ISLAMIAH COLLEGE [AUTONOMOUS]

Accredited by NAAC with "A" Grade in 3rd Cycle

[Affiliated to Thiruvalluvar University, Vellore]
VANIYAMBADI – 635 752

(AIDED & SELF FINANCE)

SYLLABI BOOK XVII

18TH BOARD OF STUDIES MEETING

(For UG & PG Students Admitted from 2023-2024)

22nd July 2023

பொதுத்தமிழ்-1(Semester I)

COURSE CODE: UCTATL11

Learning Objectives

The Main Objectives of this Course are to:

- முதலாமாண்டுப் பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ் மொழி இலக்கியங்களை அறிமுகம் செய்தல்
- தற்கால இலக்கியப் போக்குகளையும் இலக்கணங்களையும் மாணவர் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்
- தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்

Expected Course Outcomes

On the Successful completion of the Course, Students will be able to

இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்

- பாரதியார் காலந்தொட்டு தற்காலப் புதுக்கவிதைகள் வரை கவிதை இலக்கியம் அறிமுகப்படுத்தப்படுவதால் படைப்பாற்றல் திறன் பெறுதல்.
- புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்
- இக்கால இலக்கிய வகையினைக் கற்பதன் மூலம் படைப்பாக்கத் திறனைப் பெறுவர்
- மொழியறிவோடு சிந்தனைத்திறன் அதிகரித்தல்
- தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச்சொற்களை உருவாக்கவும் அறிந்து கொள்ளுதல்

அலகு-1 **மரபுக்கவிதை**

1.பெ. சுந்தரனார் - தமிழ்த் தெய்வ வணக்கம்

2.பாரதிதாசன் - சிறுத்தையே வெளியில் வா

3.கவிமணி - புத்தரும் சிவனும்

4.முடியரசன் - மொழி உணர்ச்சி

5.கண்ணதாசன் - ஆட்டனத்தி ஆதிமந்தி- ஆதிமந்தி புலம்பல்

6.சுரதா - துறைமுகம் தொகுப்பிலிருந்து ஏதேனும் ஒரு கவிதை

7.தமிழ் ஒளி - கடல்

அலகு-2 **புதுக்கவிதை**

1.அப்துல் ரகுமான் - வீட்டுக்கொரு மரம் வளர்ப்போம்

2.ஈரோடு தமிழன்பன் - சென்ரியூ கவிதைகள் (ஏதேனும் ஐந்து கவிதைகள்)
3.வைரமுத்து - பிற்சேர்க்கை
4.மு.மேத்தா - வாழைமரம்
5.அறிவுமதி - வள்ளுவம் பத்து
6.நா.முத்துக்குமார்- ஆனந்த யாழை மீட்டுகிறாய்
7.சுகிர்தராணி - சபிக்கப்பட்ட முத்தம்
8.இளம்பிறை - நீ எழுத மறுக்கும் எனது அழகு

அலகு-3 சிறுகதைகள்

1.வாய்ச்சொற்கள் - ஜெயகாந்தன் (மாலை மயக்கம் தொகுப்பு)
2.கடிதம் - புதுமைப்பித்தன்
3.கரு - உமாமகேஸ்வரி
4.முள்முடி - தி. ஜானகிராமன்
5.சிதறல்கள் - விழி.பா. இதயவேந்தன்
6.காகித உறவு - சு. சமுத்திரம்
7.வீட்டின் மூலையில் சமையல் அறை - அம்பை
8.(மொழிபெயர்ப்புக் கதை) ஆண்டன் செக்காவ் - நாய்க்காரச் சீமாட்டி

அலகு-4 பாடம் சார்ந்த இலக்கிய வரலாறு

அலகு-5 மொழித்திறன் போட்டித் தேர்வு

1.பொருள் பொதிந்த சொற்றொடர் அமைத்தல்
2.ஓர் எழுத்து ஒரு மொழி
3.வேற்றுமை உருபுகள்
4.திணை, பால், எண், இடம்
5.கலைச்சொல்லாக்கம், மொழிபெயர்ப்பு.

(குறிப்பு: அலகு 4, 5 ஆகியன போட்டித் தேர்வு நோக்கில் நடத்தப்பட வேண்டும்)

பார்வை நூல்கள்:

- தமிழ் இலக்கிய வரலாறு- சிற்பி. பாலசுப்பிரமணியன்
- புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு- தமிழண்ணல்
- வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு- எ.ஃ.ப். பாக்கியமேரி

பொதுத்தமிழ்-2 (Semester-II)

COURSE CODE: UCTATL21

Learning Objectives

The Main Objectives of this Course are to:

- சமய இலக்கியங்களையும் சிற்றிலக்கியங்களையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்
- மொழித்திறனையும் சிறுகதை இலக்கிய வடிவத்தையும் மாணவர்களுக்கு உணர்த்துதல்.

Expected Course Outcomes

On the Successful completion of the Course, Students will be able to

இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர் அடைவர்.

- பக்தி இலக்கியங்களைக் கற்பதன் மூலம் பக்தி நெறியினையும், சமய நல்லிணக்கத்தையும் தெரிந்து பின்பற்றுவர்.
- சிற்றிலக்கியங்களின் வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுவர்.
- பட்டப் படிப்பினை படிக்கும்போதே பெரும்பான்மையான தமிழ் இலக்கியங்கள் குறித்த அறிவினைப் பெறுவர்.
- தமிழ்ச் சமூகப் பண்பாட்டு வரலாற்றினை இலக்கியங்கள் வாயிலாக அறிவர்.
- போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்குத் தமிழ்ப் பாடத்தினைப் பயன்கொள்ளும் வகையில் ஏற்ற பயிற்சி பெறுவர்.

அலகு-1 **பக்தி இலக்கியம்**

1.திருநாவுக்கரசர் தேவாரம் - ‘‘நாமார்க்கும் குடியல்லோம்’’ எனத் தொடங்கும் பதிகம் (10 பாடல்கள்)

2.ஆண்டாள்- - திருப்பாவை (முதல் 10 பாசுரங்கள்)

அலகு-2

1.வள்ளலார் - அருள் விளக்க மாலை (முதல் 10 பாடல்கள்)

2.எச்.ஏ.கிருட்டிணப்பிள்ளை - இரட்சணிய மனோகரம்- பால்ய பிரார்த்தனை

3.குணங்குடி மஸ்தான் சாகிபு - பராபரக்கண்ணி (முதல் 10 கண்ணி)

அலகு-3 **சிற்றிலக்கியங்கள்**

1.தமிழ்விடுதூது (முதல் 20 கண்ணி)

2.திருக்குற்றாலக் குறவஞ்சி - குறத்தி மலைவளம் கூறுதல்

3.முக்கூடற்பள்ளு - நாட்டுவளம்

அலகு-4 **பாடம் தழுவிய இலக்கிய வரலாறு (பல்லவர் காலம், நாயக்கர் காலம்)**

அலகு-5 **மொழித்திறன்/ போட்டித் தேர்வுத் திறன்**

1.தொடர் வகைகள்

2.மரபுத்தொடர், பழமொழிகள்

3.பிறமொழிச் சொற்களைக் களைதல்

4.வழுச்சொற்கள் நீக்குதல்

5.இலக்கணக் குறிப்பு அறிதல்

(குறிப்பு: அலகு 4, 5 ஆகியன போட்டித் தேர்வு நோக்கில் நடத்தப்பட வேண்டும்)

பார்வை நூல்கள்:

- தமிழ் இலக்கிய வரலாறு- சிற்பி - பாலசுப்பிரமணியன்

- புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு-- தமிழண்ணல்
- வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு-- எ.ஃ.ப். பாக்கியமேரி

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
FOUNDATION URDU PAPER - I
TITLE OF THE PAPER: QAWA'ID, URDU NASR AND URDU DTP
SEMESTER - I
COURSE CODE: UCURTL11

UNIT – I

- **Qawa'id**
- Ism ki Tareef
- Ism Ke Aqsam Misalon ke Sath
- Jins (Muzakkar aur Muannas) ki Tareef
- Sair Pehle Darwesh ki – Meer Amman Dehlavi
- Letter to the parent/guardian asking money for college fees

UNIT – II

- Fe'l ki tareef
- Fe'l aur uski Qismein
- Ma'zi aur uski Qismein
- Ummeed ki Khushi – Sir Syed Ahmed Khan
- Letter to the Principal seeking leave

UNIT – III

- **Hikayat**
- Hikayat ki tareef
- Sahabi aur Khalifa ki tareef
- Hikayat-e-Sahaba (Khulafa e Raashidain -Sayeduna Abu Bakr Siddiq(R.A),Hazrat Umar(R.A),Hazrat Usman(R.A),Hazrat Ali(R.A)
- Shaikh Saadi ka taruf
- Hikayat-e-Shaik Saadi
- Ek Badsha
- Haroon Rasheed

UNIT – IV

- **Inshayiya**
- Inshayiya ki tareef
- Rasheed Ahmed Siddiqi ka taruf

- ❖ Dr. Abdul Haq Marhoom – Rasheed Ahmed Siddiqi

UNIT – V

- ➢ **Shakhsiyat ki Sawaneh**
- ❖ Sawaneh ki tareef
- ❖ Allama Iqbal ki Sawaneh
- ❖ Moulana Abul Kalam Azad kiSawaneh

Reference Book:

1. Qawayad Urdu– Maulvi Abdul Haq
2. Hikayat e Sahaba – Maulana Yusuf Kandhalvi
3. Mazameen e Sir Syed
4. Inshayiya aur Inshayiye – Syed Muhammad Hasnain
5. Mazhar-e- Adab –Edited by Dr.K.Habeeb Ahmed &Dr.K.H.Kaleemullah
6. Urdu Nasr – Edited by Dr M Sayeeduddeen

Web Resources:

1. www.rekhta.org
2. www.urduchannel.in
3. www.urducouncil.nic.in

Course Outcome:

- Prose makes students understand National Integration, Communal Harmony, Brotherhood and they inculcate moral and human values within themselves.
- Develop their creative thinking and writing in prose.
- Students will be able to write and use the language correctly and they develop the correct grammar sense.
- They develop the correct grammar sense and its usage.
- Students to develop skill in writing and communicating to other personalities through letter.
- They will be able to communicate effectively.

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
FOUNDATION URDU PAPER - II
TITLE OF THE PAPER: SHAYERI (GHAZAL AUR NAZM), TARJAMA NIGARI AUR MUKALIMAAT
SEMESTER - II
COURSE CODE: UCURTL21

UNIT – I

- **Ghazliyat**
- Ghazal ki Tareef
- Mirza Ghalib ka taruf
- Mirza Ghalib ki Ghazal → Dil Hi tohYeh Na Sang….
- Momin Khan Momin ka taruf
- Momin Khan Momin ki Ghazal →Adam Mein Rehte tu..

UNIT – II

- Khaja Mir Dard ka taruf
- Khaja Mir Dard → Tuhmatein Apne Zimme …..
- Jigar Muradabadi ka Taruf
- Jigar Muradabadi ki Ghazal → Na Dunya ke Sitam….

UNIT – III

- **Nazmein**
- Nazm ki Tareef
- Nazm ki Tareef
- Moulana Altaf Hussain Hali ki Tareef
- Moulana Altaf Hussain Hali ki Nazm – Taleem ki Ahmiyat
- Allama Iqbal ki Nazm→ Shikwa
- Allama Iqbal ki Nazm→ Jawab-e-Shikwa

UNIT – IV

- Akbar Allahabadi ka tarruf
- Akbar Allahabadi ki Nazm Nagma e Hasrat
- Sahir Ludhyanavi ka tarruf
- Sahir Ludhyanvi Ki Nazm Taj Mahal
- Faiz Ahmad Faiz ka tarruf
- Faiz Ahmad Faiz ki Nazm Subh-e-Azadi

UNIT – V

- Tarjama Nigari
- Tarjama Nigari Ki taareef
- Pyari Urdu (Tarjuma Urdu se Angrezi)

Reference Book:

1. Deewan-e-Meer
2. Deewan-e-Dard
3. Deewan-e-Ghalib
4. Kuliyath-e-Momin
5. Kuliyath-e-Akbar
6. Kuliyath-e- Iqbal
7. Kuliyath-e- Jigar
8. Kuliyath-e- SaherLudhyanvi
9. Urdu Shayeri Edited by Dr M Sayeeduddeen

Web Resources:

1. WWW.rekhta.org
2. WWW.Urduchannel.in
3. WWW.urducouncil.nic.in

Course Outcomes:

- Students will be able to enjoy and appreciate modern poetry.
- Students will be able to learn and inculcate moral and ethical values through Ancient & patriotic poets like Mirza Ghalib, Moulana Hali and Allama Iqbal etc.
- Students will be able to understand and promote communal harmony, Humanity and patriotism through One Act Plays Drama.
- They will be able to study the socio-cultural & political background of Indian Culture and its values through Drama.

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ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
UG FOUNDATION LANGUAGE COURSE
ARABIC SYLLABUS FOR ALL UG I YEAR FOR THE STUDENTS WHO HAVE

ARABIC PAPER I
UCARTL11

[GRAMMAR-I]

Semester I, Part I Language

Sub-Code	Part	Title of the paper	Hours week	credit	Theory/ Practical	Exam Hours	CIA	External Marks	Total Marks
	1	Arabic Paper-I	6	5	Theory	3	25	75	100

Course Objectives:

Students are aimed to develop the correct pronunciation of the Arabic Alphabet and write them joint together as per the given rules and to acquire adequate ability to form meaningful words and small sentences in Arabic

Course Outcomes:

Students will be able

CO1: To understand the correct pronunciation of Arabic letters
CO2: To understand the structure-based composition.
CO3: To acquire new vocabulary in Arabic
CO4: To clearly understand the basic grammar
CO5: To gain the skill of translation.

Unit-I	Durus-al-Lughat-al-arabiyyah li ghair al natiqina biha Vol-1 & (ELAHI)	Lsn 1,2,3&cpt 1&2
Unit-2	Durus-al-Lughat-al-arabiyyah li ghair al natiqina biha Vol-1 & (ELAHI)	Lsn 4-6 & cpt 3&6
Unit-3	Durus-al-Lughat-al-arabiyyah li ghair al natiqina biha Vol-1 & (ELAHI)	Lsn 7-9 & cpt 5&6
Unit-4	Durus-al-Lughat-al-arabiyyah li ghair al natiqina biha Vol-1 & (ELAHI)	Lsn 10-12 & cpt 7&8
Unit-5	Durus-al-Lughat-al-arabiyyah li ghair al natiqina biha Vol-1 & (ELAHI)	Lsn 14,15 & cpt 9&10

Prescribe Text Book:

Title of the Book	Author Name	Publishing House
Durus-al-Lughat-al-arabiyyah li ghair al natiqina biha Vol-1	Dr.V.Abdur Raheem	I. F. T. Chennai
ELAHI	**Composed By:** Ali bin-Abitalib(RA)	

Reference/Recommended Book for Study:

Title of the Book	Author Name	Publishing House
Al Arabiyyah lil Hayat	Nasif Musthafa	King Saud University Riyadh

SEMESTER II

ARABIC SYLLABUS FOR ALL UG I YEAR FOR THE STUDENTS WHO HAVE ADMITTED FROM THE ACADEMIC YEAR 2023-2024 ONWARDS.

ARABIC PAPER II

UCARTL21

[GRAMMAR-II]

Semester II, Part I Language

Sub-Code	Part	Title of the paper	Hours week	credit	Theory/ Practical	Exam Hours	CIA	External Marks	Total Marks
	1	Arabic Paper-II	6	5	Theory	3	25	75	100

Course Objectives:

Student are expected to develop the construction of the sentence based on the lessons taught and to gain translation skills

Course Outcomes:

Students will be able to

CO1: Able to use basic grammatical structure.

CO2: Develop reading skills and reading speed

CO3: Acquire new vocabulary in Arabic

CO4: Understand the different types of sentences.

CO5: Able to construct simple sentence in Arabic

Unit-1	Basic Arabic Grammar	Lesson 1-4	
Unit-2	Basic Arabic Grammar	Lesson 5-8	
Unit-3	Basic Arabic Grammar	Lesson 9-12	
Unit-4	Basic Arabic Grammar	Lesson 13-16	
Unit-5	Basic Arabic Grammar	Lesson 17-20	

Prescribe Text Book:

Title of the Book	Author Name	Publishing House
Basic Arabic Grammar	Dr. syed Rahmathullah	DEEN Store , CHENNAI

Reference/Recommened Book for Study:

Title of the Book	Author Name	Publishing House
Al Arabiyyah lil Hayat	Nasif Musthafa	King Saud University Riyadh

All UG (BA / B.Sc / B.Com / BCA / BBA)

FIRST SEMESTER – HINDI – I

CODE: UCHDTL11 CREDITS: 5 HOURS: 6/WEEK

Course Objectives:

1. Training in Hindi pronunciation along with basic knowledge of Hindi
2. To develop a correct grammar sense for written communication.
3. To help the students to improve their writing and understanding skills.
4. To identify the values reflected in the content of Prose writings and essays.
5. To improve reading ability.

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SYLLABUS :

Unit I

Basic Hindi

• Swar- Vowels
• Vyanjan- Consonants
• Barah Khadi – (Vowels+Consonants)
• Shabd- words

Unit II

Hindi ShabdavaliaurVakya Rachna

• Rishtoke Naam
• Gharelupadarthoke Naam
• Noun - pronoun
• Names of the fruits, Flowers, Birds, Animals, Colours
• Kriya - Vakya Rachna

Unit III

Applied Grammar

a) Gender
b) Number
c) Causative Verbs
d) Voice
e) Spell Check

Unit IV

ChoteGadyansh ka Pathan

• BachokiKahaniyan -Ramashankar – (i) Ekaur Karna (ii)Gangarampakdagaya

• Premchand – PanchParameshwar

Unit V

SamanyaNibandh

• SanthTiruvalluvar

• E.V.R ThandaiPeriyar

• ParyavaranSanrakshan(ParyavaranaurPradushan)

• Mobile ka prayog – laabhaurhaani

• Vibhinnapratiyogiparikshaoke bare meinjaankaridenaaurprashikshan

BOOKS FOR STUDY:

- Adhunik Bal Kahaniyan – Ed. Ramashankar, https://44books.com/adhunik-bal-kahaniyan-rmashankar.html
- https://www.hindikahani.hindi-kavita.com/PanchParmeshwarMunshiPremchand.php
- Hindi Parichay by D.B.HindiPracharsabha, Chennai.

BOOKS FOR REFERENCE:

a. SankshiptHindi Vyakaran– Kamta Prasad
b. Abhinav Hindi Vyakran– Nagappa
c. Saral Hindi Vyakaran– shyamchandrakapur
d. Shaikshikvyakaranaurvyavaharikhindi, Dr. Krishna kumargoswami, Aalekhprakashan, Delhi – 32.
e. SampoornaHindi Vyakaran, Sreesharan& Sri Alok Kumar Rastogi, Madhur Books, Delhi -

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SECOND SEMESTER - HINDI – II
CODE: UCHDTL21 CREDITS: 5 HOURS: 6/WEEK

Course Objectives:

1 Introduction to Hindi fiction and One – Act plays for appreciation and critical analysis.

2. To help students develop their creative thinking and writing.

3. Practical / application of grammar.

4. To help students develop Practical translation skills

5. Teaching of social values through stories and skits

SYLLABUS AND BOOKS PRESCRIBED:

Unit I

HINDI KAHANI AUR EKANKI - PARICHAY

• Kahani keTatva
• Hindi kePramukhkahanikaro ka Parichay
• Ekankike Tattva
• Hindi kePramukhEkankikaro ka Parichay

Unit II

Hindi Kahaniyan(Short Story)

• Premchand – Bade GharkiBeti
• Malathi Joshi – Vo Tera Ghar Yah MeraGhar
• Gyanranjan -Pitha

Unit III

Hindi Ekanki(one Act Play)

• Vibhajan – Vishnu Prabhakar
• Maa Baap – Sri Vishnu
• Dus Hazar - Bhatt

Unit IV

Grammar

• Kriya Visheshan- Adverb
• SambandhBodhak – Prepostion
• SamuchayBodhak - Conjuction
• Kaal – No Sub Divisions

Unit V

AnuvadAbhyas – English to Hindi & vice versa

- English To Hindi - 16,17,18, 19 & 20 only
- Hindi to English – 8, 9,10,11 & 12 only.

BOOKS FOR STUDY :

a. AathEkankiNatak – Ed. Dr. Ramkumar Verma https://db.44books.com/2019/05/आठ-एकांकी-नाटक-डॉ-रामकुमा.html
b. Das Ekanki - ttps://44books.com/das-ekanki.html
c. Gadyanikash, ed. Shaik abdulwahab, sanrachnaprakashan, U.P.
d. gadyakosh.org/gk/ **वो**_तेराघर,येमेराघर/मालतीजोशी
e. **https://www.hindisamay.com(** ज्ञानरंजन की कहानिक्याँ – पिता)

f. **https://bharatdarshan.co.nz/lit-collection/literature/**650/**bade-ghar-ki-beti-premchand.html**

g. AnuvadAbhyas– I, D.B. Hindi Prachar Sabha, Chennai.

