteem: Evaluating the Self - Internal Influences on Self-Esteem - Self-Awareness - Self-Esteem and Impression Management - Self Monitoring and Impression Management.

UNIT - III SOCIAL PERCEPTION **13 Hour**

Impression Formation: Automaticity and Social Perception - Automatic Processing - The Importance of Automaticity in Social Perception - Automaticity and Behaviour - Automaticity and Emotions - Controlled Processing - The Attribution Process – Attribution Biases - Misattributions - The Fundamental Attribution Error - Shortcuts to Reality: Heuristics.

UNIT- IV PREJUDICE AND DISCRIMINATION **13 Hour**

The Dynamics of Prejudice, Stereotypes, and Discrimination - The Persistence and Recurrence of Prejudice and Stereotypes - Personality and Prejudice: Authoritarianism and Gender - Gender and Prejudice - The Social Roots of Prejudice - The Confirmation Bias - The Difference Between Prejudice and Nonprejudiced Individuals - Reducing Prejudice - Contact Between Groups - Reducing the Expression of Prejudice Through Social Norms.

UNIT - V ATTITUDES **13 Hour**

Definite Allport's Definition of Attitudes - Explicit and Implicit Attitudes - The Function of Attitudes - The Attitude Survey - Behavioural Measures - Attitudes Formation - Mere Exposure - Direct Personal Experience - Operant and Classical Conditioning - Observational Learning - The Effect of Television and Books - The Heritability Factor - Attitudes and Behaviour.

Text books

- Nyla, R. Branscombe & Baron, R. A. (2017**)** *Social Psychology*. Pearson India Educations Services. (14th Ed.,). Noida.
- Kenneth, S. Bordens & Irwin, A. Horowitz (2008) *Social Psychology*. Freeload Press. (3rd Ed.,). New York.

Reference Books

- Chaube, S. P. & Chaube, A. (2007). *Social Psychology*. Neelkamal. New Delhi.
- Taj, H. (2007). *An Introduction to Social Psychology*. Neelkamal. New Delhi.
- Kuppuswamy, B. (1982). *Introduction to Social Psychology*.: Lily Jayasingh Publishers Pvt. Ltd. (2nd Ed.,). Bombay.

e-Resources

- http://www.tandfonline.com/toc/psai20/current/
- http://www.ummoss.org/self/
- http://www.apa49.org/

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Recognize the Techniques, typically used to gain Compliance	K1
CO-2	Demonstrate Knowledge and Examination Procedures of the Major Theories and Research in Social Psychology.	K2
CO-3	Trace the Evolution of Current Social Psychological Knowledge to their Historical Roots, in the Global and Indian Context.	K3
CO-4	Identify the Techniques for Impression Management	K4
CO-5	Justify the importance of Self-Growth, with Self-Esteem and Self-Concept.	K5

EXPERIMENTAL PSYCHOLOGY - I

UPSR 301

Semester : III **Credit : 5**
Category : Major Core **Hours/week : 5**
Class & Major : II B.Sc. Psychology **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Gain exposure to various Psychological Experiments and its conduction
CO-2	Assess and interpret the attention, memory and learning of the individual.
CO-3	Learn about important assessment methods and diagnostic criteria used in Clinical settings.
CO-4	Understand the nature of the profession and the activities involved in it.
CO-5	Report Experiments in Psychology involving Human Participants

UNIT I EXPERIMENT I SENSATION AND ATTENTION 13 Hour

Two Point Threshold-Kinaesthetic Sensitivity-Span of Attention-Division of Attention

UNIT II EXPERIMENT II PERCEPTION 13 Hour

Muller-Lyer Illusion-Size-Weight Illusion - Depth Perception - Reaction time

UNIT III EXPERIMENT III LEARNING 13 Hour

Trial and Error Learning - Concept Formation - Habit Interference - Paired Associate Learning

UNIT IV EXPERIMENT IV MEMORY **13 Hour**

Immediate Memory Span - Wechsler Memory Scale - PGI Memory Scale - 2 Experiments using Memory Drum

UNIT V EXPERIMENT V INTELLIGENCE **13 Hour**

Seguin Form Board - Koh's Block Design Test - Alexander Passalong Test - Raven's Progressive Matrices Test

Note:

✓ Each student has to complete a minimum of 12 experiments.