BOOKS FOR REFERENCE :

1. HINDI: SHABD – ARTH – PRAYOG BY DR.HARDEV BAHRI, ABHIVYAKTI PRAKASHAN, ALLAHABAD.
2. SHAIKSHIK VYAKARAN AUR VYAVAHARIK HINDI, Dr.KRISHNA KUMAR GOSWAMI, AALEKH PRAKASHAN, DELHI – 32.
3. HINDI SAHITYA KA SUBODH ITIHAS, GULANB RAAY
4. HINDI SAHITYA KA ITIHAS, DR. NAGENDRA

PROGRAMME OUTCOMES FOR PART II ENGLISH:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.

PO5: Scientific Reasoning: Ability to analyze, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through selfplaced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

PO7: Reflective Thing: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society

PO8:Reading & Projects: Document their reading and interpretive practices in assignments, translation works, and independent projects.

PO9: Confidence & Effectiveness: Confidently and effectively articulate their literary and textual experiences.

PO10: Social Skills & Empathetic Approach: Reorganize a professional and reflective approach to leadership, responsibility, personal integrity, empathy, care and respect for others, accountability and self-regulation.

PROGRAMME SPECIFIC OUTCOMES FOR PART II ENGLISH

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

PSO4: Developing a research framework and presenting their independent ideas effectively.

PSO5: Equipping their employability skills to excel in professions like teaching and exposing them to various activities to empower them through communication skills.

PSO6: Enabling a holistic perspective towards the socio-political inequalities and environmental issues Mapping of Programme Specific Outcomes (PSOs)with Programme Outcomes (POs) and can be carried out accordingly, assigning the appropriate level in the grids:

MAPPING OF PROGRAMME-SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Programme Specific Outcomes (PSOs)	Programme Outcomes (POs)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PSO1		✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO2	✓	✓		✓	✓	✓	✓	✓	✓	✓
PSO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

PSO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 50, Correlation: Very High										

MAPPING CORRELATION BENCHMARK

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-37	38-50
Correlation	Poor	Moderate	High	Very High

SEMESTER I

Course Code	Category	Course Title	Hours	Credit
UCENTL11	PART II	ENGLISH-I	4	3

COURSE OBJECTIVES

1. To enable learners to acquire the linguistic competence necessarily required in various life situations.
2. To help them understand the written text and able to use skimming, scanning skills
3. To assist them in creative thinking abilities
4. To enable them become better readers and writers
5. To assist them in developing correct reading habits, silently, extensively and intensively

Unit-I	Unit Title & Text POETRY	12 Hours

1.1 A Patch of Land – Subramanian Bharati
1.2 The Sparrow - Paul Laurence Dunbar
1.3 A Nation's Strength – Ralph Waldo Emerson
1.4 Love Cycle - Chinua Achebe

Unit-II	PROSE	12 Hours

2.1 JRD - Harish Bhatt
2.2 Us and Them - David Sedaris
From Dress Your Family in Corduroy and Denim
2.3 Uncle Podger Hangs a Picture - Jerome K Jerome

Unit-III	SHORT STORIES	12 Hours
3.1 The Faltering Pendulum- Bhabani Bhattacharya 3.2 How I Taught my Grandmother to Read- Sudha Murthy 3.3 The Gold Frame- R.K. Laxman		
Unit-IV	**LANGUAGE COMPETENCY**	**12 Hours**
4.1 Vocabulary : Synonyms, Antonyms, Word Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction		
Unit-V	**ENGLISH FOR WORKPLACE**	**12 Hours**
5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions		

CO	**COURSE LEARNING OUTCOMES:** The students will be able to	Knowledge Level
CLO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	**K1, K2**
CLO2	Understand the total content and underlying meaning in the context.	**K4**
CLO3	Form the habit of reading for pleasure and for information	**K5**
CLO4	Comprehend material other than the prescribed text	**K6**
CLO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	**K3**
K1-Remembering/knowledge,K2-Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create		

Methodology of Teaching

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems

MAPPING WITH COURSE LEARNING OUTCOMES (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

CLOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CLO1	✓	✓	✓	✓	✓	✓
CLO2	✓	✓	✓	✓	✓	✓

CLO3	✓	✓	✓	✓	✓	✓
CLO4	✓	✓	✓	✓	✓	✓
CLO5	✓	✓	✓	✓	✓	✓
Number of matches = 30, Correlation: Very High						

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-7	8-15	16-23	24-30
Correlation	Poor	Moderate	High	Very High

SEMESTER II

Course Code	Category	Course Title	Hours	Credit
UCENTL21	**PART II**	**ENGLISH-II**	**4**	**3**

COURSE OBJECTIVES

1. To introduce learners to the essential skills of communication in English
2. To enable them use these skills effectively in academic and non-academic contexts
3. To help them identify and eliminate common mistakes in writing and speaking
4. To enable them use various business communication strategies and to use advanced vocabulary
5. To familiarize them in writing descriptive essays and respond to arguments orally and in writing

Unit-I	**Unit Title & Text** **POETRY**	**12 Hours**

1.1Very Indian Poem in Indian English - Nissim Ezekiel
1.2 Still I Rise - Maya Angelou
1.3 The Flower -Tennyson
1.4 On Killing a Tree - Gieve Patel

Unit-II	**PROSE**	**12 Hours**

2.1 If You Are Wrong Admit it- Dale Carnegie
2.2 Kindly Adjust Please – Shashi Tharoor
2.3 The Spoon-fed Age- W.R. Inge

Unit-III	FICTION	12 Hours
Alchemist - Paulo Coelho		
Unit-IV	**LANGUAGE COMPETENCY**	**12 Hours**
4.1 Homonyms, Homophones, Homographs, Portmanteau words 4.2 Verbs and Tenses, Subject Verb Agreement 4.3 Error correction		
Unit-V	**ENGLISH FOR WORKPLACE**	**12 Hours**
5.1 Reading for General and Specific information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes		

CLO	**COURSE LEARNING OUTCOMES:** The students will be able to	Knowledge Level
CLO1	Learn to introduce themselves and talk about everyday activities confidently	**K1, K2**
CLO2	Be able to write short paragraphs on people, places and events	**K4**
CLO3	Identify the purpose of using various tenses and effectively employ them in speaking and writing.	**K5**
CLO4	Gain knowledge to write subjective and objective descriptions	**K6**
CLO5	Identify and use their skills effectively in formal contexts.	**K3**
K1-Remembering/knowledge,K2-Understand,K3-Apply,K4-Analyse,K5-Evaluate, K6-Create		

Methodology of Teaching

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems

MAPPING WITH COURSE LEARNING OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

CLOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CLO1	✓	✓	✓	✓	✓	✓
CLO2	✓	✓	✓	✓	✓	✓
CLO3	✓	✓	✓	✓	✓	

CLO4	✓	✓	✓	✓	✓	✓
CLO5	✓	✓	✓	✓	✓	✓
Number of matches = 30, Correlation: Very High						

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-7	8-15	16-23	24-30
Correlation	Poor	Moderate	High	Very High

SEMESTER I

COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HOURS**	**CREDIT**
UCCCSS11	**ABILITY ENHANCEMENT COURSE**	**SOFT SKILLS I**	**2**	**2**

COURSE OBJECTIVES

1. To familiarize the studentswith the importance of soft skills
2. To help in understanding the role of Verbal communication & Non-verbal communication
3. To enable leaners to practise LSRW skills
4. To closely examine the concept of personal development
5. To help l earners apply the personal traits

Unit-I		**6 Hours**

Soft Skills
Hard skills

Unit-II		**6 Hours**

Importance of Soft Skills
Verbal communication & Non-verbal communication

Unit-III		**6 Hours**

LSRW skills

Unit-IV		**6 Hours**

Self-Awareness
Personal Development

Unit-V		6 Hours
Personal traits		

Books for Study:
Soft Skills – Dr. K.Alex, S.Chand& Company, New Delhi,2010 Developing Reading Skills – Françoise Grellet, Cambridge University Press, Cambridge 2007.
Books for Reference:
Cambridge First Certificate: Listening and Speaking – Sue O' Connell with LousieHashemi, Cambridge University Press, Cambridge 2000 Inspired to Write – Jean Withrow, Gay Brookers and Martha Cumings, Cambridge University Press, New York, 2004

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	**Understand the importance of soft skills**	K1,K2
CO2	**Evaluate the role of Verbal communication & Non-verbal communication**	K3
CO3	**Practise LSRW skills in the class room**	K4
CO4	**Analyse the importance of personal development**	K6
CO5	**Apply the personal traits in individual life and profession**	K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓		✓

CO2	✓	✓			✓	✓		
CO3	✓		✓	✓	✓		✓	✓
CO4	✓	✓	✓		✓	✓		✓
CO5		✓	✓	✓	✓	✓	✓	✓
Number of matches = 30						**Correlation = High**		

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

Prepared by: Dr. **S. ABDULLAH SHAH** Verified by: Dr. **B. AKBAR ALAM**

SEMESTER II
SOFT SKILL II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCCCSS21	**ABILITY ENHANCEMENT COURSE**	**SOFT SKILLS – II**	**2**	**2**

COURSE OBJECTIVES

1. To introduce the soft skills necessary for employability
2. To provide learners with the background knowledge of dealing with others
3. To enable leaners to understand the importance of job ethics
4. To examine the role of professional ethics
5. To apply and practice personal ethics in work place

Unit-I		**6 Hours**
Adaptability, Attitude		
Unit-II		**6 Hours**
Motivation, Time Management		
Unit-III		**6 Hours**
Creativity, Job ethics		

Unit-IV		6 Hours
	Self esteem, Accountability	
Unit-V		**6 Hours**
	Transparency, Honesty	

Books for Study:

Soft Skills – Dr. K.Alex, S.Chand& Company, New Delhi,2010

Books for Reference:

Academic Encounters Human behaviour – Bernard Seal, Cambridge University Press, New Delhi, 2010

365 Steps to Self-Confidence – David Lawrence Preston, Jaico Publishers, Mumbai 2007

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Understand the soft skills necessary for employability	K1,K2
CO2	Comprehend the background knowledge of dealing with others	K3
CO3	Analyse the importance of job ethics	K4
CO4	Interpret the role of professional ethics	K6
CO5	Approach a text critically	K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓		✓		✓	✓	✓	
CO3	✓	✓			✓	✓	✓	✓
CO4	✓		✓	✓		✓	✓	✓

CO5	✓	✓				✓	✓	✓
Number of matches = 30					**Correlation = High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

Prepared by: Dr. **B. AKBAR ALAM**

PROGRAMME OUTCOMES FOR B.A. ENGLISH
PROGRAMME OUTCOMES:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.

PO5: Scientific Reasoning: Ability to analyze, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through selfplaced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

PO7: Reflective Thing: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society

PO8: Reading & Projects: Document their reading and interpretive practices in assignments, translation works, and independent projects.

PO9: Confidence & Effectiveness: Confidently and effectively articulate their literary and textual experiences.

PO10: Social Skills & Empathetic Approach: Reorganize a professional and reflective approach to leadership, responsibility, personal integrity, empathy, care and respect for others, accountability and self-regulation.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied Problems in different area of English Language and Literature.
PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, businessand other context /fields.
PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions.
To create effective entrepreneurs by enhancing their critical thinking, problem solving,

Programme Specific Outcomes	PROGRAMME OUTCOMES									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PSO1		✓	✓		✓		✓	✓	✓	✓
PSO2	✓	✓		✓	✓	✓		✓		
PSO3	✓	✓	✓	✓	✓		✓	✓		
PSO4	✓	✓	✓	✓		✓	✓	✓	✓	✓
PSO5	✓	✓		✓	✓		✓	✓	✓	
PSO6	✓	✓	✓	✓	✓	✓		✓		
PSO7	✓	✓	✓	✓	✓	✓		✓		✓
PSO8	✓	✓	✓	✓	✓		✓		✓	✓
Number of matches = 62, Correlation: Very High										

decision making and leadership skill that will facilitate startups and high potential organizations.

PSO4: Developing a research framework and presenting their independent ideas effectively.
PSO5: Equipping their employability skills to excel in professions like teaching and exposing them to various activities to empower them through communication skills.
PSO6: Enabling a holistic perspective towards the socio-political inequalities and environmental issues

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

MAPPING CORRELATION BENCHMARK

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDITS
UCENTC11	**Core Course 1**	**INTRODUCTION TO LITERATURE**	**5**	**4**

COURSE OBJECTIVES

1. To introduce the different forms of literature
2. To provide learners with the background knowledge of literature
3. To enable leaner's to understand the different genres of writing
4. To examine the various themes and methodologies, present in literature
5. To create the ability of critically examining a text

Unit-I		**15 Hours**

Introduction:
Poetry- Different forms of poetry-Sonnet, Ode, Elegy, Lyric, Ballad.
Prose-Short Story,Novella,
Novel. Drama-Comedy,Tragedy,Tragi-Comedy.

Unit-II		**15 Hours**

Michael Drayton- The Parting.
William Shakespeare-Sonnet18, Sonnet116.
John Milton- When I Consider How My Light is Spent,
William Wordsworth - Daffodils.
John Keats-Ode to Nightingale.
Thomas Gray- Elegy Written in a Country Churchyard.
Robert Frost-Mending Wall
Theodore Roethke – The Meadow Mouse

Unit-III		**15 Hours**

J.M. Barrie - The Admirable Crichton.
Lady Gregory-The Rising of the Moon

Unit-IV		**15 Hours**

Manohar Malgonkar - Spy in Amber.
Don Quixote-Tilting at the Windmills.
A Dill Pickle -The Escape from Katherine Mansfield-Bliss and other stories.

Unit-V		**15 Hours**

Saki - The Open Window
Robert Lynd–Sweet
Jerome K. Jerome- Excerpt from-Three Men in a Boat–(Packing Episode)

Backpack Literature: AnIntroductionto Fiction, Poetry, Drama, and Writing-X.J.Kennedy,byPearson,2016.
PortableLiterature:Reading,Reacting,Writing-9thedition–Laurie Kirszner,byCengageLearning,2016

Books for Reference:

1. Henny Herawatietal., Introductionto Literature,SanataDharmaUniversityPress,October2021.
2. Michael Meyer,D. Quentin Miller,TheCompactBedfordIntroduction toLiteraturewith2021 MLA Update, Bedford/St.Martin's,August2021.
3. Janice Campbell., IntroductiontoLiterature:Excellence inLiteratureEnglish1,4thEd, EverydayEducation,LLC,January2021.
4. Subhendu Mund., The Makingof IndianEnglishLiterature,Taylor& FrancisLtd.,2021.

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Understand the different forms of literature	K1,k2
CO2	Comprehend the background knowledge of literature	K3
CO3	Critically analyse different genres of writing	K4
CO4	Interpret the themes and methodologies in literature	K6
CO5	Approach a text critically	K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓		✓		✓	✓	✓	
CO3	✓	✓			✓	✓	✓	✓
CO4	✓		✓	✓		✓	✓	✓
CO5	✓	✓				✓	✓	✓
Number of matches = 30					**Correlation = High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

Prepared by: Dr. **S. ABDULLAH SHAH** Verified by: Dr. **B. AKBAR ALAM**

SEMESTER I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDITS
UCENTC12	Core Course 2	INDIAN WRITING IN ENGLISH	5	4

COURSE OBJECTIVES

6. To familiarize the studentswiththeemergenceandgrowth ofIndianWritinginEnglishinthecontextofcolonialexperience.
7. TohelpinunderstandingissuesconcerningIndianWritinginEnglishsuchas therepresentationofculture,identity,history,constructionsofnation, (Post) nationalandgenderpolitics,cross-culturaltransformations.
8. ToenableleanerstoappreciateNation-Nationalism;CounterDiscourse;Subalternity;IdentityMovements.
9. Tocloselyexaminethevariousthemesandmethodologiesexistingin ContemporaryIndianWritinginEnglish.
10. TohelplearnersapplytheideasencapsulatedinIndianAestheticstoliterary texts

Unit-I		15 Hours

Winning of Friends (Panchathantra)–Vishnu Sharma (there are four stories to choose from)

Hachiko– Pamela S. Turner

Brother's Day from Folktales – A.K. Ramanujan

Handful of Nuts, Night Train to Deoli from Ruskin Bond

Sparrows- K.A. Abbas

Unit-II		15 Hours

Rabindranath Tagore -Khabhuliwala.
India through a Traveller's Eye: Excerpt from My Several Worlds – Pearls Buck.
The School Among the Pines, Boy Scouts Forever, Uncle Ken's Rumble in the Jungle from School Days – Ruskin Bond
Inspection Episode-Examination- from Part I Childhood – M.K. Gandhi – Autobiography
Science, Humanities and Religion

Unit-III		15 Hours

The Lotus – Toru Dutt
The Tiger and the Deer - Sri Aurobindo

Unit-IV		15 Hours

Sarojini Naidu- The Village Song A.K. Ramanujam- Still Another View of Grace Shiv K Kumar-Indian Women MirzaGhalib-It is not Love, it is Madness		
Unit-V		**15 Hours**
Rabindranath Tagore-Mukhthadhara. The Window, Sentry's Lantern - Five Plays - HarindranathChattopadhyay Nalini: A Comedy in Three Acts – Three Plays - NissimEzeikel Joginder Paul- Sleepwalkers.		

Books for Study:

K.R.S. Iyengar, Indian Writing in English, Sterling Publishers Pvt. Ltd, Mumbai, 2012.

Books for Reference:

A History of Indian English Literature, Sahitya Academy, Delhi, 2007.

Indian Poetry in English: A critical study. Atlantic Publishers, New Delhi, 2009.

Concise History of Indian Literature in English. Palgrave Macmillan UK, 2008

Kaustav Chakraborty. Indian Drama in English. PHI Learning Pvt, Ltd. Delhi 2014

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Familiarize with the various genres of Indian Writing in English	K1,k2
CO2	Evaluate the literary texts and post colonialism	K3
CO3	Understand the role of Indian political writings	K4
CO4	Analyze the sociological, historical, and cultural impact of the selected texts	K6
CO5	Organize the contributions of Indian English poets and dramatists	K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓		✓
CO2	✓	✓			✓	✓		
CO3	✓		✓	✓	✓		✓	✓

CO4	✓	✓	✓		✓	✓		✓
CO5		✓	✓	✓	✓	✓	✓	✓
Number of matches = 30					**Correlation = High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

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SEMESTER I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCENTA11	**GENERIC ELECTIVE 1**	**ALLIED - SOCIAL HISTORY OF ENGLAND**	**4**	**3**

COURSE OBJECTIVES

1. To define the transforming influence of pre-history to the early modern England.
2. To help students to summarize critically the impact upon the English society and its literature.
3. To connect the key themes which encapsulate the period.
4. To categorize the full breadth of English life and Society.
5. To design the major trends that has shaped English society.

Unit-I	**THE EARLY HISTORY OF ENGLAND**	**12 Hours**
The Norman Kings The Plantagenet Family		
Unit-II	**THE RENAISSANCE**	**12 Hours**
The Great Cultural Movement Renaissance Thinkers		
Unit-III	**RESTORATION ENGLAND(1660 TO 1688)**	**12 Hours**
Social Life		
Unit-IV	**THE INDUSTRIAL REVOLUTION**	**12 Hours**

The Late Eighteenth Century The Early Nineteenth Century		
Unit-V	**THE DEVELOPMENT OF EDUCATION IN NINETEENTH CENTURY**	**12 Hours**
The Dame School The Charity School The Sunday School		

Books and e-Books for Study:

1. The Social History of England by Padmaja Ashok, Orient Blackswan Private Limited 2011- First Publication 2011-Reprinted 2012(Four Times), 2016(Two times)Second Edition 2019.
2. https://www.ebooks.com/en-us/series/great-medieval-thinkers/
3. https://www.britannica.com/event/Industrial-Revolution#:~:text =Industrial%20Revolution%2C%20in%20modern%20history,other%20parts%20of%20the%20world.
4. https://www.bl.uk/romantics-and-victorians/articles/ the-impact-of-the-french-revolution-in-britain
5. https://www.ippr.org/files/2017-10/1508402633 cej-wealth-in-the-21st-century-oct-2017.pdf

e-Books for Reference:

1. https://www.historyextra.com/period/ anglo-saxon/difference-between-britain-england-brief-history/
2. https://www.history.com/topics/renaissance/renaissance# :~:text=The%20Renaissance%20was%20a%20fervent, classical%20philosophy%2C%20literature%20and%20art. https://www.history.com/topics/industrial-
4. revolution/industrial-revolution http://www.nationalarchives.gov.uk/pathways/
6. citizenship/struggle_democracy/revolution.htm
7. https://www.nytimes.com/2020/04/30/movies/ capital-in-twenty-first-century-review.html

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Understand the transforming influence of pre-history to the present modern history of England	K1,K2
CO2	Comprehend the impact upon the England society and its literature	K3
CO3	Critically analyse the themes which encapsulate the period	K4

CO4	**Interpret the nature of English life and society**	**K6**
CO5	**Critically approach the major trends that have shaped English society**	**K5**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓		✓	✓	✓	✓
CO3	✓	✓		✓	✓	✓	✓	
CO4	✓	✓	✓		✓	✓		✓
CO5	✓	✓	✓	✓	✓		✓	
Number of matches = 33					**Correlation = Very High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

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SEMESTER I
SOFT SKILL I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCENTS11	**GENERIC ELECTIVE 1**	**Allied - LEADERSHIP SKILLS**	**2**	**2**

COURSE OBJECTIVES

1. To familiarize the students with the meaning of leadership and its functions
2. To help in understanding the styles of leadership
3. To enable leaner's to comprehend the reasons for conflicts in an organization
4. To closely examine the theories of leadership
5. To help learners apply the leadership styles and theories

Unit-I		**6 Hours**
Definition of Leadership Difference between Leadership and Management Functions of Leadership		
Unit-II		**6 Hours**
Effective Leadership Autocratic style of leadership Democratic style of leadership		
Unit-III		**6 Hours**
Laissez Faire style of leadership Charismatic leadership Authentic leadership		
Unit-IV		**6 Hours**
Power and Authority- Reasons for Organizational Politics- Managing Organizational Politics		
Unit-V		**6 Hours**
Path- Goal leadership theory- Situational leadership theory- The Managerial Grid		

Books for Study:

Organizational Behaviour: S. S. Khanka. S. Chand.

Books for Reference:

Organizational Behaviour: Fred Luthans, McGraow-Hill International Edition (Twelfth Edition)
Leadership in Organizations: Gray Yukl, Pearson Education (Sixth Edition)

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Familiarize with the meaning of leadership and its functions	K1,K2
CO2	Evaluate the styles of leadership	K3
CO3	Understand the reasons for conflicts in an organization	K4
CO4	Analyse the theories of leadership	K6
CO5	Apply the leadership styles and theories in the real life situations	K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓		✓
CO2	✓	✓			✓	✓		
CO3	✓		✓	✓	✓		✓	✓
CO4	✓	✓	✓		✓	✓		✓
CO5		✓	✓	✓	✓	✓	✓	✓
Number of matches = 30					Correlation = High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

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SEMESTER I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCENTF11	SKILL ENHANCEMENT COURSE [FC]	BRIDGE COURSE	2	2

COURSE OBJECTIVES

1. To introduce the significance of grammar
2. To provide earners with the knowledge of parts of speech
3. To enable leaner's to understand the different sentence patterns
4. To enable learners to comprehend the tenses
5. To apply the correct voices in writing and speaking

Unit-I		**6 Hours**
Introduction to Grammar Importance of Grammar		
Unit-II		**6 Hours**
Noun and Pronoun Verb and Adverb		
Unit-III		**6 Hours**
Voices Adjective and Preposition		
Unit-IV		**6 Hours**
Conjunction and Interjection Articles		
Unit-V		**6 Hours**
Sentence Pattern Tenses		

Books for Study:

Wren and Martin - High School Grammar and Composition
Dr. S. Radha Krishnan – English Grammar and Composition

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Understand the significance of grammar	K1,K2
CO2	Identify the parts of speech in sentences	K3
CO3	Analyze the different sentence patterns	K4
CO4	Use the correct tenses in day to day communication	K6
CO5	Apply the correct voices in writing and speaking	K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓		✓		✓	✓	✓	
CO3	✓	✓			✓	✓	✓	✓
CO4	✓		✓	✓		✓	✓	✓
CO5	✓	✓				✓	✓	✓
Number of matches = 30					Correlation = High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

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SEMESTER II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCENTC21	CORE COURSE-3	BRITISH LITERATURE I	5	4

COURSE OBJECTIVES

5. To introduce British Identity, Periods and other related forms.
6. Toincreasetheabilityforstudentstointellectuallyassesstheworldandtheirplaceinit.
7. ToenableleanerstounderstandthatBritishliteratureisatthefoundationof English-speaking peoples' culture.
8. Tocloselyexaminethevariousthemesandmethodologiespresentin Britishliterature.
9. To create an aptitude of critically probing through the text.

Unit-I		15 Hours

Of Truth, Of Adversity - Francis Bacon
A City Night –Piece - Oliver Goldsmith
The Spectator Club, On Gratitude, On Giving Advice - Joseph Addison and Sir Richard Steele

Unit-II		15 Hours

Robert Jamieson - Robinhood& The Monk
Robert Edgar Burns-The Potter
Anne Bradstreet -Prologue
William Blake – The Chimney Sweeper
John Keats –Endymion Book-I

Unit-III		15 Hours

P.B.Shelly - Arethusa, Hymn to Intellectual Beauty.
William Wordsworth - Ode: To Intimation & Immorality
Lord Byron-She Walks In Beauty
John Milton-Paradise Lost Book 4.

Unit-IV		15 Hours

Christopher Marlowe - Dr. Faustus
Francis Beaumont and John Fletcher – Philaster
Oliver Goldsmith-She Stoops to Conquer

Unit-V		15 Hours

Mary Shelly-Captain Walton's Conclusion-Frankenstein
Jonathan Swift-Voyage to Lilliput / Houyhnhnms - Gulliver's Travels
Charles Dickens-Recalled to Life-A Tale of Two Cities.

Books for Study/Online Materials:

Rexroth,Kenneth.*TheNewBritishPoets:AnAnthology*.GrangerBooks, 1976.

Reference books:

Bacon,Francis,andMichelLeiris. *FrancisBacon*.EdicionesPoligrafa,2008.
https://literariness.org/2020/07/09/analysis-of-alexander-popes-the-rape-of-the-lock/*Ranger, Paul."TechnicalFeatures."*SheStoopstoConquerbyOliver Goldsmith*,1985,pp.51–68.,https://doi.org/10.1007/978-1-349-07664-2_5*

Books for Reference:

Bacon,Francis,andMichelLeiris. *FrancisBacon*.EdicionesPoligrafa,2008.
https://literariness.org/2020/07/09/analysis-of-alexander-popes-the-rape-of-the-lock/
*Ranger, Paul."TechnicalFeatures."*SheStoopstoConquerbyOliver Goldsmith*,1985,pp.51–68.,https://doi.org/10.1007/978-1-349-07664-2_5*

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Comprehend the major social, political, philosophical and scientific developments of British literature	K1,K2
CO2	Understand the Technic of criticism and evaluation	K3
CO3	Apply the themes, style and contribution of British literature	K4
CO4	Analyze the characteristics of British literary movements	K6
CO5	Evaluate literary terminology and literary conventions	K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓		✓
CO2	✓	✓			✓	✓		
CO3	✓		✓	✓	✓		✓	✓

CO4	✓	✓	✓		✓	✓		✓
CO5		✓	✓		✓	✓	✓	✓
Number of matches = 29					Correlation = High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

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SEMESTER II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCENTC22	**CORE COURSE 4**	**AMERICAN LITERATURE-I**	**5**	**4**

COURSE OBJECTIVES

1. To understand the growth and development of American literature.
2. To critically examine how various genres developed and progressed.
3. Learn about prominent writers and famous works in American literature.
4. To closely examine the various themes and methodologies present in British literature
5. To create an aptitude of critically probing through the text

Unit-I		**15 Hours**
E.M. Foster - The Prologue Passage to India (Lines 1 - 68). Walt Whitman O Captain, My Captain! – Walt Whitman		
Unit-II		**15 Hours**
Sherman Alexie –Crow Testament, Evolution Edgar Allan Poe-The Raven Emily Dickinson-Because I Could Not Stop for Death.		
Unit-III		**15 Hours**

Edgar Allan Poe -The Philosophy of Composition Martin Luther King Jr- I have a Dream Abraham Lincoln- Gettysburg Address		
Unit-IV		**15 Hours**
Tennessee Williams-The Glass Menagerie Eugene O'Neill-Emperor Jones		
Unit-V		**15 Hours**
Harriet Beecher Stowe-Uncle Tom's Cabin Herman Melville-Billy Budd Washington Irving-The Legend of the Sleepy Hollow, Rip Van Winkle Leslie Marmon Silko-Ceremony		

Books for Study:

Levine,RobertS.,etal.*TheNortonAnthologyofAmericanLiterature*.W.W.Norton&Company,2022.

Books for Reference:

Dickinson,Emily,andJohannaBrownell.*EmilyDickinson:Poems*.ChartwellBooks,2015.
Gould,Jean. *AmericanWomenPoets:PioneersofModernPoetry*.DODD,MEAD,1980.
Poe,EdgarAllan,etal. *PoetryforYoungPeople:EdgarAllenPoe*.SterlingPub.Co.,1995.
Kallen,StuartA.,andTerryBoles.*TheGettysburgAddress*.Abdo&Daughters,1994.

E-Resources:

https://getit.library.nyu.edu/go/3588410 https://getit.library.nyu.edu/go/3588458
https://getit.library.nyu.edu/go/3588535 https://getit.library.nyu.edu/go/3588642
https://getit.library.nyu.edu/go/3580904 http://dbs.lib.byu.edu/oxford-companion-toamerican literature http://dbs.lib.byu.edu/oxford-encyclopedia-of-american-literature
https://databases.library.jhu.edu/databases/proxy/JHU06924

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	**Identify the key features of prose.**	K5
CO2	**Clarify the key features of poetry.**	K2
CO3	**Discuss the major critical approaches to literary interpretation.**	K4
CO4	**Understand the cultural developments of colonial America**	K3

CO5	**Infer the major conventions, tropes and themes.**	**K6**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓		✓		✓			✓
CO2	✓		✓	✓		✓	✓	✓
CO3		✓		✓	✓	✓		✓
CO4	✓	✓	✓	✓		✓		✓
CO5	✓	✓		✓	✓	✓		✓
Number of matches = 27					**Correlation = High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

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SEMESTER II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCENTA21	GENERIC ELECTIVE 2	ALLIED - HISTORY OF ENGLISH LITERATURE	4	3

COURSE OBJECTIVES

1. To introduce pupils to the evolution of language and literature
2. To comprehend the history of all segments of society, from aristocrats to artisans
3. To encourage learners to apply theories in literature
4. To interpret diverse writing styles
5. To recognize the various emotions and views of notable authors

Unit-I	**POETRY**	**12 Hours**
Tennyson Browning Mathew Arnold		
Unit-II	**PROSE & NOVEL**	**12 Hours**
Prose: Thomas Carlyle, John Ruskin Novel: Charles Dickens, Thomas Hardy		
Unit-III	**POETRY**	**12 Hours**
G.M. Hopkins, W.B. Yeas, T.S. Eliot		
Unit-IV	**DRAMA**	**12 Hours**
George Bernard Shaw Galsworthy		
Unit-V	**NOVEL**	**12 Hours**
E.M. Forster, James Joyce, Virginia Woolf		

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Understand the evolution of language and	K2

	literature	
CO2	Compare the society from aristocrats to craftsmen	K4
CO3	Apply theories related to history in literature	K3
CO4	Evaluate the writing styles of authors	K5
CO5	Analyse famous authors' themes and techniques	K4
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (COs)
and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓		
CO2	✓	✓		✓			✓	✓
CO3	✓		✓	✓				✓
CO4	✓	✓		✓	✓		✓	✓
CO5	✓	✓		✓			✓	✓
Number of matches = 26					**Correlation = High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

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SEMESTER II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCENTS21	GENERIC ELECTIVE 2	Allied - BUSINESS ENGLISH	2	2

COURSE OBJECTIVES

1. To introduce the learners, the significance of Business writing
2. To enable the learners, understand the writing techniques
3. To recognize writing plans effectively
4. To interpret hints and develop sentences
5. To encourage learners, develop the skill of editing

Unit-I		**6 Hours**
Introduction to Business writing Writing E-mails and letters		
Unit-II		**6 Hours**
Writing techniques Choice of words		
Unit-III		**6 Hours**
Writing a plan Referring and giving news		
Unit-IV		**6 Hours**
Preparing Hints Preparing an appropriate reply		
Unit-V		**6 Hours**
Mechanics of writing Polishing and improving		

E Book/Books for Study:

1. Communication Skills for Technical Students. T.M. Farhatullah: Orient Longman, Chennai, 2002
2. Science and Technical Writing: A Manual of Style. Philip Rubens. RoutledgeNY, 2004
3. Writing Remedies: Practical Exercises for Technical Writing. Edmund H Weiss. Hyderabad University Press, 1990
4. Richards, Jack C. 1972. An Introduction to Error Analysis. London: Longman.
5. Abdul Rahim, F. (2005), Thesis Writing: A Manual for Researchers (New Delhi: New Age International)

Books for Reference:

1. Gerald J Alred and Charles T Brusaw, Handbook of Technical Writing, 12th Edition; Macmillan Learning Publishers
2. Sharon Gerson and Steven Gerson, Technical Writing, 8th Edition, Pearson Publications
3. Meenakshi Raman and Sangeeta Sharma, Technical Communication-Principles and Practice, 3rd Edition; Oxford Press
4. Dr. S. K. Singh, Technical Writing; Vayu Education of India Publishers
5. SajeethaJayaprakash, Technical Writing; Himalaya Publishing House

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Evaluate the techniques of Business English	K5
CO2	Understand the significance of Business writing	K2
CO3	Analyze the mechanics of Business writing	K4
CO4	Apply the methods in Business writing	K3
CO5	Create instructions and user manuals	K6
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (COs) and
PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓

CO2	✓		✓		✓	✓	✓	
CO3	✓	✓			✓	✓	✓	✓
CO4	✓		✓	✓		✓	✓	✓
CO5	✓	✓				✓	✓	✓
Number of matches = 30					Correlation = High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

Prepared by: Dr.**B. AKBAR ALAM** Verified by: Dr. **S. ABDULLAH SHAH**

SEMESTER II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
UCENTS22	**SKILL ENHANCEMENT COURSE 3**	**TECHNICAL WRITING**	**2**	**2**

COURSE OBJECTIVES

1. To prepare technical and operating manuals.
2. To understand the nuances of business correspondence.
3. To develop official media postings.
4. To create official reports.
5. To synthesize utility bills and similar documents.

Unit-I		**6 Hours**
Introduction To Technical Writing Writing Process – Prewriting, Writing and Rewriting		
Unit-II		**6 Hours**
The Rationale - the Process Writing Effective Sentences		
Unit-III		**6 Hours**
Structure of a Paragraph Writing Effective Paragraphs		

Unit-IV		**6 Hours**
Organizing The Information Instructions and User Manuals		
Unit-V		**6 Hours**
Writing Summaries, Reports and Proposals, Writing different kinds of letters		

E Book/Books for Study:

Communication Skills for Technical Students. T.M. Farhatullah: Orient Longman, Chennai, 2002
Science and Technical Writing: A Manual of Style. Philip Rubens. RoutledgeNY, 2004
Writing Remedies: Practical Exercises for Technical Writing. Edmund H Weiss. Hyderabad University Press, 1990
Richards, Jack C. 1972. An Introduction to Error Analysis. London: Longman.
Abdul Rahim, F. (2005), Thesis Writing: A Manual for Researchers (New Delhi: New Age International)

Books for Reference:

Gerald J Alred and Charles T Brusaw, Handbook of Technical Writing, 12th Edition; Macmillan Learning Publishers
Sharon Gerson and Steven Gerson, Technical Writing, 8th Edition, Pearson Publications
Meenakshi Raman and Sangeeta Sharma, Technical Communication-Principles and Practice, 3rd Edition; Oxford Press
Dr. S. K. Singh, Technical Writing; Vayu Education of India Publishers
SajeethaJayaprakash, Technical Writing; Himalaya Publishing House

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Evaluate the concept of technical writing	K5
CO2	Understand the technical specifications	K2
CO3	Analyse the contents of technical texts	K4
CO4	Apply the techniques in writing summaries and reports	K3
CO5	Create instructions and user manuals	K6
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓		✓		✓			✓
CO2	✓		✓	✓		✓	✓	✓
CO3		✓		✓	✓	✓		✓
CO4	✓	✓	✓	✓		✓		✓
CO5	✓	✓		✓	✓	✓		✓
Number of matches = 27					Correlation = High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

Prepared by: Dr. **B. AKBAR ALAM** Verified by: Dr. **S. ABDULLAH SHAH**

PROGRAMME OUTCOME FOR M.A. ENGLISH

PO1 :Conduct Research independently to bring out new facts and strengthen the existing body of knowledge. Communicate the findings of Research through well-structured Report.

PO2 :Demonstrate domain-specific knowledge and its applications in real-life situations.

PO3 :Synthesise learned knowledge and skills to effectively and efficiently perform the job duties of a profession.

PO4 :Critically evaluate a situation and suggest a solution after careful consideration of the alternatives.

PO5 :Exhibit potential to accomplish tasks independently or as a member or leader of a team.

PO6 :Plan and Execute a Project after careful evaluation of the activities involved

PO7 :Develop products, Design Policies, and/or collaborate to help Society in building a Sustainable Environment.

PO8 :Discover a passion for Lifelong Learning through MOOCs, ODL, and Self - Learning techniques through the optimum use of ICT.

PO9 :Identify the need and importance of Human Rights, especially for Women, Children, Bonded Labourers, and Refugees.

PO10 : Exhibit Ethics and Values in professional, Social, and Personal spheres of life, caring for the underprivileged, leading to a better sustainable future.

PROGRAMME SPECIFIC OUTCOMES

PSO1; Illustrate the connection between modern themes and classical and romantic ideas
PSO2:Explains the methodical approach to the literature and categorize it.
PSO3: Compare the language's scientific and non-scientific ways of doing things.
PSO4:Discovers the visual arts which are a vexing and complex history.
PSO5:Connects the language as the study of reasoning and the theory of language.
PSO6:Defends why people are complicit with their ideological construction,
PSO7: Develops the systematic study of literature and methods to analyze
PSO8: Writes effectiveness of rational inquiry, and logical and empirical investigation

Programme Specific Outcomes (PSOs)	**Programme Outcomes (POs)**									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PSO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO2	✓	✓		✓	✓	✓	✓	✓	✓	
PSO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PSO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PSO7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO8	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Number of matches = 75, **Correlation: Very High**

MAPPING OF PROGRAMME-SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

MAPPING CORRELATION BENCHMARK

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

SEMESTER-I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTC11	CORE COURSE I	ENGLISH POETRY	6	4

COURSE OBJECTIVES

1. TofamiliarizestudentswithEnglishPoetrystartingfromMedievalEnglandto17th Century.
2. TofocusontheevolutionofPoeticformssuchasSonnet,Ballad,Lyric,Satire,Epic etc.
3. A good comprehension of History of English literature is enabled.
4. Differentiation among the various stages of English could be identified by students.
5. Critical approaches towards various literary forms can be learnt.