✓ At least two experiments from each unit.

References.

- Anne Anastasi. & Susana Urbina. (2016). Psychological Testing (7th Ed.,) Pearson Publication. New Delhi.
- Raja Mani M. (2005) Psychology with Advanced Experiments. Concept Publishing Company. New Delhi.
- Woodworth & Schlosberg. H. (1965) Experimental Biology. Methen and Co. Ltd, New York.

e-Resources

- https://imotions.com/blog/what-is-experimental-psychology/
- https://www.verywellmind.com/what-is-experimental-psychology-2795784
- https://www.frontiersin.org/articles/10.3389/fpsyg.2020.612805/full
- https://psychology.fandom.com/wiki/Introduction_to_experimental_psychology
- https://www.slideserve.com/sherlock_clovis/experimental-psychology-powerpoint-ppt-presentation

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Knowledge on various Experiments in Psychology	K1
CO-2	Skills to demonstrate effective conduction of experiments	K2
CO-3	Acquire psychological skills in learning and memory domain	K3
CO-4	Generate an interest in working in the community with a Psychological outlook	K4
CO-5	Report writing skills for experiments involving Human Participants	K5

PRINCIPLES OF MANAGEMENT

UPSA 301

Semester	**: III**	**Credit**	**: 4**
Category	**: Allied**	**Hours/week**	**: 5**
Class & Major	**: II B.Sc. Psychology**	**Total Hours**	**: 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Understanding of Basic Management Concepts, Principles, and Practices
CO-2	Develop Strategic Planning and Decision-making Strategies in an Organization
CO-3	Summarize the Concept and Complete the Process of Organizing
CO-4	Develop Staffing, Leadership, Motivation and Organization
CO-5	Predict the Dynamics of Controlling and Emerging Issues in Management

UNIT I LEVELS OF MANAGEMENT AND PLANNING 13 Hour

Levels of management – Roles of manager, Management as a Science or Art – Approaches to management- Definition– Nature – Importance – Forms – Types – Steps in Planning – Objectives – Policies – Procedures and Methods – Nature and Types of Policies – MBO – Case Studies.

UNIT II DECISION MAKING 13 Hour

Decision Making – Process of Decision making – Types of Decisions – Problems involved in Decision making – Forecasting – Decision Tree – Case Studies.

UNIT III ORGANIZING 13 Hour

Organizing - Nature & Importance – Principles of Organizing Delegation & Decent realization – departmentation – Span of Management. Organizational structure – Line & staff and functional – Organizational charts and manual – making organizing effective– Staffing.

UNIT IV DIRECTING 13 Hour

Function of directing – Motivation – Major Theories of motivation (Need hierarchy theory – hygienic approach – Expectancy Theory) – 4 Motivation techniques – Leadership – Definition –Theories and approach to leadership – Styles of leadership – Types – Case Studies.

UNIT V CONTROLLING & CO-ORDINATION 13 Hour

Nature – Problems – Effective coordination- Control – Nature – Basic control process – Importance – Control techniques – traditional and non-traditional Control devices – Use of Computers in managing information – Case Studies.

Text Book

- Tripathi P.C. & P.N. Reddy. (2007) Principal of Management. TMH. (4th Ed.,). New Delhi.

Reference Books

- L.M. Prasad. (2009.) Principles and practices of Management. Sultan Chand & Sons. New Delhi.
- George Terry. (2006). Principles of Management. A.I.T.B All India Travel Pvt Ltd. New Delhi.

e-Resources

- https://open.umn.edu/opentextbooks/formats/1717
- https://2012books.lardbucket.org/pdfs/management-principles-v1.0.pdf
- https://d3bxy9euw4e147.cloudfront.net/oscms-prodcms/media/documents/PrinciplesofManagement-OP.pdf

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understanding Managerial Functions like Planning, and Basic Knowledge of the Aspect of Management	K1
CO-2	Understand the Planning process in the Organization	K1
CO-3	Understand the concept of Organization	K2
CO-4	Demonstrate the ability to Direct, Leadership, and Communicate Effectively	K3
CO-5	Analysis Isolate Issues and Formulate best Control Methods	K6