Unit-I	Middle English Poetry	14 Hours
Chaucer:"The General Prologue":Pardoner, The Nun Additional Reading: Doctor, Friar		
Unit-II	**Elizabethan Poetry**	**14 Hours**
Spenser: "Epithalamion" Donne: "A Valediction: forbidding mourning" "The Canonization"		
Unit-III	**Seventeenth Century Poetry**	**15 Hours**
John Milton “Paradise Lost” Book IX Marvell:"To His Coy Mistress"		
Unit-IV	**Eighteenth Century Poetry**	**14 Hours**

Dryden "Absalom and Achitophel"Lines 150 – 476 Gray "Elegy"/"The Bard"/"On a Favourite Cat Drowned in a tub of Goldfishes" Burns"HolyWillie's Prayer""AuldLang Syne"		
Unit-V	**Modern Poetry**	**15 Hours**
Rupert Brooke: "The Soldier" WilfredOwen:"AnthemforDoomedYouth" W.H.Auden:"ElegyontheDeathofW.B.Yeats"&"MuseedesBeauxArts" DylanThomas:"DoNotGoGentleIntoThatGoodNight"&"PoeminOctober" PhilipLarkin:"WhitsunWeddings" Ted Hughes: "Hawk Roosting" &"LifeAfterDeath" SeamusHeaney:"Digging" CarolAnnDuffy:"StandingFemale Nude" EavanBoland:"AchillesWoman"		

Books for Study:

1. 1973,TheOxfordAnthologyofEnglish LiteratureVol. I.The MiddleAgesThrough the18thcentury.OUP,London.
2. T.S.Eliot,1932,"TheMetaphysicalPoets"fromSelectedEssay;FaberandFaber limited, London.
3. H.S.Bennett,1970,ChaucerandtheFifteenthCentury,ClarendonPress,London.
4. MalcolmBradburyandDavidPalmer,ed.,1970MetaphysicalPoetry,Stratford-upon –AvonStudiesVol.II,EdwardArnold,London.
5. A.G.George,1971,StudiesinPoetry,HeinemannEducationBooksLtd.,London.
6. **http://www.english/.org.uk/chaucer/htm**
7. **https://www.britannica.com/topic/The-Canonization**
8. **https://www.worldhistory.org/Elizabethan_Theatre/https://www.britannica.com/topic/Paradise-Lost-epic-poem-by-Milton**

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on topics.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Students will gain ideas about the old English writing style.	K1, K2
CO2	The knowledge about various forms of poetry during different centuries can be well comprehended.	K5,K6
CO3	Evaluate various poets as representatives of their periods	K4,K6
CO4	Trace the evolution of various literary movements	K4,K5
CO5	Justify British Poetry as an aesthetic record of the societies concerned	K4,K5,K6
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓		✓	✓	✓	✓	✓
CO2	✓		✓	✓	✓	✓		✓
CO3	✓	✓	✓		✓		✓	✓
CO4	✓	✓		✓	✓	✓	✓	✓
CO5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 33					**Correlation = Very High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTC12	CORE COURSE II	ENGLISH DRAMA	6	4

COURSE OBJECTIVES

1. ToacquaintthestudentswiththeoriginofdramainBritain.
2. DifferentstagesofBritishDramaanditsevolutioninthecontextoftheatrecanbeunderstood by the students.
3. Socio-cultural scenario can be well comprehended through a study ofrepresentativetextsfromtheElizabethan ageto20thcentury.
4. Evaluatingdifferent formsof dramafrom thehistorical background couldbe Learnt.
5. Understanding dramatic techniques implied by the pioneers of English drama

Unit-I	BEGINNINGS OF DRAMA	14 Hours
Miracle and Morality Plays –Everyman The Sene can and Revenge Tragedy Thomas Kyd-The SpanishTragedy		
Unit-II	**ELIZABETHAN THEATRE**	**14 Hours**
Theatres, Theatre groups, audience, actors and conventions TragedyandComedy,ChristopherMarlowe:TheJewofMaltaBenJonson:Volpone		
Unit-III	**JACOBEANDRAMA**	**14 Hours**
JohnWebster: The White Devil		
Unit-IV	**RESTORATION**	**15 Hours**
William Congreve The Way of the World, Irish Dramatic Movement J.M Synge The Play boy of the Western World		
Unit-V	**EPIC THEATRE**	**15 Hours**
Bertolt Brecht:Mother Courageand herChildren Comedy of Menace, Harold Pinter :Birthday Party Post-ModernDramaSamuelBeckett :Waitingfor Godot		

Books for Study/Online Materials:

1. Bradbrook,M.C.,1955,TheGrowthandStructureandElizabethanComedy,London.
2. TillyardE.M.W.,1958,TheNatureofComedy&Shakespeare,London.
3. Una Ellis-Fermor, 1965,TheJacobeanDrama:AnInterpretation,Methuen&Co., London.
4. AllardyceNicoll, 1973, British Drama, Harrap, London.
5. Bradbrook,M.C.,1979,ThemesandConventionsofElizabethanTragedy,VikasPublishingHouse Pvt., Ltd., (6th ed) New Delhi.
6. **http://www.questia.com**(online library for research)
7. **http://www.clt.astate.edu/wmarey/asste%**
8. **https://nosweatshakespeare.com/resources/era/jacobean-drama-theatre/**

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Appraise various aspects of drama and theatre.	K1, K2
CO2	Identify drama and performance as cultural process and an artistic discourse	K3,K5
CO3	Evaluate plot structure, characterization and dialogue	K4
CO4	Interpret drama texts asaes thetic records of their times viz., Elizabethan, Restoration, Victorian and Early Modernages	K6
CO5	Examine the sequential course dealing with Modern and Postmodern British Drama	K4,K5,K6
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓		✓
CO2	✓		✓	✓	✓	✓		✓
CO3	✓	✓	✓		✓	✓	✓	✓
CO4	✓		✓	✓		✓	✓	✓
CO5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 33					Correlation = Very High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTC13	CORE COURSE III	ENGLISH FICTION	5	4

COURSE OBJECTIVES

1. TofamiliarizethestudentswiththeoriginanddevelopmentoftheBritishNovelupto the 20th Century.
2. The contents of the paper are meant to throw light on various concepts andtheories of the novel.
3. Tounderstandthesocialbackgroundbaseontheprescribednovels.
4. Identifyinganddifferentiatingvarious formsofnovels.
5. Tryinghandsinwritinga pieceofworkontheir own.

Unit-I		12 Hours

Novel as a Form, Concepts and Theories about the Novel; Poetics of the Novel – definition,types, narrative modes: omniscient narration.

Allegorical Novel and Satire

John Bunyan ThePilgrim'sProgress

Jonathan SwiftGulliver'sTravels

Unit-II		12Hours

TheNewWorldNovel: Daniel Defoe Picaresque Novel Laurence Stern Robinson Crusoe:Tristram Shandy.

Unit-III		12 Hours

Middle Class Novel of Manners **:**Jane Austen "Emma"

Unit-IV		12Hours

Women'sIssues**:**CharlotteBronte,JaneEyre

Unit-V		12 Hours

Liberal Humanism, Individual Environment and Class Issues . Lawrence :The Rainbow Quest, James Joyce Portrait of the Artist as a Young Man

Books for Study:

1. WayneC.Booth,1961,TheRhetoricofFiction,ChicagoUniversityPress, London.
2. F.R.Leavis,1973,TheGreatTradition,Chatto&Windus,London.
3. IanWatt,1974,RiseoftheEnglishNovel,Chatto&Windus,London.
4. FrederickR Karl,1977, Reader'sGuide tothe Developmentof the EnglishNovel tillthe18th Century,TheCamelotPressLtd.Southampton.
5. Arnold Kettle, 1967, An Introduction to English Novel Vol. II, Universal BookStall, New Delhi.
6. http://en.wikipedia.org/wiki/English_literature
7. http://en.wikipedia.org/wiki/novel
8. https://www.britannica.com/art/novel-of-manners
9. https://www.britannica.com/art/picaresque-novel
10. https://www.britannica.com/topic/Jane-Eyre-novel-by-Bronte

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on topics.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	A wide knowledge about different types of novels can bemastered by the students.	K1
CO2	Studentscanlearntheartofwritingdifferentforms of novel with the learned notions.	K2,K3
CO3	Evaluate Social, domesticandgothicnovels.	K4,K5
CO4	Assess philosophical and politicalunderpinningsof Victorianmorality,antivictorianrealitiesandtheaestheticmovement.	K4,K5,K6
CO5	Inferthemesrelatingtotheturnofthecenturyevents throughclosereadingoftext.	K5,K6
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓		✓	✓	✓	✓
CO2	✓		✓	✓		✓	✓	✓
CO3	✓	✓		✓	✓	✓	✓	✓
CO4	✓		✓	✓		✓	✓	✓
CO5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 33					Correlation = Very High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTC14	CORE COURSE IV	WOMEN'S WRITING IN ENGLISH	5	4

COURSE OBJECTIVES

1. To introduce learners to English literature written by women writers.
2. To explore key issues and debates in women's studies.
3. To assist students, explore the depth and diversity of women's literary creativity.
4. To present a collection of women's literature from various genres, geographical places, and ethnic groups.
5. To get an insight into the richness and diversity of female literary creativity.

Unit-I	POETRY	12 Hours

1. Maya Angelou : Phenomenal Woman
2. Sylvia Plath : Daddy
3. KishwarNaheed : I am not that Woman
4. ImtiazDharker : Minority

Unit-II	PROSE	12Hours

1. Virginia Woolf: A room of one's own **2.** Arundhathi Roy : The Algebra of Infinite Justice		
Unit-III	**FICTION**	**12 Hours**
1. Alice Walker : The Colour Purple 2. GoguShyamala : Father may be an Elephant and Mother Only a Small Basket, But-		
Unit-IV	**DRAMA**	**12Hours**
1. Henrick Ibsen : A Doll's House **2.** Caryl Churchill : Top Girls **3.** Mahasweta Devi : Ruddi **4.** Vinodini : Thirst		
Unit-V	**THEORY**	**12 Hours**
1. Dr. Vandana Siva: Empowering Women 2. Bell Hooks: Black Women and Feminism 3. Simon de Beauvior: Myth and Reality from *The Second Sex* 4. Arundhathi Roy : The Algebra of Infinite Justice		

Books for Study:

1. Hooks, Bell. Feminist Theory from Margin to Center. London: Pluto Press, 2000.
2. https://likeawhisper.files.wordpress.com/2009/03/empoweringwomen.pdf
3. Tharu, Susie & K. Lalitha. *Women Writing in India: 600 BC to the Present.* New York: The Feminist Press at CUNY, 1993.
4. Roy, Arundhati. The Algebra of Infinite Justice. New Delhi: Penguin, 2013

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Define the factors such as race, gender, disability, class, and ethnicity.	K1, K2
CO2	Correlate the texts to historicist, feminist, and other feminist criticism.	K4,K6
CO3	Appraise a text from the perspectives of gender and intersectionality.	K5

CO4	Engage in intellectual discourse pertaining to gender.	K3,K6
CO5	Identify cultural history of women's literature via critical analysis.	K3
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓	✓		✓	✓
CO2	✓		✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓		✓	✓
CO4	✓	✓	✓		✓	✓	✓	✓
CO5	✓	✓	✓	✓		✓	✓	✓
Number of matches = 33					**Correlation = Very High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTE11	CENTRIC ELECTIVE I	INDIAN WRITING IN ENGLISH	4	2

COURSE OBJECTIVES

1. Enablingthestudentstounderstandthe evolutionofIndianWritingin English.
2. Toenablethelearnerstogetexposedtothehistoricalmovementsoftheindiansubcontinent.
3. Comprehendingdifferentgenresthroughtherepresentationofdifferenttexts.
4. ToinculcateinthestudentstheculturalsignificanceofIndianEnglishliterature.
5. TocomprehendIndianwritinginEnglishwithitsdualfocusontheinfluenceof classicalIndiantraditionandtheimpactoftheWest.

Unit-I		10 Hours
Aurobindo:TigerandtheDeer,RoseofGod ToruDutt:TheLotus,TheCasuarinaTree Sarojini Naidu: Palanquin Bearers,Coromandel Fishers		
Unit-II		**09 Hours**
Kamala Das: Looking Glass,An Introduction Parthasarathy:ARiver Once, UndertheSky Nissim Ezekiel: Morning Prayer, Enterprise.		
Unit-III		**09 Hours**
GirishKarnad: Nagamandala. Asif Currimbhoy:Inquilab.		
Unit-IV		**10 Hours**
Sri Aurobindo: The Essence of poetry, Style and Substance (from 'The Future Poetry') Dr. S. Radhakrishnan : Emerging World Society, Dr. A. P. J. Abdul Kalam : Orientation (Wings ofFire).		
Unit-V		**09 Hours**
Anita Desai:Where Shall we go this Summer? ShashiDeshpande: Roots and Shadows		

Books for Study:

1. 1.Ramamurti,K.S.(ed.).TwentyfiveIndianPoetsinEnglishMacmillan.1995.
2. K.R.SrinivasaIyengar,1962,–HistoryofIndianWritinginEnglish,Sterling Publishers, New Delhi.
3. Herbert H. Gowen, 1975,AHistory of Indian Literature, Seema Publications, Delhi.
4. K.Satchidanandan, 2003,Authors,Texts, Issues: Essays on Indian literature, Pencraft International, New Delhi.
5. TabishKhair,2001, BabuFictions:AlienationinContemporaryIndianEnglish Novels.,OUP.
6. http://en.wikipedia.org/wik/indian_wriTIng_in_english
7. https://www.thehindu.com/books/books-children/short-history-of-indian-writing-in-english/article5226149.ece/amp/
8. https://www.britannica.com/biography/Sri-Aurobindo
9. https://www.literaryladiesguide.com/author-biography/kamala-das-indian-poet/
10. https://www.britannica.com/biography/Anita-Desai

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on topics.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Understand the themes of Indian Writing in English	K1
CO2	Identify the major trends in Indian Writing in English	K1,K2
CO3	Examine the background and settings of the prescribed texts	K4,K6
CO4	Evaluate the cultural significance of Indian English Literature	K4,K5,K6
CO5	The exposure to diverse culture and literature will further enlighten them about socio-cultural scenario in the contemporary era.	K3
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓		✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓	✓		✓
CO3	✓	✓		✓	✓		✓	✓
CO4	✓		✓	✓	✓	✓		✓
CO5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 32					**Correlation = Very High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTE12	CENTRIC ELECTIVE I	INDIAN ENGLISH POETRY	4	2

COURSE OBJECTIVES

1. To explore on the literary context of Indian English Poetry
2. To illustrate the phases and social and political influences of Indian English Poetry
3. To investigate the themes of Indian English Poetry
4. To introduce haiku and free verse poetry as well as their approaches.
5. To acknowledge the contributions of renowned Indian poets to literature

Unit-I		10 Hours

Introduction to Indian Poetry in English – Literary Renaissance in India – Derozio's Poems- Kasi PrasadGhose's*TheShair or Ministrel and other Poems* –
Michael MadhusudanDutt's*The Captive Lady*

Unit-II		10 Hours

Pre- Independence Poetry - Post-Independence Poetry
Sarojini Naidu – Tagore- AurobindoGhose- HarindranthChattopadhyaya- Nissim Ezekiel- Dom Moraes-JayantaMahapatra

Unit-III		11 Hours

Conversion of popular stories from the Ramayana, Mahabharata and the Puranas into English verse by Toru Dutt- Usage of free verse in Indian English Poetry- Lal and D. Narasimhaiah: Two Eliot figures of India- SaleemPeerdina- Agha Shahid Ali- Vikram Seth

Unit-IV		12 Hours

Existential Poets-Indian Diasporic Poetry - Haiku in Indian English Poetry; Ethnographic Voices

Unit-V		09 Hours

Post-modern Poets - Impressionistic Poets -Voices from the Margin- IndianWomen Poets in India

Books for Study:

1. A History of Indian Poetry In English, edited by RoshinkaChaudhuri, 2016.
2. *The Oxford India Anthology of Twelve Modern Indian Poets*, edited by Arvind Krishna Mehrotra, Oxford University Press, 1997
3. *Modern Indian Poetry in English* by Bruce King, 1987.
4. https://englishsummary.com/indian-poetry-inenglish/
5. http://www.tmv.edu.in/pdf/Distance_education/MA(English)/Indian%20Literature%20in%20English/Ch-1.pdf

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on topics.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Define the literary context of Indian English Poetry	K1,K2
CO2	Trace the socio-political influences in Indian English Poetry	K4
CO3	Appraise the contribution of Indian poets	K5
CO4	Try at producing haiku and free verse poetry.	K6
CO5	Compare women poets from India and other countries	K3
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓	✓		✓	✓
CO2	✓	✓	✓	✓	✓	✓		✓
CO3	✓	✓		✓	✓		✓	✓
CO4	✓		✓	✓	✓	✓		✓
CO5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 32					Correlation = Very High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTE13	**GENERIC ELECTIVE II**	**THEATRE ART**	**4**	**2**

COURSE OBJECTIVES

1. Tointroducethelearnerstotheliteraryaspectofdramas.
2. TofamiliarizeTheatreasanartform.
3. Tointroducetheconceptsofdirectingandstagemanagement.
4. ToinculcateinthestudentstheroleofTheatreinsociety.
5. Tofamiliarizethestudentswiththecomponentsofacting.

Unit-I		**09 Hours**
Dramaasaperformingart,Relation betweendramaandtheatreTheroleoftheatreThe need for permanent theatres.		
Unit-II		**10 Hours**
Greek theatre Shakespearean theatre, The Absurd theatre The Epic theatre, TheMultipurposetheatreDesigningforaparticulartheatre,TheEasterntheatre-conventionalandthenon-conventional theatre, Folk theatre, urban theatre, third theatre, other theatres in vogue.		
Unit-III		**13 Hours**
FundamentalsofPlaydirecting:Concept,technique,physicalbalance,demonstrationThedirector and the stage		
Unit-IV		**14 Hours**
Componentsofacting:Gesture,voice,costume,make-up,maskanddifferentstylesinacting as an art form, violence in the theatre, need for censorship, managing time and space.		
Unit-V		**09 Hours**

Reactions against the theatre of illusion Expressionism and dramatic symbolism Stagedesigninthe modernworld Lightingin themodern World Wordversus spectacles

Books for Study:

1. Sangeetha, K andA.Selvalakshmi.An IntroductiontoTheatreArt. New CenturyBook House (P) Ltd.,2015.
2. Balme,ChristopherB.*TheCambridgeIntroductiontoTheatreStudies*.CambridgeUniversity Press,2008.Leach,Robert.*TheatreStudies:TheBasics*.Routledge,2013.
3. **https://paradisevalley.libguides.com/the111/theatre_history_websites**
4. **https://www.britannica.com/art/theater-building/Production-aspects-of-Expressionist-theatre**
5. **https://www.worldhistory.org/Greek_Theatre/**
6. **http://scriptclickcreate.weebly.com/acting.html**

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on topics.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Understand a broad range of theatrical disciplinesand Experiences	K2
CO2	Identify the diversity of theatrical experiences andthe role of theatre in society	K1,K2
CO3	Discover the relationships among the various facetsofTheatre	K4,K5
CO4	Estimate drama as a performing art and the aspectsof Stagecraft	K4,K5,K6
CO5	The exposure to diverse com[ponents of actingand techniques	K5,K6
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8

CO1	✓	✓		✓		✓	✓	✓
CO2	✓	✓	✓		✓	✓		✓
CO3	✓	✓	✓	✓	✓		✓	✓
CO4	✓	✓		✓	✓	✓		✓
CO5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 32					**Correlation = Very High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-I

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTE14	**GENERIC ELECTIVE II**	**CRITICAL INTERPRETATION OF R.K.NARAYAN**	**4**	**2**

COURSE OBJECTIVES

1. To study the cultural, political and social identity.
2. To analyze the culture, races.
3. To evaluate the narrative, socio political changes.
4. To understand the characters, themes in the plays.
5. To illustrate the role of literature.

Unit-I	**SHORT STORY COLLECTIONS**	**09 Hours**
Malgudi Days Under the Banyan Tree and Other Stories		
Unit-II	**ESSAYS**	**11 Hours**
Next Sunday A Writer's Nightmare		
Unit-III	**AUTOBIOGRAPHY**	**15 Hours**

My Dateless Diary My Days		
Unit-IV	**NOVELS**	**16Hours**
Swami and Friends The Vendor of Sweets		
Unit-V	**ADAPTATIONS**	**10 Hours**
The Guide Mr. Sampath		

Books for Study:

1. A Critical Study Of The Fictional World Of R.K. Narayan by AmandeepRana
2. The Fiction of R K Narayan: Appeal in the 21st Century by SubrataDebangana
3. The Novels of R.K. Narayan: A Sudy of Characters by Dnyate Ramesh
4. Critical Response to R K Narayan byYadav B. L.
5. The World of Malgudi: A Study of R. K. Narayan's novels by A. Hariprasanna
6. https://smartenglishnotes.com/2020/12/21/the-guide-by-r-k-narayan-summary-analysis-characters-theme-and-question-andwers/
7. https://instapdf.in/malgudi-days-by-rk-narayan/

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on topics.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Define the culture, language and literature.	K1, K2
CO2	Interpret ideas associated with cultural, political and social.	K2
CO3	Analyze the socio-political changes of the characters.	K4
CO4	Relate to social, historical, cultural and literary contexts.	K4
CO5	To develop interest in the literature.	K3,K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓		✓	✓		✓	✓

CO2	✓	✓	✓		✓	✓	✓	✓
CO3	✓	✓		✓	✓		✓	✓
CO4	✓		✓	✓	✓	✓		✓
CO5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 32					**Correlation = Very High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTC21	**CORE COURSE IV**	**AMERICAN LITERATURE**	**6**	**5**

COURSE OBJECTIVES

1. To introduce the learnersto thedevelopmentofAmericanliterature.
2. Tofamiliarizesocialandpoliticaleventsthathasabearingon Americanwriting.
3. Tointroduce theconceptsandemergingthemesinAmericanliterature.
4. To inculcate the movementsand trendsthatshapedAmericanliterature.
5. Tofamiliarizethestudentswiththerelationbetweenaestheticsandracismin Fiction.

Unit-I	POETRY	10 Hours

WaltWhitman"OutoftheCradleEndlesslyRocking"
Emily Dickinson "The Last NightThat SheLived", "The Soul Selects Her Own Society"
Robert Frost "AfterApple Picking"
E.E.Cummings"CambridgeLadies"
WallaceStevens"AnecdoteoftheJar"
DenisLevertor"Scenario","ThinkingofELSalvador"
RobertLowell"SkunkHour"
SylviaPlath "LadyLazarus"
Anne Lexton"Wanting toDie"
AdrienneRich"Snapshotsofa Daughter-in-law"

Unit-II	POETRY	10 Hours

Victor Herandez Cruz "Today is a day of great joy" AmiriBaraka"AnAgony asNow'in (FourCenturies of Literature, Ed, Mohan Ramanan, Macmillan, 1996)Gwendolyn Brooks "Kitchenette Building" Joy Harijo"Remember" (From the Language I Give You Back), Life: AFestivalofPoets EdJamesHabai,DoubleDay,1995.p.165-66 Prose-Emerson-TheAmericanScholar AmyTan-MotherTongue Thoreau-Walden (Chapter"Pond")

Unit-III	DRAMA	10 Hours
Arthur Miller - Death of a Salesman Tennessee Williams - A Street Car Named Desire MarshaNorman-NightMother, NtozakeShange–For Colored Girls.		

Books for Study:

Unit-IV	FICTION/SHORT STORY	09 Hours
Edgar Allan Poe - "The Cask of Amontillado" Herman Melville -"BartlebytheScrivener" N.ScottMomaday-TheHouseMadeofDawn ToniMorrison-Beloved KateChopin -TheAwakening		
Unit-V	**AUTOBIOGRAPHY**	**09 Hours**
Excerpts from – Malcolm X Hispanic Women Writing Cherrie Moraga - Getting HomeAlive		

1. WillisWagner:AmericanLiterature-AWorldView
2. Marcus Cunliffe: Sphere Historyof Literature -American Literatureto 1900.
3. BorisFord:TheNewPelicanGuidetoEnglishLiterature-Vol.9.AmericanLiterature.

Web Sources:

1. **https://www.thoughtco.com/american-literary-periods-741872**
2. **https://www.poetryfoundation.org/poets/walt-whitman**
3. **https://blog.eyewire.org/emerson-vs-thoreau-transcendentalist-battle/**
4. **https://www.britannica.com/art/American-literatur**
5. **https://ivypanda.com/essays/edgar-allan-poes-and-herman-melville- comparison/**

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Analyze the movements and trends that shaped American literature	K1, K2
CO2	Estimate various speeches and concepts of living which changed American history	K4
CO3	Evaluate the relation between aesthetics and racismin fiction	K5
CO4	Validate representative socio-political, cultural,racialandgenderperspectivesintheatricalworks	K6
CO5	Theexposuretothedifferentliterarygenresandits evolution inAmerican Literature	K3
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**									
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PS09**	**PS10**
CO1	✓	✓		✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 47							**Correlation = Very High**			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTC22	CORE COURSE V	SHAKESPEARE STUDIES	6	5

COURSE OBJECTIVES

1. Toexamine,understandandenjoyShakespeare'splaysandCriticismofTheatre.
2. Analyzing the context of Elizabethan England from the evolving contemporary
3. perspective down the ages
4. UndertaketextualanalysisofShakespeare'sPlaysandSonnets
5. AppraiseShakespeare'scontributiontoEnglishlanguageandliterature
6. Critically understanding the appreciations by critics on Shakespeare

Unit-I		15 Hours

Shakespeare Theatre; Theatre Conventions; Sources; Problems of categorization; Trends

Books for Reference:

1. Harrison,1951,G.B.Shakespeare'sTragedies,Routledge,London.
2. KnightG.W.,1957,TheWheelofFire:EssaysinInterpretationofShakespeare's
3. SombreTragedies,NewYork.
4. KnightG.W.,1947,TheCrownofLife:EssaysinInterpretationofShakespeare'sFinal Plays, Oxford.
5. Johnf.Andrews,ed.,1985,WilliamShakespeare:HisWorld, HisWork, HisInfluence,CharlesScribner'sSons.
6. JonathanDollimore,ed.,1984,TheRadicalTragedy,TheHarvesterPress,Cambridge..

inShakespeare Studies up to the 19th Century; Sonnet and court politics; famous actors; theatre criticism;Shakespeare into film &play production.

Unit-II		15 Hours

Sonnets–12,65,86,130
Comedies-MuchAdoAboutNothing,Winter'sTale.

Unit-III		14 Hours

Tragedy –Othello

Unit IV- 14 Hours

History-Henry IV Part I

Unit V – 14 Hours

ShakespeareCriticism-Modernapproaches-mythical,archetypal,feminist,post-colonial,New historicist;A.C. Bradley (extract)
ChapterV&VIandtheNewIntroductionbyJohnRussellBrowninShakespeareanTragedybyA.C.Bradley, London, Macmillan,ThirdEdition, 1992.
Granville Baker - From Prefaces to Shakespeare
Stephen Greenblatt-InvisibleBullets: RenaissanceAuthorityand itsSubversion,HenryIV&HenryV,inShakespeareanNegotiations.NewYork: OxfordUniversityPress,1988

Also in Political Shakespeare:New Essays in Cultural Materialism.Eds.JonathanDollimore and Alan Sinfield Manchester UniversityPress,1994,AniaLoombaSexuality and Racial Difference in Gender, Race,And RenaissanceDrama,Manchester UP, 1989.

E Books for study:

1. https://www.kobo.com/us/en/ebook/twelfth-night-59
2. https://www.ebooksread.com/authors-eng/william-shakespeare/as you like it-018.shtml
3. http://www.gutenberg.org/ebooks/1796
4. https://www.globalgreyebooks.com/henry iv part i-ebook.html
5. https://www.thoughtco.com/introducing-shakespeares-tragedy

E-Resources:

1. http://www.shakespeare.bham.ac.uk/resources
2. https://www.folger.edu/shakespeares-theater
3. https://www.britannica.com/art/sonnet
4. https://www.sparknotes.com/shakespeare/othello/genre/
5. https://www.historytoday.com/archive/british_english_monarchs/henry-iv

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Critically understanding the appreciations by critics onShakespeare	K1
CO2	Understandelizabethantheatreandthetheatre'sdevelopment.	K2
CO3	CriticalperspectivesonShakespeare'sPlaysandSonnets	K4
CO4	Understand the trends in Shakespeare studies	K5
CO5	ModernApproaches in Shakespearean criticism	K6
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PS09	PS10
CO1	✓	✓		✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓		✓	✓		✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓

CO4	✓	✓		✓	✓	✓	✓	✓		✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 44						**Correlation = Very High**				

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTC23	**CORE COURSE VI**	**POST-COLONIAL THEORY AND LITERATURE**	**6**	**4**

COURSE OBJECTIVES

1. Toexamine,understandcurrentsociopoliticalmoodin`third-world'countries throughthestudyoftheirfictionandpoetry.
2. Tofamiliarizestudentsaboutthebasicconceptsandtheoriesrelatedtopostcolonialismasexpressedin differentliterarygenres
3. Tofocusontheproblemsandconsequencesofthedecolonizationofacountry,especially relating to the political and cultural independence of formerly subjugated people
4. Emphasis will be laid on tracing the development of post-colonialliteraturesand theory.
5. Understanding the critical perspectives in Postcolonial literatures.

Unit-I	**FICTION**	**15 Hours**
Joseph Conrad : Heart of Darkness. E.M. Forster :APassage to India.		
Unit-II	**FICTION**	**15 Hours**
ChinuaAchebe:Things FallApart. Salman Rushdie: Midnight'sChildren. ThomasKing :The OneAbout Coyote GoingWest		
Unit-III	**FICTION**	**15 Hours**
Samuel Selvon:The Lonely Londoners. BapsiSidhwa: Ice Candy Man		
Unit-IV	**POETRY**	**15 Hours**

ArunKolatkar : The Priest, A Low Temple, Yeshwant Rao, An Old Woman, Scratch A.K.Ramanujan. : Returning, Death of Poem, No Fifth Man, Birthdays, Farewells. KofiAwonoor:EasterDawn,TheWeaverBird,SongsofSorrow,SongofWar.		
Unit-V	**POETRY**	**15 Hours**
LeopoldSenghor. :InMemoriam,NightofSine,AllDayLong. GraceNichols:In My Name, Of course when they ask for poems about the 'realities' of blackwomen, Praise Song for my Mother, Caribbean Women Prayer. James Reaney :MapsGeorge Bowering : Grand Father		

Books for Study/ Online Materials:

1. B. Ashcroft: The Empire Writes Back.
2. Edward Said: Orientalism.
3. HomiBhabha: Nation and Narration
4. Aijaz Ahmad: In Theory.
5. MakarandParanjape(ed.): In-diaspora.

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Critically understanding the appreciations by critics on Shakespeare	K1
CO2	Understand Elizabeth an theatre and the theatre's development.	K2
CO3	Critical perspective son Shakespeare's Plays and Sonnets	K4
CO4	Understand the trends in Shakespeare studies	K5
CO5	Modern Approaches in Shakespearean criticism	K6
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PS09	PS10
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 47							Correlation = Very High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER-II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTE21	DISCIPLINE CENTRIC ELECTIVE III	APPROACHES TO ENGLISH LANGUAGE TEACHING	4	3

COURSE OBJECTIVES

1. ToenhancethelearningandteachingskillsofEnglish
2. TofamiliarizestudentsaboutthebasicconceptsandtheoriesrelatedtoEnglish language teaching
3. Tofocusontheproblemsandconsequencesonlanguageteaching
4. Emphasis will be laid on tracing the development of language teachingskills
5. Understanding the teaching aspects

Unit-I	A BRIEF HISTORY OF LANGUAGE TEACHING	12 Hours

The Grammar – Translation method
TheDirectmethod
TheAudiolingualmethod
Languageteachinginnovationsinthe nineteenth century

Unit-II	NATURE OF APPROACHES AND METHODS IN LANGUAGE TEACHING	12 Hours

1. Definition ofApproach and method
2. Objectives,Syllabus,learningactivities,rolesoflearners,teachersandmaterialsofthe following approaches:
    a. Oral approach and situational language teaching
    b. TheSilentWay
3. Community Language Learning.Suggestopedia
4. CompetencybasedLanguageteaching

Unit-III	CURRENT COMMUNICATIVE APPROACHES	12 Hours

TheNaturalApproachCooperativelanguagelearningContentbasedinstruction
Task-based languageteaching

Unit-IV	TEACHING ASPECTS	12Hours

TeachingProse
TeachingPoetry
TeachingGrammar
TeachingofNon-DetailedText

Unit-V	USE OF MEDIA	12 Hours

Use of Media in ELT
The integration of elements in multi- media language learning systems
BBCEnglishby RadioandTelevision- anoutlinehistory
UsingBBCEnglishbyRadioandTelevisionintheclassroom

SEMESTER-II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTE22	DISCIPLINE CENTRIC ELECTIVE III	INTERPRETATION OF LITERATURE	4	3

COURSE OBJECTIVES

1. To introduce the learners, methods of interpretation
2. To make learners analyze poetry and the techniques
3. To enhance learners interpret prose texts
4. To evaluate the techniques used in drama
5. To analyze a text critically

Unit-I	INTRODUCTION	12 Hours
Major Literary Terms Interpretation Of Literature Methods Of Interpretation		
Unit-II	**POETRY**	**12 Hours**
Interpreting A Poem Edgar Allen Poe: A Dream Within A Dream Langston Hughes: Mother To Son		
Unit-III	**PROSE**	**12 Hours**
Interpreting A Short Story Alice Munro: The Bear Came Over The Mountain		
Unit-IV	**PROSE**	**12 Hours**
Interpreting A Novel		
Unit-V	**DRAMA**	**12 Hours**
Interpreting A Play Stanley Houghton: "The Dear Departed"		

SEMESTER-II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTE23	**GENERIC ELECTIVE IV**	**A GLIMPSE OF NOBEL LAUREATES**	**4**	**3**

COURSE OBJECTIVES

1. TointroducethelearnerstotheNobelLaureatesofvariousgenresofLiterature
2. TofamiliarizestudentsonvariousNobelLaureates
3. TofocusoninterpretingtheworksofvariousNobelLaureates
4. Focus on evaluate critically and aesthetically the prescribed texts
5. Understanding the Nobel Laureates contribution to the society

Unit-I	DETAILED POETRY	12 Hours
DETAILED POETRY IfYouForget ASongofDespairOdetotheOnionYour Laughter **NON-DETAILED POETRY** As One Listens to the Rain - Octavio Paz The Street - Octavio Paz ThePoweroftheDog-RudyardKiplingOracle-SeamusHeaney		
Unit-II	**PROSE**	**12 Hours**

DETAILED PROSE **Loot - Nadine Gordimer** Disorder and Early Sorrow -Thomas Mann He Comes Round the Corner **NON-DETAILED PROSE** ExcerptsfromDisgrace-J.M.CoetzeeExcerptfromSula-		
Unit-III	**DRAMA**	**12 Hours**
DETAILEDDRAMA The Caretaker - Harold Pinter **NON–DETAILEDDRAMA** ManandSuperman- GeorgeBernardShaw		
Unit-IV	**SHORT STORIES**	**12 Hours**
Alice Munro TheTurkeySeasonDifferentlyRunaway The Bear Came Over the Mountain Boys and Girls		

Unit-V	**NOVELS**	**12 Hours**
The Pearl - John Steinbeck OneHundredYearsofSolitude-GabrielGarciaMarquez		

SEMESTER-II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTE24	**GENERIC ELECTIVE IV**	**MODERN ENGLISH LITERATURE**	**4**	**3**

COURSE OBJECTIVES

1. To portrait the ideals of the Modern Literature
2. To focus the beauty and imagination of the writers
3. To turn the classical writers as a source of inspiration
4. To analyze the emotional, personal, natural and artistic themes
5. To appreciate the language and literary works form scintillating poets.

Unit-I	**POETRY**	**12 Hours**
T.S. Eliot :Waste Land Ted Hughes : Hawk Roosting W.B. Yeats : Second Coming Philip Larkin : Whitsun Wedding		
Unit-II	**PROSE**	**12 Hours**

E.M. Forster : What I Believe T.S. Eliot : Tradition and Individual Talent G.K. Chesterton : A Piece of Chalk C.P. Snow: Two Cultures		
Unit-III	**DRAMA**	**12 Hours**
Samuel Beckett : Waiting for Godot Harold Pinter : Birthday Party		
Unit-IV	**PROSE**	**12 Hours**
George Orwell :Reflections Of Gandhi Bertrand Russell : a) The Basis of and Ideal Character (From "On Education") b) How to Escape from Intellectual Rubbish (From "Unpopular Essays)		
Unit-V	**FICTION**	**12 Hours**
D.H. Lawrence : Sons and Lovers William Golding :The Spire James Joyce : The Portrait of the Artist as a Young Mans		

SEMESTER-II

COURSE CODE	CATEGORY	COURSE TITLE	HOURS	CREDIT
PCENTS21	**SKILL ENHACNEMENT COURSE 1 [NME 1]**	**TECHNOLOGY IN TEACHING ENGLISH**	**4**	**2**

COURSE OBJECTIVES

1. Acquaint participants with technology tools, learn to implement network-relatedprogramswith concepts ofWeb Developing.
2. Integrate these tools into their English language teaching.
3. Enhance English language teaching professionals around the world acquire andmaintain basic knowledge and skills in technology for professional purposes.
4. Help participants utilize technology in lesson planning, materials development,feedback,andassessment.Practicedifferentphasesofsoftware/systemdevelopment.
5. Facilitate professional communication, collaboration, and efficiency improvement byparticipating in online discussions .Students will be able to demonstrate adequate skillsinoralandwrittencommunicationfortechnicalEnglishlanguage,activelyparticipateingroupdiscussions andinterviewsandexhibitevidenceofvocabularybuilding

Unit-I	DEFINITION- MEANING	12 Hours
1. Virtual- Learning Environment 2. Web-Based Learning Environment 3. Virtual- Learning Environment 4. Web Tools 5. Effective Web Tools in Teaching 6. ClassroomTools.		
Unit-II	**WEBPAGEDEVELOPMENT**	**12 Hours**
Howtodevelopawebpage,HostingAWebpage,Meta Data Development.ContentWriting,CreatingAds, WikipediaDevelopment:HowtodevelopandeditWikipedia.		
Unit-III	**COMPUTATIONAL LINGUISTICS**	**12 Hours**
Introduction to speech recognition (SR) systems, text-to-speech(TTS) synthesizers, Interactive voice response (IVR) systems, search engines, text editors andlanguage instruction materials.		
Unit-IV	**LEXICOGRAPHY**	**12 Hours**
IntroductiontoLexicography,DictionaryDevelopment(e-Dictionary),WorldNet,Thesaurus.Language Teaching: First Language and Second Language Teaching, Various methods ofLanguageTeaching.		
Unit-V	**E-LEARNING**	**12 Hours**
AsynchronousE-LearningVsSynchronousE-LearningofLanguageE-LearningChallengesandSolutions.Application:MachineTranslation.		

Books for study:

1. Butcher, N.andWilson-Strydom, M.)AGuideto Qualityin OnlineLearningDallasTX:Academic Partnerships, 2013
2. Batson,T.,&Bass,R.Teachingandlearninginthecomputerage.Change,Mar-Apr., 1996.

E-Resources:

1. https://englishpost.org/tools-teach-english-technology/
2. https://www.britishcouncil.in/teach/resources-for-teachers/technology-teachers- series
3. https://www.techtarget.com/whatis/definition/virtual-learning-environment-VLE-or-managed-learning-environment-MLE?amp=1
4. https://en.m.wikipedia.org/wiki/Web_development
5. https://plato.stanford.edu/entries/computational-linguistics/
6. https://en.m.wikipedia.org/wiki/Lexicography

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems.

CO	COURSE OUTCOME The students will be able to	KNOWLEDGE LEVEL
CO1	Understand the digital system, its organization and architecture	K1
CO2	Identify needs and aspirations on a broader spectrum,AbletorecognizetheevolvingroleofDigitalTechnologies.	K3
CO3	Discusshowtechnologyaffectslanguagelearningandteachingtoday	K4
CO4	Usestrategiestoteachvocabularygrowththroughsocialmedia.	K6
CO5	Identify appropriate grammar activities thatincludeopportunitiesforlearnerstodiscover,analyze,andproduce Englishgrammarduringlanguageinteractions.	K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

MAPPING WITH COURSE OUTCOME (CLOs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PS09	PS10
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓		✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 47							Correlation = Very High			

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

Programme Outcomes & Programme Specific Outcomes for B.A. History

Programme Outcomes:

PO1: Theoretical Knowledge of History: Ability to understand different theories of History and application of History to society. To develop an adequate competency on the different Historical approaches.

PO2: Analytical Reasoning and Critical Thinking: Critically Analyze and assess the way in which economists examine the real world to understand the current events and evaluate specific proposals.

PO3: Logical Reasoning and Quantitative Ability: Ability to understand how to collect and analyze data and use empirical evidence to evaluate the validity of hypothesis, using Quantitative Methodology and conduct data analysis to interpret results.

PO4: Communication and Research Skills: Communication and Research related skills. Developing a sense of capability for relevant/appropriate inquiry and asking questions, synthesizing and articulating and reporting results and to efficiently communicate thoughts and ideas in a clear and concise manner.

PO5: Gender, Environment and Sustainability: Comprehend the Environmental issues and Sustainable Development and strive to achieve economic and social equity for women and be Gender Sensitive.

PO6: Employability and Leadership Skills: Become empowered individuals to be employed in various positions in industry, academia and research and have the potential to become Entrepreneurs and take leadership roles in their chosen occupations and communities.

PO7: **Social Interaction**: Acquire the ability to engage in relevant conversations and have the ability to understand the views of society that would help initiate policy making.

PO8: Digital Literacy and Lifelong Learning: Capability to use ICT tools in a variety of learning situation and use appropriate software for analysis of data - Ability to acquire Knowledge situations and skills for life through self-directed learning and adapt to different learning environments.

Programme Specific Outcomes:

PSO1: To enable students to apply different Historical theories in real life situations and decision-making circumstances.

PSO 2: To sensitize students to various world issues related to Development, Growth, International Economics, Sustainable Development and Environment.

PSO 3: To familiarize students to the concepts and theories related to good governance,

Modern Administrations and construction of an ideal society.

PSO 4: Evaluate various social and economic problems in the society and develop answer to the problems as global citizens.

PSO 5: Enhance skills of analytical and critical thinking to analyze effectiveness of policies of the government.

MAPPING OF PROGRAMME-SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Programme Outcomes (POs)

Programme Specific Outcomes (PSOs)	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
PSO 1	3	3	3	2	3	2	2	2
PSO 2	3	3	3	2	3	2	2	2
PSO3	3	3	3	2	2	3	3	2
PSO 4	3	3	2	3	3	3	3	3
PSO 5	3	3	2	3	3	3	3	3

(3 – Strong) (2 – Medium) (1 – Low)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITC11	**Core Course 1**	**HISTORY OF ANCIENT INDIA UP TO 1206 CE**	**5**	**4**

Course Objectives

1. Understanding of the characteristics of pre and proto historic cultures in India.
2. The impact of Vedic culture on society, religion and culture.
3. Emergence of the Centralized State under the Mauryas and Ashoka's Dhamma.
4. Achievements of the Guptas and their contribution to literature, art and architecture.
5. Post-Gupta polity and the invasions of Mahmud of Ghazni and Muhammed of Ghor.