SOCIAL PSYCHOLOGY II

UPSM 403

Semester	**: IV**	**Credit**	**: 5**
Category	**: Major Core**	**Hours / Week**	**: 5**
Class & Major	**: II B.Sc. Psychology**	**Total Hours**	**: 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Ensure Understanding of Social Psychology
CO-2	Acquaint Students with Classic and Contemporary Research in Social Psychology
CO-3	Develop an Understanding of the Individual in Relation to the Social World
CO-4	Develop a link between Social Psychology and Personality
CO-5	Explain Social Influence, Individuals think Feel and Behave in Social Situations

UNIT - I PERSUASION AND ATTITUDE CHANGE **13 Hour**

The communicator -The Message and the Audience - Social Judgment Theory - The Cognitive Approach to Persuasion - The Effect of Mood on Processing - The Effect of Personal Relevance on Processing - The Heuristic Model of Persuasion - Cognitive Dissonance Theory: A Model of Self-Persuasion - Self-perception Theory.

UNIT - II LIKING, LOVE, AND OTHER CLOSE RELATIONSHIPS **13 Hour**

The Roots of Interpersonal Attraction and Close Relationships - Affiliation and Intimacy - Loneliness and Social Anxiety - Love and Close Relationships - Love's Triangle - Types of Love - The Formation of Intimate Relationships - Attachment Styles and Adult Love Relationships - Determinants of Interpersonal Attraction.

UNIT - III CONFORMITY, COMPLIANCE AND OBEDIENCE **13 Hour**

Conformity: Informational and Normative Social Influence - Social Norms: The Key to Conformity - Classic Studies in Conformity - Factors That Affect Conformity - Minority Influence - Compliance: Responding to a Direct Request - Foot-in-the-Door Technique - Door-in-the-Face Technique – Obedience - Situational Determinants of Obedience – Disobedience.

UNIT- IV INTERPERSONAL AGGRESSION **13 Hour**

Levels and Types of Aggression - Factors That Contribute to Aggression - Biological Explanations for Aggression - The Social Learning Explanation for Aggression - Reducing Aggression - Reducing Aggression in the Family - Reducing aggression with Cognitive intervention.

UNIT - V GROUPS AND INDIVIDUALS **13 Hour**

Characteristics of Groups - Roles in Groups - The Effects of an Audience on Performance - Groups Self-Identity, and Intergroup relationships - Why People Identify with a Social Category - The Power of Groups to Punish: Social Ostracism - Group Decision Making and Group Productivity - The Effect of Leadership Style on Group Decision Making.

Text Books

- Nyla, R. Branscombe and Baron, R. A. (2017**)** *Social Psychology*. Pearson India Educations Services. (14th Ed). Noida.
- Kenneth, S. Bordens and Irwin, A. Horowitz (2008) *Social Psychology*. Freeload Press. (3rd Ed.). New York.

Reference Books

- Chaube, S. P. and Chaube, A. (2007). *Social Psychology*. Neelkamal. New Delhi.
- Taj, H. (2007). *An Introduction to Social Psychology*. Neelkamal. New Delhi.
- Kuppuswamy, B. (1982). *Introduction to Social Psychology*.: Lily Jayasingh Publishers Pvt. Ltd. (2nd Ed.). Bombay.

E-Resources

- http://www.personalityresearch.org/attachment.html
- http://www.thelifeyoucansave.com/
- http://sparq.stanford.edu/

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Demonstrate the ability to Articulate Independently, Human Social Behaviour and the Cultural Influences that affect our Behaviour.	K1
CO-2	Describe, discuss and analyse major issues and concepts in the field of Social Psychology	K2
CO-3	Compare and contrast the Research Methodologies used in the Scientific Study of Human Social Behaviour.	K3
CO-4	Demonstrate the ability to state the Fundamental Principles of Social Psychology	K4
CO-5	Describe the Dynamics of group Behaviour of Social Influence, such as Altruism, Conformity, Obedience, Deindividuation, Leadership, Intergroup relations, and Conflict and Cooperation	K5