Unit-I	Geographical Features – Sources of Indian History – Pre- and Proto History - Megalithic Culture – Harappan Civilization - Ancient Tamil Civilization – Early Vedic Age – Later Vedic Age.	**15 Hours**
Unit-II	Buddhism and Jainism – Greek and Persian Invasions of India– Alexander's Invasion - Rise of Mahajanapadas - Magadhan Empire – Nandas - Mauryas – Chandragupta Maurya – Asoka – Mauryan Administration – Art and	**15 Hours**

	Architecture.	
Unit-III	Satavahanas – Kushanas – Kanishka-I – Gupta Empire – Chandragupta Vikramaditya -Samudragupta –Kumara Gupta - Administration – Social, Economic and Cultural Developments – Vakatakas - Nalanada, Vikramasila and Valabhi Universities	**15 Hours**
Unit-IV	Vardhanas - Harshavardhana – Administration – Religious Contributions –Provincial Dynasties – Chalukyas – Rashtrakutas - Paramaras – Palas – Senas - Art and Architecture - Cultural contributions.	**15 Hours**
Unit-V	Rajputs – Cultural Contributions - Arab Conquest of Sind - Mahmud of Ghazni – Invasions – Mohammed of Ghor – Battles of Tarain	**15 Hours**

Books for Study

1. G. Venkatesan, *Cultural History of India*, Varthamanan Pathipagam, 2018 (inTamil)
2. R.C. Majumdar, et. al., *An Advanced History of India*, MacMillan, Delhi, 1974
3. Upinder Singh, *A History of Ancient and early Medieval India*, Pearson and Longman, Delhi, 2008

Books for Reference:

1. RomilaThapar, *The Penguin History of Early India: From the origin to A.D. 1300*, Penguin Books, New Delhi, 2002
2. A.L. Basham, *The Wonder that was India*, London, Macmillan, 2004
3. R.S. Sharma, *India's Ancient Past*, Oxford University Press, New Delhi, 2017
4. B.N. Luniya, *Evolution of Indian Culture*, Agra, Lakshmi Narain Publication, 2005

Web Resources :

1. https://archive.org/details/in.ernet.dli.2015.279506/page/n1/mode/2up
2. (407) Abul Fazal - YouTube
3. History Of India - Facts, Timelines, Events, Personalities & Culture (culturalindia.net)
4. History of India (tamildigitallibrary.in)
5. ஆக்ஸ்போர்டின் இந்திய வரலாறு-III (tamildigitallibrary.in)

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Outline the characteristic features of pre and proto historic cultures in India.	K1
CO 2	Discuss the impact of the Vedic culture on Indian society and religion.	K2
CO 3	Examine Ashoka's policy of Dhamma.	K3

CO 4	Justify Gupta Age as a classical age.	K5
CO 5	Describe the nature of Post-gupta polity and the invasions of Mahmud of Ghazni and Muhammed of Ghor.	K1

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong(3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITC12	**Core Course 2**	**HISTORY OF TAMIL NADU UP TO 1311 CE**	**5**	**4**
Course Objectives				
1. Knowledge of geography and sources of Tamil Nadu. 2. Understanding of polity, society and economy of the Sangam period. 3. The contribution of Pallavas in the field of art and architecture. 4. Appreciation of the achievements and contribution of the Imperial Cholas. 5. Knowing the factors for the decline of the Pandyas.				
Unit-I	Geography – Sources for the study of history of Tamil Nadu – Pre & Proto history of Tamil Nadu – Ancient Tamil Civilization		**15 Hours**	
Unit-II	Sangam Age – Historicity –Early Cholas – Karikala –		**15 Hours**	

	Cheras – Senguttuvan – Pandyas – Nedunchezian – Polity – Society – Economy – Foreign Trade – Religion – Literature – Kalabhara Interregnum – Impact of their rule	
Unit-III	The Pallavas – Origin: Early Pallavas – Later Pallavas – Political, Social and Economic Conditions – Growth of Literature and Education – Art and Architecture – Sculpture – Paintings & Fine arts – Early Bakthi Movement - The First Pandyan Empire – Sources –Triangular conflict between Pallavas, Pandyas and Western Chalukyas – Administration – Art and Architecture	**15 Hours**
Unit-IV	Later Cholas:Raja RajaChola I - RajendraChola I – Overseas Expansion – Kulothunga – Chalukya-Chola relations – Administrative System – Land Grants and Temple Administration – Social and Economic life – Maritime Trade & Commerce – Religion – Literature –Art and Architecture – Bronze Sculptures	**15 Hours**
Unit-V	The Second Pandyan Empire (1190-1312 CE) – Triangular conflict among Cholas, Pandyas and Hoysalas – Social and Economic Life – Malik Kafur's Invasion	**15 Hours**

Books for Study

1. A. Ramasamy, *A History of Ancient Tamil Civilization*, New Century Book House, Chennai

2. K.A. NilakantaSastri, *A History of South India: From Prehistoric Times to the Fall of Vijayanagar*, Oxford University Press, Chennai, 1997

3. V.T. Chellam, *New Light on the Early History of Tamil Nadu*, Vijay Publications, Trichy, 1981

Books for Reference:

1. N. Subramanian, *Sangam Polity*, Asia Publishing House, Bombay, 1966

2. K.K. Pillay, *A Social History of the Tamils*, University of Madras, Madras, 1967

3. Ma.Rajamanickanar, *History of Pallavas*, Saran Books, Chennai.

4. Dr. C. Manoranjithamoni, *History of Tamil Nadu upto 1565 A.D.*, Dave - Beryl Publications, Tirunelveli, 2018.

Web Resources :

1. https://www.tamildigitallibrary.in/bookdetail.php?id=jZY9lup2kZl6TuXGlZQdjZt9lJpd#book1/
2. http://www.historydiscussion.net
3. http://globalsecurities.org/military/world/india/history-chola.htm
4. https://tamilnation.org/heritage/chronology.htm
5. https://tamilencylopedia.jimdofree.com/history-of-tamilnadu/

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Describe the various sources for the study of history of Tamil Nadu.	K1
CO 2	Examine the various aspects of Sangam Age.	K4
CO 3	Explain the rise of Pallavas and their cultural contribution.	K2
CO 4	Estimate the supremacy of the Chola power.	K5
CO 5	Outline the achievements of the Second Pandyan Empire.	K1

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	3	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	3	2	3	2	2	3
Total	15	15	12	10	15	13	10	15
Average	3	3	2.4	2	3	2.6	2	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	2
Total	15	15	14	15	13
Average	3	3	2.8	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITA11	**Generic Elective 1**	**Allied- STUDIES ON STATES AND GOVERNMENTS – I**	**4**	**3**

Course Objectives

1. About the state, a few political concepts and their values.
2. The students to acquire knowledge on forms of governments and types of Constitutions.
3. The students aware of their rights and duties and the values of human rights.
4. To know the classification of Constitutions.
5. To know the rights and duties of a citizen.

Unit-I	**State:** Historical Developments-Theories of Origin - Elements of State-Nation, Nationality, Society, Community and Institution.	**12 Hours**
Unit-II	**Concepts:** Liberty, Equality and Justice- Democracy and Liberalism – Socialism – Secularism- Nationalism and Fascism – Feminism.	**12 Hours**
Unit-III	**Forms of Government:** Aristotle's Classification **–** Unitary and Federal Form- Parliamentary and Presidential Form.	**12 Hours**
Unit-IV	**Constitution:** Modern Classification - Written and Unwritten **-** Flexible and Rigid - Salient Features of the Constitutions of USA, England and India.	**12 Hours**
Unit-V	**Rights and Duties:** Classification of Rights -The State and Citizenship -Fundamental Rights -Fundamental Duties - Human Rights -UDHR**.**	**12 Hours**

Books for Study

1. Agarwal.R.C, *Political Theory* (*Principles of Political science*), Chand & Company, New Delhi, 2005
2. BiswaranjanMohanty, *"Dynamics of Political Theory-The Current Analysis"* Atlantic Publishers and Distributors (P) Ltd., New Delhi, 2010
3. Vijayaragavan, *Political Thought*, New Delhi, Sterling Publications, 2000

Books for Reference

1. R.G Gettle,*Introduction to political Science*, Ginn and Company, New York, 2019
2. Rajeev Bhargava & Ashok Acharya, *Political Theory: An Introduction*, Pearson, New Delhi, 2019
3. O.P.Gauba,*Western Political Thought*, MacMillan Publishers India Limited, Delhi, 2014
4. Andrew Heywood, *Political Ideologies: An Introduction*, Andrew MacMillan, 2015

Web Resources :

1.https://youtu.be/Ck87nSn9Fcs
2.https://youtu.be/OI5VxxDZxfg
3. https://youtu.be/-6qOg6P_wgs
4. https://youtu.be/0ytJ0rr8fAI
5. https://youtu.be/-6qOg6P_wgs

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Understand the historical developments, theories of origin, elements and other units of state.	K1, K2
CO 2	Understand a few political concepts, ideologies and values.	K1
CO 3	Examine the forms of government and its classifications	K1
CO 4	Understand the meaning of constitution, its classifications and know about various constitutions.	K2
CO 5	Analyze the rights and duties of citizens; critically analyze the types of citizenship and human rights.	K4

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	2	2	2	3	2
CO 2	3	3	3	3	3	2	3	2
CO 3	3	3	3	2	2	2	3	2
CO 4	3	3	3	3	3	2	3	3
CO 5	3	3	3	3	3	3	3	3
Total	**15**	**15**	**15**	**13**	**13**	**11**	**15**	**12**
Average	3	3	3	2.6	2.6	2.2	3	2.4

S-Strong (3) **M-Medium (2)** **L-Low (1)**

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	2
CO 3	3	3	3	2	2
CO 4	3	3	3	2	2
CO 5	3	3	3	3	3
Total	15	15	15	13	12
Average	3	3	3	2.6	2.4

S-Strong (3) **M-Medium (2)** **L-Low (1)**

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITS11	Elective 1	INTRODUCTION TO TOURISM	2	2

Course Objectives

1. Understanding of the basic components and elements of tourism
2. Knowledge of different types and forms of tourism
3. Knowledge of the role of Travel Agents
4. Understanding of the role of Tour Operators
5. Knowledge of the travel documents

Unit-I	Concepts of Tourism: Definition of Tourism – Traveller – Tourist – Excursionist – Travel Motivations: Push and Pull Motivations of Travel – Basic Components of Tourism: Transport, Attraction, Accommodation – Elements of Tourism: Weather, Amenities, Accessibility, Historical and Cultural Factors	**6 Hours**
Unit-II	Types and Forms of Tourism: Domestic and International Tourism – Long Haul and Short Haul Tourism – Leisure Tourism – Pilgrimage Tourism – Special Interest Tourism – Adventure Tourism – Eco Tourism – Cultural Tourism – Desert Tourism – Agro Tourism – Culinary Tourism – Medical Tourism – Sustainable Tourism	**6 Hours**
Unit-III	Travel Agency: Meaning of Travel Agent – Types of Travel Agency – Roles of Large Travel Agent – Characteristics of a Professional Travel Agent	**6 Hours**
Unit-IV	Tour Operator: Meaning of Tour Operator – Types of Tour Operator: Inbound, Outbound, Domestic, Ground and Specialized – Role of Tour Operators – Itinerary Planning: Principles, Resources and Guidelines	**6 Hours**
Unit-V	Travel Documents: Passport – VISA – Health Certificates – Tax – Customs – Currency – Travel Insurance – Role of Information Technology in Tourism related Services – Computerized Reservation System (CRS) and Global Distribution System (GDS)	**6 Hours**

Books for Study

1. A.K. Bhatia, *Tourism Management,* Sterling Publications, New Delhi, 2016

2. A.K. Bhatia, *The Business of Travel Agency and Tour Operations Management,* Sterling Publications, New Delhi, 2014

3. N. Jayapalan, An Introduction to Tourism, Atlantic Publications, New Delhi, 2013

Books for Reference:

1. Marc Mancini, *Conducting Tours: A Practical Guide*,Cengage Learning Publications, New Zealand, 2000

2. J. Negi, *Travel Agency and Tour Operation: Concepts and Principles*,Kanishka Publisher, New Delhi, 2004

3. PranNath Seth, *Successful Tourism Management: Fundamentals of Tourism*, Sterling Publications, New Delhi, 2008

4.Bhatia, A.K: *Tourism Development: Principals and Practices*, Sterling Publishers Pvt, Ltd, New Delhi, 1989.

Web Resources :

1. https://www.academia.edu/14264572/Basic_Concept_on_Tourism
2. http://bieap.gov.in/Pdf/TTPaperIIYR2.pdf
3. https://youtu.be/A3PDAmJ8hV
4. https://youtu.be/olk4dS3M9Lk
5. https://www.google.co.in/books/edition/Introduction_to_Tourism/9HBZh2Lkm04C?hl=en&gbpv=1&printsec=frontcover

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	List out the various components and elements of tourism	K1
CO 2	Explain the types and forms of tourism.	K2
CO 3	Describe the roles of Travel Agent	K2
CO 4	Explain the roles of Tour Operators	K2
CO 5	Examine the importance of travel documents	K4

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	3	2	3	2	3
CO 2	3	3	3	3	3	3	3	3
CO 3	3	3	3	3	3	2	3	3
CO 4	3	3	3	3	3	2	3	3
CO 5	3	3	3	3	3	3	3	3
Total	15	15	15	15	14	13	14	15
Average	3	3	3	3	2.8	2.6	2.8	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	3	2	2	3
CO 2	3	3	3	2	3
CO 3	2	2	2	2	3
CO 4	2	2	2	2	3
CO 5	2	2	2	2	3
Total	11	12	11	10	15
Average	2.2	2.4	2.2	2	3

S-Strong (3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITF11	**Skill Enhancement Course (FC)**	**INTRODUCTION TO HISTORY**	**2**	**2**
Course Objectives				
1. Introduction to the meaning and nature of history. 2. Knowledge of different kinds of history and its relationship with other disciplines. 3. Use of facts in writing history. 4. Introduction of the concepts in history. 5. Knowledge of various sources for the study of history and usage of bibliography and footnotes.				
Unit-I	History – Meaning & Definitions– Nature and Scope of History – Uses and Abuses of History – Lessons in History			**6 Hours**
Unit-II	Kinds of History – History and Allied Disciplines – Debates on history: Science or an Art			**6 Hours**
Unit-III	Herodotus – Thucydides – Livy – Tacitus – St. Augustine – IbnKhaldun – Alberuni – Voltaire – Ranke – Hegel – Marx – Antonio Gramsci – Michel Foucault – E.H. Carr			**6 Hours**
Unit-IV	JadunathSarkar – R.C. Majumdar – D.D. Kosambi – RomilaThapar – R.S. Sharma – IrfanHabib – Bipan Chandra – RanajitGuha P.T. SrinivasaIyyangar– C.S. Srinivasachari – K.A. NilakantaSastri – K.K. Pillai- N. Subramaniam – K.A. Rajayyan- G. Venkatesan			**6 Hours**
Unit-V	Repositories of Sources: Archaeological – Epigraphical – Numismatic – Material Remains – Literary – Oral Sources - Archival and Government Records – Use of Footnotes and Bibliography in writing assignments. **Field Visit –** Nearest archaeological/historical site, museum, archives and libraries **Field Report**			**6 Hours**

Books for Study

1. E.H.Carr, *What is History?*, Penguin Books Ltd., New Delhi, 2018.

2. G. Venkatesan, A Study of Historiography (History of Historical Knowledge),V.C.Publications,2018

3. SheikAli, *History: Its Theory and Method*, Laxmi Publications, 2019

Books for Reference:

1. John C.B. Webster, *Studying History*, Primus Books, Delhi, 2019

2. MarcBloch, *The Historian's Craft*, Aakar Books, Delhi, 2017

3. R.G.Collingwood, *The Idea of History,* OUP, Delhi, 1994

4. RomilaThapar, *History and Beyond*, Taylor and Francis, Oxford University of Press,

Web Resources :

1. https://archives.history.ac.uk/history-in-focus/Whatishistory/index.html
2. http://d-nb.info
3. https://books.google.ba/books?id=AIGq85RVvdoC&printsec=copyright#v=onepage&q&f=false
4. https://old.mu.ac.in/wp-content/uploads/2021/05/History-Paper-I.pdf
5. https://ddceutkal.ac.in/Syllabus/MA_history/Paper_07_N.pdf

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Describe the meaning and definition of history.	K1
CO 2	Explain the relationship between history and allied disciplines.	K2
CO 3	Illustrate the use of facts in writing history.	K3
CO 4	Examine the concept of causation in history.	K4
CO 5	Develop an essay based on sources using foot notes and bibliography.	K6

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	3	2	3	2	3
CO 2	3	3	3	3	3	3	2	3
CO 3	3	3	3	3	3	3	3	3
CO 4	3	3	3	3	3	2	2	3
CO 5	3	3	3	3	3	3	3	3
Total	15	15	15	15	14	14	12	15
Average	3	3	3	3	2.8	2.8	2.4	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Total	15	15	14	15	15
Average	3	3	2.8	3	3

S-Strong (3) M-Medium (2) L-Low (1)

II Semester

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITC21	**Core Course 3**	**HISTORY OF MEDIEVAL INDIA – 1206 – 1707 CE**	**5**	**4**

Course Objectives

1. Understanding about the genesis of the Sultanate rule in India and its early rulers
2. Appreciation of the administration of Tuglaqs, Sayyids and Lodis and the impact of Bhakti Movement
3. Knowledge about the founding and conquests of the Mughal rulers
4. Art and architecture and administrative policies during the Mughals
5. The administration, art and architecture during Bahmini and Vijayanagar kingdoms

Unit-I	Establishment of Sultanate Rule in India – Slave Dynasty – Qutb-uddin-Aibak – Iltutmish–Sultana Raziya – Balban – Khilji Dynasty – JalaluddinKhilji – AlauddinKhilji – Malik Kafur's Invasion	**15 Hours**
Unit-II	Tughlaq Dynasty – Mohammed-bin-Tughlaq – Feroz Shah Tughlaq – Sayyids and Lodis –Administrative System under Delhi Sultanate – Bhakti Movement – Sufi Movement	**15 Hours**
Unit-III	Advent of Mughals – Babur – Humayun – SherShah Administration- conquests of Akbar Mughal administration- Mughal Art and Architecture	**15 Hours**
Unit-IV	Jehangir –Chain of Justice- Shah Jahan – Aurangazeb – Rise of the Marathas – Life and Career of Shivaji – Shivaji's Administration	**15 Hours**
Unit-V	Bahmini Kingdom – Vijayanagar Empire – Administration – Art and Architecture-Position of Women in Medieval Period	**15 Hours**

Books for Study

1. AshirbadiLalSrivastava, *History of India 1000 A.D. to 1707 A.D.*, Shiva LalAgarwala, Agra, 1964
2. Satish Chandra, *History of Medieval India*, Orient Blackswan, New Delhi, 2017

3. R.C. Majumdar, et. al., *An Advanced History of India*, MacMillan, Delhi, 1974

Books for Reference:

1. A.B.M. Habibullah, *The Foundation of Muslim Rule in India*, Central Book Depot, 1967
2. AshirbadiLalSrivastava, *The Mughal Empire, 1526-1803 A.D.*, Shiva LalAgarwala, Agra, 1969
3. Chandra, Satish, *Essays on Medieval Indian History*, OUP, New Delhi, 2005
4. MohammadHabib and K.A. Nizami, *Comprehensive History of India: The Delhi Sultanate (A.D. 1206-1526)*, People's Publishing House, Delhi, 1970

Web Resources :

1. https://archive.org/details/MedievalIndiaFromContemporarySources
2. https://selfstudyhistory.com/medieval-indian-history/
3. Indian History to 1526 made easy (tamildigitallibrary.in)
4. Mughal dynasty | Map, Rulers, Decline, & Facts | Britannica
5. book A. L. Basham Cultural History of India.pdf (archive.org)

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Describe the foundation of the Delhi Sultanate and its early dynasties	K1
CO 2	Elucidate the administration of the Delhi Sultanate and appreciate the Bhakthi and Sufi Movements	K2
CO 3	Discuss the genesis and the conquest of the Mughals	K2
CO 4	Outline the art and architecture and administration of the Mughals	K1
CO 5	Illustrate the administration, art and architecture during the Bahmini and Vijayanagar kingdoms	K4

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	3	3	3	2	3
CO 2	3	3	3	3	3	3	3	3
CO 3	3	3	3	3	3	3	2	3
CO 4	3	3	2	3	3	2	2	3
CO 5	3	3	3	3	3	3	3	3
Total	15	15	13	15	15	14	12	15
Average	3	3	2.6	3	3	2.8	2.4	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	2	3	3
CO 5	3	3	3	3	3
Total	15	15	14	15	15
Average	3	3	2.8	3	3

S-Strong (3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITC22	Core Course 4	HISTORY OF TAMIL NADU - 1311 – 1801 CE	5	4

Course Objectives

1. Rise of the Madurai Sultanate and its contribution.
2. Knowledge about the impact of Vijayanagar rule in Tamilaham.
3. Contribution of the Nayaks of Madurai, Senji and Thanjavur.
4. Contribution of the Marathas to Tamil culture.
5. Understand the Poligar Rebellion as the early resistance against British imperialism.