EXPERIMENTAL PSYCHOLOGY - II

UPSR 401

Semester : IV **Credit : 5**
Category : Major Core **Hours/week : 5**
Class & Major : II B.Sc. Psychology **Total Hours : 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Assess and interpret the level of Intelligence and problem-solving ability of the individual
CO-2	Evaluate and improve the Emotion, Motivation and Personality of the individual
CO-3	Learn about important Assessment methods and Diagnostic Criteria used in Clinical Settings.
CO-4	Understand the nature of the profession and the activities involved in it.
CO-5	Report Experiments in Psychology involving Human Participants

UNIT I EXPERIMENT I MOTIVATION & EMOTION 13 Hour

Level of Aspiration -Picture frustration -Emotional intelligence test -Locus of control

UNIT II EXPERIMENT II INTEREST & APTITUDE TEST 13 Hour

Thurstone interest schedule-Differential aptitude test - Test of personal values -Test of Verbal & Nonverbal reasoning

UNIT III EXPERIMENT III PERSONALITY **13 Hour**

Neo-PI-16 PF-Jung's word Association Test-Projective test (TAT or Rorschach Ink Bottle Test)

UNIT IV EXPERIMENT IV MEMORY STRESS / ADJUSTMENT / MENTAL HEALTH **13 Hour**

Stress Coping Test-Stress- Trait Anxiety-Mental Health -Adjustment Inventory for College Students

UNIT V EXPERIMENT V CREATIVITY & LEADERSHIP **13 Hour**

Passi Test of Creativity-Non-Verbal Test of Creative Thinking-Leadership Preference Scale-Decision Making Scale

Note:

✓ Each student has to complete a minimum of 12 experiments.
✓ At least two experiments from each unit.

References.

- Anne Anastasi. & Susana Urbina. (2016). Psychological Testing (7th Ed.,) Pearson Publication. New Delhi.
- Raja Mani M. (2005) Psychology with Advanced Experiments. Concept Publishing Company. New Delhi.
- Woodworth & Schlosberg. H. (1965) Experimental Biology. Methen and Co. Ltd, New York.

e-Resources

- https://imotions.com/blog/what-is-experimental-psychology/
- https://www.verywellmind.com/what-is-experimental-psychology-2795784
- https://www.frontiersin.org/articles/10.3389/fpsyg.2020.612805/full
- https://psychology.fandom.com/wiki/Introduction_to_experimental_psychology
- https://www.slideserve.com/sherlock_clovis/experimental-psychology-powerpoint-ppt-presentation

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Knowledge on various Experiments in Psychology	K1
CO-2	Skills to demonstrate effective conduction of experiments	K2
CO-3	Acquire psychological skills in learning and memory domain	K3
CO-4	Generate an interest in working in the community with a Psychological outlook	K4
CO-5	Report writing skills for experiments involving Human Participants	K5

RESEARCH METHODOLOGY

UPSA401

Semester	**: IV**	**Credit**	**: 4**
Category	**: Allied**	**Hours/week**	**: 5**
Class & Major	**: II B.Sc. Psychology**	**Total Hours**	**: 65**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Demonstrate the Foundations of Research
CO-2	Illustrate with Importance of the Research Problem and Types of Samplings.
CO-3	Summarize the Basic Concepts and Types of Research Design.
CO-4	Explain the Methods and Types of Data Collection.
CO-5	Construct the use of APA style in Writing Research Reports.

UNIT – I INTRODUCTION OF RESEARCH **13 Hour**

Definition-Principles-Meaning & Importance-Type of Research-Research Methods versus Methodology-Variables-Meaning of Types.

UNIT - II RESEARCH PROBLEM AND RESEARCH DESIGN **13 Hour**

Research Problem-Selecting of Problem-Defining the Problem-Technique Involved in Defining a Problem.

Meaning-Need for Research Design- Features of a Good Design-Important Concepts Relating to Research Design- Different Research Design-Basic Principles of Experimental Designs-Important Experimental Design.

UNIT - III SAMPLING AND DATA COLLECTION **13 Hour**

Sample Design-Sampling and Non-Sampling Error-Sample Survey Vs. Census Survey - Types of Sampling Design-Non-Probability Sampling-Probability Sampling-Complex Random Sampling Designs.

Collection of Primary Data-Collection of Secondary Data-Selection of Appropriate Method for Data Collection-Case Study Method.

UNIT- IV TESTING OF HYPOTHESIS **13 Hour**

Definition-Meaning-Concepts-Testing of Hypothesis-Type –I &II Error- Limitation.

UNIT - V INTERPRETATION AND REPORT WRITING **13 Hour**

Meaning of Interpretation-Techniques of Interpretation-Precautions in Interpretation Significance of Report Writing- Writing a Research Report.

Text Books:

- Kothari, C.R. (2008). *Research Methodology – Methods and Techniques*. Wiley Eastern Ltd. New Delhi.
- Kumar, Ranjith. (2005). *Research Methodology – A step by step guide for beginners.* Pearson Education. (2nd Ed.). New Delhi.

Reference Books

- Kundu, (2010) *Research Methodology*. Pearson Publishing. New Delhi
- Myers, J. (2008). *Methods in Psychological Research*. Sage Publication. New Delhi.
- Coaley, K. (2009). *An Introduction to Psychological Assessment and Psychometrics.* Sage Publications. New Delhi.
- Coolican, H. (2009) *Research Methods in Statistics in Psychology*. Rawat Publications. New Delhi.

E-Resources

- https://study.sagepub.com/kumar5e
- https://www.ala.org/tools/research/larks/researchmethods
- https://www.questionpro.com/blog/what-is-research/

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Identify different Research Problems and solve a Research Project.	K1
CO-2	Paraphrase the Review of Literature while doing the Research Project in Group.	K2
CO-3	Implement an appropriate Statistic in SPSS while Analysing the Data.	K3
CO-4	Identify appropriate Research Designs and Systematically able to use them while carrying out a Research Project in a Group.	K4
CO-5	Compare different Methodologies in relation to different kinds of Research Problems in Psychology.	K5

GUIDANCE AND COUNSELLING

UPSE 401

Semester	**: IV**	**Credit**	**: 2**
Category	**: Non Major Elective**	**Hours / Week**	**: 3**
Class & Major	**: II UG**	**Total Hours**	**: 39**

COURSE OBJECTIVES

CO No.	To enable the students
CO-1	Explain the concepts of Guidance and Counselling.
CO-2	Demonstrate an Understanding of Educational, Vocational and Personal Guidance.
CO-3	Recognize the Need for Guidance and Counselling in Schools.
CO-4	Explain various Services in the School Guidance Program.
CO-5	Know the Qualities required for a Good Counsellor.

UNIT I COUNSELLING FUNDAMENTALS **8 Hour**

Introduction – Definition – Development and Goals – Counsellor and Counselee relationship – Purposes of Counselling.

UNIT II THEORIES OF COUNSELLING **8 Hour**

Psychoanalytic – Person-Centered – Behavioural Theories – Transactional Analysis

UNIT III SPECIAL AREAS OF COUNSELLING **8 Hour**

Marital and Family Counselling – Student Counselling – Parental Counselling – Employee Counselling – Geriatric Counselling.

UNIT IV SCOPE OF GUIDANCE **8 Hour**

Fundamentals of Guidance – Theories of Guidance – Theories of Career Choice.

UNIT V EDUCATIONAL GUIDANCE **7 Hour**

Meaning – Needs – Objectives and Functions – Areas in Guidance – Educational Settings – Schools and Colleges – Vocational Guidance.

Textbook

- Shertzer, B. & Stone, S.C. (1976). *Fundamentals of Guidance and Counselling*. Boston: Houghton Mifflin Co.

Reference Books

- Kumari, S. & Tomar, M. (2012). *Guidance and Counselling*. Shree Publishers & Distributors. New Delhi.

- Shah Alam, (2009). *Basics of Guidance and Counselling*. Global Vision Publishing House, New Delhi.