Unit-I	Decline of the Pandya Kingdom – Rise of the Madurai Sultanate – Administration – Society – Economy – Culture	**15 Hours**
Unit-II	Impact of Vijayanagar Rule – Invasion of Kumara Kampana – The Nayaks of Madurai – VishwanathaNayak – ThirumalaiNayak – Rani Mangammal – Meenakshi – Decline of Nayaks of Madurai	**15 Hours**
Unit-III	Nayaks of Tanjore – Nayaks of Senji – Civil War among the Nayak Rulers – Poligari system – Administration – Social and Economic Conditions – Religion – Temple Art and Architecture	**15 Hours**
Unit-IV	Marathas of Tamil Country – Serfoji II – Administration – Contribution of Maratha to the Tamil Culture – SaraswathiMahalLibrary – Sethupathis of Ramnad – Society – Economy – Religion and Culture	**15 Hours**
Unit-V	Nawabs of Carnatic – Tamil Society Under the Nawabs – Anglo – Mysore Relations – Carnatic wars - Society – Economy and Religion and Culture -Poligar Rebellion – PuliThevar – Khan Sahib – VeluNachiyar – VeerapandiaKattabomman – Revolt of Maruthu Brothers	**15 Hours**

Books for Study

1. G. Venkatesan, *History of Modern Tamil Nadu 1600-2011*, VC Publications, Rajapalayam
2. K. Rajayyan, *History of Tamil Nadu, 1565 to 1982*, Raj Publishers, 1982
3. N. Subramanian, *History of Tamil Nadu, 1336 to 1984*, Koodal Publications, 197

Books for Reference:

1. K. Rajayyan, *Rise and Fall of the Poligars of Tamil Nadu,* University of Madras, 1974
2. K. Rajayyan, *South Indian Rebellion: The First War of Independence 1800-1801,*AkaniVeliyeedu, 2012
3. K.A. NilakantaSastri, *The Illustrated History of South India: from Pre-Historic times to the fall of Vijayanagar*
4. K.R. Srinivasan, *Temples of South India*, National Book Trust, New Delhi, 2005

Web Resources :

1. https://archive.org/details/SouthIndianRebellion/mode/2up
2. www.nationalgeographic.org/threekingsintamilakam
3. **http://www.indiancommunities.org/2016/10/30/vijayanagar-rule-in-tamil-nadu/#:~:text=The%20Vijayanagar%20Empire%20was%20founded,and%20Thuluva%20dynasties%20were%20prominent**
4. **https://www.outlookindia.com/outlooktraveller/explore/story/71221/aranmanai-remembering-the-marathas-of-thanjavur#:~:text=The%20Marathas%20ruled%20Thanjavur%20between,under%20the%20Doctrine%20of%20Lapse).**
5. **https://www.studyiq.com/articles/poligars-revolt/**

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	List out the various components and elements of tourism	K1
CO 2	Explain the types and forms of tourism.	K2
CO 3	Describe the roles of Travel Agent	K2
CO 4	Explain the roles of Tour Operators	K2
CO 5	Examine the importance of travel documents	K4

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	3	2	3	2	3
CO 2	3	3	3	3	3	3	2	3
CO 3	3	3	3	3	3	3	3	3
CO 4	3	3	3	2	3	2	2	3
CO 5	3	3	3	3	3	2	3	3
Total	15	15	15	14	14	13	12	15
Average	3	3	3	2.8	2.8	2.6	2.4	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	2	3	3
CO 5	3	3	3	3	3
Total	15	15	13	15	15
Average	3	3	2.6	3	3

S-Strong (3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITA21	Generic Elective 2	Allied- WESTERN POLITICAL THOUGHT	4	3

Course Objectives

1. Knowledge about Greek philosophy of Plato and Aristotle
2. Knowledge about social contract theory.
3. The political ideas of Machiavelli and John Locke
4. Utilitarian philosophy of Jeremy Bentham
5. Ideas of Karl Marx and Antonio Gramsci

Unit-I	Socrates – Plato – Aristotle	**15 Hours**
Unit-II	Machiavelli – Thomas Hobbes – John Locke – Rousseau	**15 Hours**
Unit-III	Voltaire – Montesquieu – Thomas Paine – Mary Wollstonecraft – Luigi Taparelli	**15 Hours**
Unit-IV	Jeremy Bentham – J.S. Mill – David Thoreau – Nietzsche	**15 Hours**
Unit-V	Karl Marx – Antonio Gramsci – Richard Rorty – Martin Luther King Jr.	**15 Hours**

Books for Study

1. George H. Sabine, *A History of Political Theory*, Oxford and IBH Pub. Co. Ltd., New Delhi, 2019
2. Phyllis Doyle, *A History of Political Thought*, Jonathan Cape, London, 1963
3. R.C. Gupta, *Western Political Thought*, Lakshmi NarainAgarwal, Agra, 2012

Books for Reference:

1. Brian R. Nelson, *Western Political Thought: From Socrates to the Age of Ideology*, Waveland Press Inc., Long Grove, Illinois, 1996
2. Des Raj Bhandari, *History of European Political Philosophy*, Bangalore Print & Pub. Co., Bangalore, 1963
3. George Catlin, *The Story of the Political Philosophers*, Kessinger Pub., 2010
4. J.S. McClelland, *A History of Western Political Thought*, Routledge, London, 1996

Web Resources :

1. https://archive.org/details/dli.ernet.260180/page/n5/mode/2up
2. https://archive.org/details/in.ernet.dli.2015.260320/page/n1/mode/2up
3. https://archive.org/details/dli.ernet.13555/page/n13/mode/2up
4. https://archive.org/details/in.ernet.dli.2015.226409/page/n3/mode/2up
5. https://ia800100.us.archive.org/14/items/AHOWPT/AHOWPT.pdf

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level

CO 1	Describe the political philosophy of Plato and Aristotle.	K1
CO 2	Discuss the Social Contract theory.	K2
CO 3	Compare the political ideas of Machiavelli and John Locke	K4
CO 4	Justify the advantages of utilitarian philosophy.	K5
CO 5	Describe the political ideas of Karl Marx and Antonio Gramsci.	K1

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	2	2	3	2	3
CO 2	3	3	2	3	3	3	2	3
CO 3	3	3	3	2	3	3	3	3
CO 4	3	3	2	3	3	2	2	3
CO 5	3	3	3	3	3	3	3	3
Total	15	15	13	15	14	14	12	15
Average	3	3	2.6	2.6	2.8	2.8	2.4	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	3
CO 2	3	3	3	3	3
CO 3	3	2	3	3	3
CO 4	3	3	2	3	3
CO 5	3	3	3	3	3
Total	15	14	13	15	15
Average	3	2.8	2.6	3	3

S-Strong (3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITS21	**Generic Elective 2**	**INDIAN CONSTITUTION**	**2**	**2**

Course Objectives

1. Understanding of the salient features of the Indian Constitution
2. Knowledge about fundamental rights and duties
3. Knowledge about the structure and functions of the Union Government
4. Knowledge about the structure and functions of the State Government
5. Understanding of the powers and functions of the local government

Unit-I	Sources – Preamble – Salient Features – Citizenship – Amendments	**6 Hours**

Unit-II	Fundamental Rights – Directive Principles – Fundamental Duties.	**6 Hours**
Unit-III	Union Government: President – Prime Minister and Council of Ministers – Parliament –Supreme Court of India	**6 Hours**
Unit-IV	State Government: Chief Minister – Governor – State Legislature – High Courts	**6 Hours**
Unit-V	Local Government: Urban – Rural	**6 Hours**

Books for Study

1. B.N. Rao, *India's Constitution in the Making*, Orient Longmans, Madras, 1960
2. Durga Das Basu, *Introduction to the Constitution of India*, Lexis Nexis, Gurgaon, 2019
3. M.V. Pylee, *Constitutional Government in India*, S. Chand & Co. Ltd., New Delhi, 2012

Books for Reference:

1. G. Balan and D. Dakshinamurthy, *Constitutional Development and Freedom Movement*, VanathiPathipagam, Chennai
2. Granville Austin, *The Indian Constitution: Cornerstone of a Nation*, Oxford University Press, New Delhi, 1999
3. Hari Hara Das, *Indian Government and Politics*, Himalaya Publishing House, New Delhi, 2001
4. JagadishSwarup, *Constitution of India*, Dandewal Publishing House, Allahabad, 1984

Web Resources :

https://www.tn.gov.in/index.php
https://www.assembly.tn.gov.in/
https://legislative.gov.in/constitution-of-india
https://www.india.gov.in/
https://www.indianculture.gov.in/ebooks/indias-constitution-making

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Describe the salient features of the Indian Constitution	K1
CO 2	Elaborate the Structure and Functions of Union Government	K2
CO 3	Elaborate the Structure and Functions of Union Government	K2
CO 4	Explain the Structure and Functions of State Governments	K3
CO 5	Discuss the powers of the local government	K2

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	3	3	3	2	3
CO 2	3	3	3	3	3	3	2	3
CO 3	3	3	3	3	3	3	3	3
CO 4	3	3	3	3	3	2	2	3
CO 5	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	14	12	15
Average	3	3	3	3	3	2.8	2.4	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Total	15	15	15	15	15
Average	3	3	3	3	3

S-Strong (3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCHITS22	**Skill Enhancement Course 2**	**BASIC JOURNALISM**	**2**	**2**
Course Objectives				
1. Understanding the definition, types, and determinants of news 2. Knowledge about news paper organization structure 3. Knowledge about the role, qualities, and responsibilities of a reporter 4. Knowledge about reporting and writing 5. Understanding of the role, qualities, and responsibilities of an editor.				
Unit-I	Definition of News – Types of News – Determinants of News – News Evaluation		**6 Hours**	
Unit-II	Newspaper Organization Structure – News Sources and Agencies – Target audience		**6 Hours**	
Unit-III	Role, Qualities and Responsibilities of a Reporter – Lead Writing – News Pegs – Developing a News Story		**6 Hours**	

Unit-IV	Interviews – Interpretative Reporting – Investigative Reporting – Reviews – Feature Writing – Travelogues – Web Writing	**6 Hours**
Unit-V	Role, Qualities and Functions of an Editor – Headlines – Layout – Placement of Photographs – Caption Writing – Infographics	**6 Hours**

Books for Study

1. K.M. Shrivastava, *News Reporting and Editing,* Sterling Pub. Pvt. Ltd., New Delhi, 1991
2. M.K. Verma, *News Reporting and Editing*, APH Publishing Corporation, New Delhi, 2009
3. Rangaswami Parthasarathy, *Basic Journalism*, Laxmi Publications, Chennai,2000

Books for Reference:

1. Graham Greer, *A New Introduction to Journalism*,Juta and Co. Ltd., Kenwyn, South Africa, 1999
2. Carole Fleming, et.al., *An Introduction to Journalism*, SAGE Publications Ltd., New Delhi, 2006
3. Barun Roy, *Beginners' Guide to Journalism and Mass Communication,* PustakMahal, Delhi, 2013
4. Tim Harrower, *Inside Reporting, McGraw Hill; 3rd edition, Delhi 2012*

Web Resources :

1. https://www.americanpressinstitute.org/journalism-essentials/what-is-journalism/
2. https://owl.purdue.edu/owl/subject_specific_writing/journalism_and_journalistic_writing/index.html
3. https://dde.pondiuni.edu.in/files/StudyMaterials/PG/MAEnglish/2year/MAEG2003BasicsofJournalism.pdf
4. virtual-institute.us/pr/Crash Course Chpt 1.pdf
5. Essays About 'The Elements of Journalism,' Nieman Reports Summer 2001 (harvard.edu)

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Describe the types and determinants of news.	K1
CO 2	Elaborate the newspaper organization structure.	K2
CO 3	Elaborate the role, qualities, and responsibilities of a reporter.	K2
CO 4	Explain the types of reporting.	K2
CO 5	Discuss the role, qualities, and responsibilities of an editor.	K2

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	3	2	3	2	3
CO 2	3	3	3	3	3	3	2	3
CO 3	3	3	3	3	3	3	3	3
CO 4	3	3	3	3	3	2	3	3
CO 5	3	3	3	3	3	3	3	3
Total	15	15	15	15	14	14	13	15
Average	3	3	3	3	2.8	2.8	2.6	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Total	15	15	15	15	15
Average	3	3	3	3	3

S-Strong (3) M-Medium (2) L-Low (1)

M.A. History

Programme Specific Outcomes (PSO'S) of the PG Programme in History

Programme Outcomes (Pos):

PO1: Problem Solving and Decision-Making Skill

Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. Foster analytical and critical thinking abilities for data-based decision-making.

PO2: Ethical Value

Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities and in conducting one's life.

PO3: Communication Skill

Ability to develop communication, managerial and interpersonal skills.

PO4: Individual and Team Leadership Skill

Capability to lead themselves and the team to achieve organizational goals.

PO5: Employability Skill

Inculcate contemporary business practices to enhance employability skills in the competitive environment.

PO6: Entrepreneurial Skill

Equip with skills and competencies to become an entrepreneur.

PO7: Contribution to Society

Succeed in career endeavors and contribute significantly to society.

PO8: Multicultural competence

Possess knowledge of the values and beliefs of multiple cultures and a global perspective.

Programme Specific Outcomes (PSOs)

PSO1 – Placement

To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.

PSO 2 - Entrepreneur

To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

PSO3 – Research and Development

Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.

PSO4 – Contribution to Business World

To produce employable, ethical and innovative professionals to sustain in the dynamic business world.

PSO 5 – Contribution to the Society

To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

MAPPING OF PROGRAMME-SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Programme Specific Outcomes (PSOs)	P O 1	PO2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8
PSO1	3	3	3	3	3	3	2	3
PSO2	3	2	3	3	3	3	2	2
PSO3	3	2	3	2	2	2	3	3
PSO4	3	3	3	3	3	3	2	2
PSO5	3	3	2	2	2	2	3	2

(3 – Strong) (2 – Medium) (1 – Low)

Semester I

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITC11	**Core Course I**	**History of Ancient and Early Medieval India - Prehistory to 1206 CE**	**6**	**4**
Course Objectives				
1. Explain the sources and the features of Pre and Proto history at the national and regional level 2. Understanding of the social, political and economic life in the Vedic age and the post- Vedic polity and religion 3. An account of Mauryan and Post- Mauryan period 4. The chief features of the Age of Guptas and its legacy 5. Knowledge of the history of the Peninsular India under various dynasties				
Unit-I	Sources: Archaeological Sources – Literary Sources – Foreign Accounts; Prehistoric culture: Palaeolithic – Mesolithic – Neolithic – Distribution – Tools – Life of the people; Proto History – Harappan Civilization: Origin – Chronology – Extent – First Urbanization – Town Planning – Seals and Script – Trade Contacts ;Ancient Tamil Civilization: Adichanallur – Keeladi – Kondagai – Mayiladumparai – Sivagalai			**18 Hours**
Unit-II	Vedic Period: Debate on the original home of the Aryans –Life during Early Vedic Age – Transformation from Early Vedic to Later Vedic Period – Social - Political – Economic; Second Urbanization: Emergence of the Mahajanapadas – Formation of State: Republics and Monarchies – Rise of Urban Centres – Magadha: Haryankas – Sisunagas – Nandas; Intellectual Awakening: Rise of Buddhism and Jainism -their impact on society in India and Abroad; Persian and Macedonian Contacts – Alexander's Invasion and its impact			**18 Hours**
Unit-III	The Mauryan Imperial State: Chandragupta Maurya and his political achievements - Ashoka, his edicts and his policy of Dhamma; Spread of Religion;Mauryan Administration: Kautilya and Arthasastra – Megasthenes; Economy – Mauryan Art and Architecture – Disintegration of the Mauryan Empire; Post Mauryan Political, Economic, Social and Cultural developments: Indo-Greeks – Sakas – Parthians – Kushanas – Western Kshatrapas – Development of Religions – Mahayana; Satavahanas of Andhra: their contribution to art and architecture			**18 Hours**
Unit-IV	Guptas – Polity and Administration – Patronage to Art, Architecture and Literature–Educational Institutions: Nalanda – Vikramashila – Valabhi; Huna Invasion and Decline; Vakatakas: Polity and Economy; Harsha: The assemblies at Prayag and Kanauj - Hiuen-Tsung's account of India			**18 Hours**

Unit-V	Peninsular India: Tamil country up to 12th Century– Chalukyas: some important attainments; Rise of Regional Kingdoms in Northern India up to 12th century: Rashtrakutas,Prathikaras and Palas; Arab conquest of Sind; Campaigns of Mahmud of Ghazni and Muhammad Ghori, and their impact	**18 Hours**

Books for Study

1. Singh, Upinder, *A History of Ancient and Early Medieval India: From the Stone Age to the 12th Century*,

Pearson, Delhi, 2009

2. Chakravarthy, Ranabir, *Exploring Early India up to c. A.D. 1300*, Primus Books, Delhi, 2016

3. Thapar, Romila, *Early India: From the Origins to A.D. 1300*, Penguin, Delhi, 2003(Tamil Translation)

Books for Reference:

1. Kosambi, D.D., *The Culture and Civilization of Ancient India: An Historical Outline*, Vikas Pub. House Pvt.
Ltd., Delhi, 1997
2. Kosambi, D.D., *An Introduction to the Study of Indian History*, Sage Publications, Delhi, 2016
3. Raychaudhuri, Hemchandra, *Political History of Ancient India*, Surjeet Publications, New Delhi, 2014
4. Basham, A.L., *The Wonder that was India, Vol. 1*, Picador, New Delhi, 2004

Web Resources :

1. https://sourcebooks.fordham.edu/india/indiasbook.asp
2. https://www.pbs.org/thestoryofindia/resources/websites/
3. https://archive.org/details/IndiaHistory
4. (407) Abul Fazal - YouTube
5. https://archive.org/details/in.ernet.dli.2015.279506/page/n1/mode/2up

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Knowledge of the Prehistoric sites and the life of early man and appreciate the urban character of Indus Valley Civilization	K1
CO 2	Knowledge of the various theories of origin of Aryans, and their socio-economic life	K1
CO 3	Understand the polity, administration and religious policy of Mauryas and the origin and development of new religions	K2
CO 4	Evaluate the significance of the age of Guptas and Harsha	K5
CO 5	Analyse the history of Peninsular India under various dynasties	K4

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITC12	**Core Course II**	**Socio Cultural History of Tamil Nadu upto1565 CE**	**6**	**4**
Course Objectives				
1. Present the early history of Tamil Nadu 2. Detail the history of Pallavas and their contribution 3. Highlight the impact of the Chola rulers's administration 4. Give an account of the history of Pandyas of Madurai. 5. Explain the society, culture under Madurai Sultanate and Vijayanagara rulers.				
Unit-I	Sources of the History of Tamil Nadu – Ancient Tamil Civilization - Sangam Literature – Concept of Tinai– Social and Economic life –Roman Trade Contacts and their impact – Religious life– Murugan and Korravai – Nadukal		**18 Hours**	
Unit-II	Pallavas: Origin, history and contribution to South Indian culture –Socio-religious condition – Bhakti Movement and theState – Growth of Saiva and Vaishnava Traditions – Institution of Temple – Art and Architecture – Education: Ghatikas – Literature		**18 Hours**	
Unit-III	Imperial Cholas: Socio- religious condition – Local Self Government and Village Autonomy – Landholding System and Society – Economic Life – Art and Architecture – Overseas expansion and cultural impact		**18 Hours**	
Unit-IV	Pandyas of Madurai: Social Classes –Religion: Saivism and Vaishnavism – Art and Architecture: Later Pandyas, Marco Polo's Account – Society: Valangai and Idangai– Religion –		**18 Hours**	

	Art and Architecture: Madurai Meenakshi Temple – Religion: Mathas – Saivasiddhantam and Virsaivism	
Unit-V	Society and Culture under the Madurai Sultanate – Vijayanagar Empire – Krishnadeva Raya – Royal Patronage of Literature, Art and Architecture – Social Life – Position of Women	**18 Hours**

Books for Study

1. Karashima, Noboru, *A Concise History of South India: Issues and Interpretations,* OUP, New Delhi,

2014

2. Subramanian, N., *Social and Cultural History of Tamilnadu (upto 1336 A.D.), 2011*

3. Dr. C. Manoranjithamoni, *History of Tamil Nadu upto 1565 A.D*, Dave -Beryl Publications, Tirunelveli, 2018.

Books for Reference:

1. Kanakasabhai,V., *The Tamils Eighteen Hundred Years Ago,* The South India SaivaSiddhantha Works

Publishing Society, Tinnevelly, 1956.