E-Resources

- https://www.euroguidance.cz/publikace/cbs-18.pdf
- https://www.learningclassesonline.com/2020/11/guidance-and-counselling.html
- https://www.nalandaschool.org/importance-of-guidance-and-counselling

COURSE OUTCOMES

CO No.	On completion of the course, the student will be able to	Bloom's Level
CO-1	Understand Human Behaviour at Different Stages	K1
CO-2	Recognize Behavioural Problems and Examine Strategies for Positive Behaviour Management	K2
CO-3	Identify Different Types of Exceptionalities	K3
CO-4	Relate Counselling theory to issues in Counselling	K4
CO-5	Develop an Ethical Approach to Counselling	K5

III AND IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
III	Major Core I / DSC	UPSM301	Social Psychology- I	Assignment	Seminar
III	Allied – I / (GE)	UPSA301	Principles of Management	Assignment	Seminar
IV	Major Core III / DSC	UPSM401	Social Psychology-II	Assignment	Seminar
IV	Allied – II / (GE)	UPSA401	Research Methodology	Report Writing	Seminar
IV	Non-Major Elective / SEC	UPSE401	Guidance and Counselling	Case Study	Seminar

Internal Quality Assurance Cell

1. Guidelines for E- content Development

E-Content & E-Materials can be prepared following online platforms

- Power Point, Documents, Website, Blogs, Videos, Screen Recording Tools, Audios, and Subject Oriented Games etc.,

E-Content

- Minimum 2 E-content (NPTEL/ SWAYAM) should be prepared by the Department
- Minimum duration of the E-content 10 – 15 minutes.
- Faculty creates the E-content with full preparation on their topics.
- E-content materials should be MP4 format.

E-Materials

- All the faculties should be involved to preparation of E-materials in the department.
- Each faculty need to be prepared at least 1 E-material per semester.
- Minimum 10 E-materials should be prepared by the department and it is may be PDF or PPT.
- E-Content & E-Materials will be uploaded to our college website.

2. Internship/Field work/Field Project

- Incorporated in UG & PG course profile (Sem II, IV & VI)
- 30 Hrs training programme in Industries / Research Institutes / Laboratories / Rural Field / any other concern related to any discipline for all UG, PG Students in every Academic Year.
- Departments to submit a List of Suitable Industries and Laboratories in their Discipline to Dean A office.
- Concern class Teachers are Responsible to Organize and monitor the Internship.
- Students can undergo the Internship in First Year, Second Year, and Third Year.

- 30Hrs has to be completed by the Students before the end of the Year.
- 1 credit can be awarded under Extra Credit Earning Provision.
- Report of the Training Programme to be submitted.
- Power Point Presentation and Viva Voce to be conducted with the External Expert.
- Assessment by the internal and external expert.

1. Report	–	20
2. Presentation	–	20
3. Viva voce	–	10
Total	–	**50**

3. Rural outreach Programme

- For UG Students under Extra Credit Earning Provision.
- Student has to complete 30 Hrs of ROP before the end of V semester.
- ROP can be based on entrepreneurship, health camp and others for the benefits of the Villagers.
- Report of activities and Output to be submitted
- Viva-voce will be conducted with External Experts

- Assessment by the internal and external expert.

1. Report	–	20
2. Presentation	–	20
3. Viva voce	–	10
Total	–	**50**

4. Provision for Re-totaling, Re-valuation and Photocopies of answer scripts to all PG Programmes (with effect from ESE April 2021-This replaces the guidelines given in AC Booklet-IV)

To ensure the transparency in end semester examinations PG students can apply for Re-totaling, Re-valuation and Photocopies of answer scripts. Last date to apply for re-totaling / photo copies / re-valuation.

- Seven working days from the date of publication of result.
- The Photocopies of answer, to be issued to the students within 7 working days after the receipt of application from the students.

- If the student desires to go for revaluation after verifying the photocopies of answer scripts, it is to be applied within next 7 working days after receiving photocopies.

5. PG Valuation (with effect from ESE April 2021-This replaces the guidelines given in AC Booklet-I)

- Single valuation in the campus by the external examiners.

6. Consultancy Policy

The sharing pattern of the amount received by the institution towards consultancy and testing for faculty and institution

S.No	Details	Sharing Pattern		
		Testing Tasks	Consultancy work with use of institution facilities	Consultancy work without useof institution facilities
1	Institution Share	60 %	40%	20%
2	Faculty Share	40%	60%	80%