2. Pillay, K.K., *Historical Heritage of the Tamils,* MJP Publishers, Chennai, 2008

3. Sastri, K.A.Nilakanta, *The Colas,*University of Madras, Madras, 1955

4. Sastri, K.A.Nilakanta, *A History of South India: From Prehistoric Times to the Fall of Vijayanagar,*

OUP, Chennai, 1997

Web Resources :

1. https://www.tn.gov.in/tamilnadustate
2. https://diksha.gov.in/tn/
3. https://www.thepeninsula.org.in/2020/08/05/trade-during-the-sangam-age-exploring-the-sangam-literature-and-keezhadi-excavations/
4. https://www.britannica.com/topic/Pallava-dynasty
5. https://www.mintageworld.com/history/detail/153-Sultans-of-Madura/

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	detail the early history of Tamil Nadu	
CO 2	give an account of the history of Pallavas and their contribution	
CO 3	highlight the impact of the Cholarulers's administration	
CO 4	present an account of the history of Pandyas of Madurai	

CO 5	explain the society and culture under Madurai Sultanate and Vijayanagara	

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITC13	**Core Course III**	**History of World Civilizations (Excluding India)**	**5**	**4**

Course Objectives

1. Explain the concepts of civilization and culture and brief history of Pre- historic period
2. Present different features of variousancientcivilizations
3. Explain the main West Asian civilizations
4. compare the features of Chinese and Japanese civilizations
5. studyand compare Greek and Roman Civilizations

Unit-I	Introduction – Definition of Civilization – Comparison between Culture and Civilization – Origin and Growth of Civilizations – Pre – historic Culture – Palaeolithic and Neolithic period Culture – rivers, resources and civilizations	**15 Hours**
Unit-II	The role of environment – the invention of writing – Mesopotamian Civilization – Sumerian –Babylonian – Life under Hammurabi – the Kassite interlude – Egyptian and the Age of Pharaohs – the rise of the Hittites and their greatness –	**15 Hours**

	The fall of empires and survival of cultures	
Unit-III	The evolution of Jewish religion – the power of Assyria – Assyrian rule and culture – Chaldean Babylonia – The rise of Persia – the coming of the Medes and Persians – Zarathustra – Persia's World Empire.	**15 Hours**
Unit-IV	China's Classical Age – the Zhou dynasty – Age of Confucius and his followers – the Qin unification – the glory of the Han Dynasty – contribution to the World – development of Art and Architecture – Religion and Science – Japanese Civilization and Culture – Maya, Aztec and Inca Civilizations	**15 Hours**
Unit-V	Greek Civilization – the Minoans and Mycenaeans – Homer- the Heroic Past – the Polis – Sparta – Athens – the Age of Pericles – the spread of Hellenic civilization – the Greeks and the opening of the East – Hellenic Religion, Science and philosophy – The Roman republic – the PaxRomana – Administration and expansion under Augustus	**15 Hours**

Books for Study

1. Will Durant, The Story of Civilization I and II (Simon and Schuster, New York, 1966)
2. Gokale, B.K, Introduction to Western Civilization, S.Chand& Company, New Delhi, 1999.
3. Manoj Sharma, History of World Civilization, Anmol Publication Pvt.Ltd, New Delhi, 2005.

Books for Reference:

1. Judd, G.P, History of Civilization, Macmillan, New York, 1966
2. Rebello , World Civilization – Ancient and Medieval, Part II, Mangalore, 1969
3. Scarre C. and Brian Fagan, Ancient Civilizations, New Jersey: Pearson, 2008.
4. Finley M.I, Ancient Slavery: Modern Ideology, London: Chatto and Windus 1980.

Web Resources :

1. https://www.worldhistory.org/civilization/
2. https://www.historyworld.net
3. https://www.ancienthistorylists.com
4. **https://ddceutkal.ac.in/Syllabus/MA_History/Paper_1_Ancient_Civilisations_N.pdf**
5. **https://web.ung.edu/media/university-press/World%20History%20Textbook-082817.pdf**

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	compare the concepts of civilization and culture and brief history of pre- historic period	
CO 2	understandthe significant features of Mesopotamian, Sumerian and Egyptian civilizations	

CO 3	study about origin and growth of river valley civilizations	
CO 4	describe the features of Chinese and Japanese civilizations	
CO 5	explain the contributions of Greek and Roman civilizations	

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITC14	**CORE COURSE IV**	**MUSLIMS CONTRIBUTION TO HUMANITY**	**5**	**4**

Course Objectives

1. To explain the importance of education in Islam and Abbasid contribution to culture and science.
2. To identify the contribution of Muslims to Medicine and Hospitals.
3. To study the contribution of Muslims to PhysicalSciences.
4. To study the contribution of Muslims to Mathematics and Astronomy.
5. To know the progress of Humanities and Social Science.

Unit-I	**The Glorious period of Islamic Civilization**:Introduction – Education in Islam – Branches of the studies in Quran – Preservation of Ancient Literature by the	**15 Hours**

	Abbasids –Contribution of Arabs to the Cultural and Scientific Developments – Role of Public Libraries	
Unit-II	**Medicine and Hospitals:**Tibb-i-Nabawi (Medical Guidance of the Prophet Muhammed PBUH)– Ibn Sina (Avicenna) – Abu Al-Jarrah – Al-Razi – Ali Ibn Al-Abbas – Al-Zahravi – Al-Tabari – Abbas Ibn Firnas – Ibn Al-Nafis – Al-Kindi – Al-Walid – Bimaristan(Hospital)	**15 Hours**
Unit-III	**Physical Sciences**:Chemistry – Physics – Botany – Zoology – Jabir Ibn Hayyan – Zakriya Al-Razi – Imam Jafar as Sadiq – Abul Qasimi – Al-Kindi – Al-Hasan Ibn Al-Haytham Ibn Nahsiyah – Al Asmai – Al-Jahiz	**15 Hours**
Unit-IV	**Astronomy and Mathematics**:Al-Khawarizmi – Al-Farghani – Ibn Younus – Ibn Al-Shatir – Al-Biruni – Ibn Al-Haytham – Omar Khayyam	**15 Hours**
Unit-V	**Social Science:**Al-Masudi – Al-Kindi – Ibn Al-Jazzar – Al-Tamimi – Al-Masihi – Ali Ibn Ridwan – Muhammad Al-Idrisi – Ahmed Ibn Fadlan–Ibn Khaldun	**15 Hours**

Books for Study

1. Dr. Major Syed Shahabuddeen, Islamia Varlarum Panpadum (Tamil), Ahmed Patipagam, Vaniyambadi,
2001
2. Dr. Major Syed Shahabuddeen, Muslims Contribution to Humanity, Vijay Nicole Imprints Pvt. Ltd.,
Chennai,2016
3. Prof. K. Ali, A Study of Islamic History, Idarah-i-Adabiyat, Delhi, 1950

Books for Reference:

1. Browne, E.G., *History of Arabian Medicine*, Cambridge University press,1921.
2. Haskins, C. H.,*Arabic Science in Western Europe*, The University of Chicago Press, Chicago, 1925.
3. Syed Ameer Ali, *The Spirit of Islam*, New Delhi, 1922.

4. Philip K. Hitti, *History of the Arabs*, MacMillan, London, 1970

E-Resources:

1.https://www.khanacademy.org/humanities/world-history/medieval-times/cross-cultural-diffusion-of-knowledge/a/the-golden-age-of-islam

2. https://ia801204.us.archive.org/14/items/TibENabi1/Tib-e-nabi-%20(1).pdf

3. https://www.britannica.com/biography/al-Razi

4. https://files.eric.ed.gov/fulltext/EJ854295.pdf

5. https://www.islamawareness.net/Science/science_article010.html

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Identify the importance of science as discussed in Quran.	K1
CLO2	Summarise the contribution of Muslims to the field of Medicine.	K2
CLO3	Evaluate the role of Muslim scientist in the field of Physical sciences.	K5
CLO4	Articulate the services of Muslim scientists to Astronomy and Mathematics.	K3
CLO5	Illustrate the influences of Muslim social scientists on Historiography.	K4

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	3	2	3	3	3
CO 2	3	3	2	2	3	2	3	3
CO 3	3	3	2	2	3	2	3	3
CO 4	3	3	2	2	3	2	3	3
CO 5	3	3	3	3	3	2	3	3
Total	15	15	12	12	14	11	15	15
Average	3	3	2.4	2.4	2.8	2.2	3	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	3	3	3	3
CO 2	3	3	3	2	3
CO 3	3	3	3	2	3
CO 4	3	3	3	2	3
CO 5	3	3	3	2	3
Total	14	15	15	11	15
Average	2.8	3	3	2.2	3

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITE11	**DISCIPLINE CENTRIC ELETIVE I**	**Freedom Struggle in Tamil Nadu**	**4**	**2**

Course Objectives

1. To present the early resistance to colonial rule
2. To detail the factors for the emergence of national consciousness and the role of socio-political organisations
3. To explain the activities of Indian National Congress in Tamil Nadu under various rulers; also, the role of national press
4. To detail the activities of moderate and revolutionary leaders and the impact of Gandhi
5. To point out the role of Tamil Nadu in the latter phase of the freedom struggle

Unit-I	Poligar Revolt – PuliThevan – VeeraPandiyaKattabomman – VeluNachiyar – Marudu Brothers – South Indian Rebellion – Vellore Revolt of 1806 – Causes – Course – Impact	**12 Hours**
Unit-II	Emergence of Nationalist Consciousness –Socio - Political Organizations – Madras Native Association – Madras MahajanaSabha- Impact of Gandhi Visit Tamil Nadu	**12 Hours**
Unit-III	Press and Nationalism – The 'Hindu', Swadesamitran, New India, Dinamani, India (edited by Bharathi), Swarajya-; Salem Desabhimani – Desabhaktan- Sooryodhayam- - Vijaya- Chakravardhini- BalaBharatham- Nava Sakthi – Swantira changu.	**12 Hours**
Unit-IV	Moderate Phase and Extremist Phase –Swadeshi Movement in Tamil Nadu – G.SubramiayaIyer-V.O. Chidamabaram – SubramaniaBharathi – KadalurAnjaliammal- SoundaramAmmayar. Revolutionary Movement in Tamil Nadu – Vanchinathan– TirupurKumaran - Subramania Siva – NeelakantaBrahmmachari	**12 Hours**
Unit-V	Impact of Gandhi –Role of Rajaji – Vedaranyam March – S. Satyamurthi Quit India Movement in Tamil Nadu – K.Kamaraj- Participation of Tamils in Indian National Army – Popular Participation of Tamils	**12 Hours**

Books for Study

1. Rajayyan, K.: South Indian Rebellion, The First War of Independence,1800- 1801.
2. Rajendran, N.K.: The National Movement in Tamil Nadu, 1905-1914: Agitational Politics and State Coercion
3. G. Venkatesan, History of Indian Freedom Struggle

Books for Reference:

1. Narasimhan V.K.: Kamaraj – A Study
2. Sundarajan, Saroja. : March to Freedom in Madras Presidency, 1885-1915.
3. Suntharalingam, R. : Politics and Nationalist Awakening in South India,1852-1891.
4. **Subramanian.N History of Tamilnadu Vol.2**

Web-Resources:

1. https://www.indiaculture.nic.in/sites/default/files/pdf/Martyrs_Vol_5_06_03_2019.pdf
2. https://www.youreducationportal.com/freedom-fighters-of-tamil-nadu/
3. https://gascnagercoil.in/wp-content/uploads/2020/12/Core-8-History-of-Tamilnadu-1800-1967-AD-III-Semester-converted.pdf
4. http://kamarajcollege.ac.in/Department/History/II%20Year/004%20Core%208%20-%20History%20of%20Tamilnadu%20(1800%20-%201967%20A.D.)%20-%20III%20Sem.pdf
5. https://www.researchgate.net/publication/330752612_Monograph_on_Women_freedom_fighters_in_Tamil_Nadu/link/608b6bb6299bf1ad8d68eebf/download

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) **M-Medium (2)** **L-Low (1)**

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITE12	DISCIPLINE CENTRIC ELETIVE I	Indian Art and Architecture	4	2

Course Objectives

1. Detail the art and architectural forms during the Harappan and Mauryan periods
2. Explain the impact of Buddhism on art forms
3. Discuss the evolution of art and architecture under Pallavas and the Cholas
4. Highlight the features of Islamic architecture particularly under Mughlas
5. To point out the salient features of colonial architecture

Unit-I	Pre-Historic Art - Harappan Art: Seals, Sculptures: Stone and Metal - Harappan Architecture: Fortification, Town Plan, Public Buildings - Mauryan Art: Chaityas – Viharas - Stupas - Asokan Pillars	**12 Hours**
Unit-II	Hinayana Phase of Buddhist Art – Mahayana Phase of Art: Gandhara School of Art – Mathura School of Art-Amaravathi School of Art- Gupta Art and Architecture – Ajanta and Ellora – Jaina Art: Jaina beds – Shravanabelagola	**12 Hours**
Unit-III	Pallava Art: Rock Cut Cave Temples, Monolithic Temples - Structural Temples – Mahabalipuram - Nagara Style of Architecture: Lingaraja Temple (Bhubaneshwar), Sun Temple(Konarak) - Dravida Style of Architecture: Brihadeeswara Temple, Thanjavur – Gangaikondacholapuram – Airavatesvara Temple, Darasuram - Vesara Style of Architecture: Chennakesava Temple(Belur), Hoysaleswara Temple(Halebidu).	**12 Hours**
Unit-IV	Islamic Art:Mosques, Mausoleums, Palace complexes, Gardens - Quawwat-ul-Islam Mosque – QutubMinar - Mughal Art and Architecture: Humayun's Tomb – FatehpurSikri, -Red Fort- TajMahal - Mughal Paintings	**12 Hours**
Unit-V	Colonial Architecture: Forts: St. George Fort, Chennai – Indo-Saracenic Architecture: ChatrapatiShivaji Terminal, Mumbai – Victoria Memorial, Kolkata – Amir Mahal and Senate House, University of Madras, Chennai	**12 Hours**

Books for Study

1. Craven, Roy, A concise history of Indian Art,Thames and Hudson; London; 1976
2. Hardy, Adam, The Indian Temple Architecture, Abhinav Publications, 2002
3. Tomory, Edith, A History of Fine Art in India and the West,OrientBlackSwan; Reprinted edition (1989)

Books for Reference:

1. Banerjee.J.N., Development of Hindu Iconography,MunshiramManoharlal; 3rd edition,2002
2. Coomaraswamy.A.K., History of Indian and Indonesian Art, Kessinger Publishing, LLC,2003
3. Deva,Krishna , Temples of North Indian National Book Trust, 2002

4. Gupta.R.S., Iconography of the Buddhist, Hindu and Jain, StosiusInc/Advent Books Division; Subsequent edition,1980

Web Resources :

1. https://ia600406.us.archive.org/25/items/indianarchitectu00have/indianarchitectu00have.pdf
2. https://ignca.gov.in/Asi_data/18060.pdf
3. https://www.culturalindia.net/indian-architecture/colonial-architecture.html
4. https://www.jainfoundation.in/JAINLIBRARY/books/iconography_of_hindus_buddhists_and_jains_011008_std.pdf
5. https://indianculture.gov.in/ebooks/history-fine-arts-india-and-west

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Explain the various forms of Indus and Mauryan Art.	K1
CO 2	Compare and contrast the Gandhara and Mathura Schools of Art.	K4
CO 3	Examine the similarities and differences between temple architectural styles.	K5
CO 4	Discuss the relation between the five pillars of Islam and Islamic architecture.	K6
CO 5	Appreciate the features of colonial architecture	K3

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITE13	**GENERIC ELETIVE II**	**Administrative History of Tamil Nadu**	**4**	**2**

Course Objectives

1. To examine the administration of Justice party
2. To highlight the achievements of Congress rule
3. To explain the major achievements of governments after 1967
4. To point out working of governments under AIADMK party
5. To highlight the cumulative impact since independence

Unit-I	Justice Party- A.SubbarayuluReddiyar- Raja of Panagal- P.Subbarayan – Raja of Bobbili - achievements- reservation- Communal GO- creation of staff selection board- right to vote for women- regulation of temples- mid –day meal scheme.	**12 Hours**
Unit-II	Congress rule: C.Rajagoplachari - K. Kamaraj - M.Bhakhthavatsalam- achievements: free mid-day meal scheme- opening of new schools- Increase in irrigation facilities- industrial growth.	**12 Hours**
Unit-III	DMK administration-C.N Annadurai- renaming of Madras state as Tamil Nadu-Two language policy- free education for all till P.U.C -Kalaignar M Karunanithi-Slum clearance board-beggar rehabilitation scheme- Formation of Backward Class Commission- implementation of reservation policy - Salem Steel plant - ManuNeethiThittam- Free electricity for farmers- property rights to women; creation of universities-33 percent reservation for women in local body elections-30percent reservation for women in government jobs- Samathuvapuram scheme- Tidel park- financial assistance for marriage of poor girls- increase of infrastructure-Industrial development.	**12 Hours**
Unit-IV	AIADMK administration: MGR-Nutritious Meal scheme- educational reforms -introduction of Plus Two in Higher Secondary schools- Krishna water project-establishment of new universities-Tamil University at Tanjore-Mother Teresa university at kodaikkanal- J.Jayalalitha -welfare measures- AmmaUnavagam - free laptop for students- Cradle Baby Scheme- infrastructure development- rain water harvesting.	**12 Hours**
Unit-V	Policies and programmes– economic- social and demographic impact.	**12 Hours**

Books for Study

1. Rajaram .P The justice Party:A Historical Perspective,1916-1937
2. Venkatesan.G.TharkalaThamizhagaVaralaru(Tamil)
3. Narasimhan.V.K., Kamaraj A Study

Books for Reference:

1. SandhyaRavishankar.,Karunanidhi: A Life in Politics
2. Vasanthi., A Lone Empress:A Portrait of Jayalalitha
3. Subramanian.N History of Tamilnadu Vol.2
4. Narayanan.S, The Dravidian Years

Web Resources :

1. www.jetir.org
2. https://www.inc.in
3. https://dmk.i
4. http://kamarajcollege.ac.in/Department/History/II%20Year/004%20Core%208%20-%20History%20of%20Tamilnadu%20(1800%20-%201967%20A.D.)%20-%20III%20Sem.pdf
5. https://www.researchgate.net/publication/330752612_Monograph_on_Women_freedom_fighters_in_Tamil_Nadu/link/608b6bb6299bf1ad8d68eebf/download

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Appreciate the administration of Justice Party	
CO 2	Evaluate the Congress Administration	
CO 3	Interpret DMK administration	
CO 4	Compare AIADMK administration	
CO 5	Assess the impact of various administrations	

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2

Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITE14	**GENERIC ELETIVE II**	**Cultural Heritage of India**	**4**	**2**

Course Objectives

1. explain the meaning and the concepts of the course title and the dynamism inherent in its evolution, using, initially, Harappan and Vedic Ages
2. highlight the massive impact of religions on culture with examples drawn from Jainism and Buddhism
3. throw light on the importance of Royalty and it's patronage on cultural transformation
4. analyse the impact of Islam and the Muslim rulers on the emergence of new forms and motifs in Indian Art and architecture
5. critically evaluate the colonial compulsions and consequential impact on Indian Art and Architecture

Unit-I	Meaning of Culture, Heritage – linkages- dynamism - Evolution and continuities -Indian Culture in the Harappan and Vedic Ages	**12 Hours**
Unit-II	Religious ferment in the Sixth century B.C- Jainism and Buddhism and their impact on Art, Architecture and literature	**12 Hours**
Unit-III	Royal Patronage and the radical transformation of Indian Art and Architecture; Mauryan and Gupta eras – Bhakti Movement	**12 Hours**
Unit-IV	Advent of Islam –Sufi Movement – Emergence of new forms and motifs in Indian Art and Architecture – Literature during medieval period	**12 Hours**
Unit-V	Colonial Rule and the westernisation of Culture - Amalgamation of the old and new artforms. Education and the enduring legacy of the colonial rule – Impact of Western Literature	**12 Hours**

Books for Study

1. Luniya, B.N. : Evolution of Indian Culture
2. Wolport, S. : Introduction to India
3. Hussain, S.A. : The National Culture of India

Books for Reference:

1. Brown, Percy : Indian Architecture – Buddhist and Hindu, Vol. I
2. Coomaraswamy, A.K.: History of Indian and Indonesian Art

3. Kramrish, Stella : Art of India
4. Poande, Susmita: Medieval Bhakti Movement

Web Resources :

1. https://indiaculture.gov.in
2. https://www.india.gov.in
3. http://www.intach.org
4. https://www.exoticindiaart.com
5. https://www.ccrtindia.gov.in

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Explain the concepts and the dynamism involved in the Evolution of culture	K2
CO 2	Describe critical role of religions in the growth of Art and architectural forms	K4
CO 3	Examine the importance of Royal patronage for the progress of various art forms	K3
CO 4	Appreciatethe advent of new art forms	K3
CO 5	Explain the role of British colonialism and its compulsions in the introduction of syncretic art forms	K3

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

SEMESTER II

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITC21	**CORE COURSE V**	**History of Medieval India - 1206 - 1707 CE**	**6**	**5**

Course Objectives

1. Examine the establishment of centralized monarchy
2. Evaluate the contributions of AlauddinKhalji and Muhammad bin Tughlaq
3. Analyse the Mughal religious and Deccan policy.
4. Outline the advancements in art and architecture
5. Explain the economic and socio-cultural life in medieval India

Unit-I	**Establishment of the Delhi Sultanate:**QutbuddinAibak and Iltutmish — *Iqta*System - Centralised Monarchy: Sultana Raziya and Period of Instability -Age of Balban- *Chihalgani*- Theory of Kingship –Reorganisation of the Government - Mongol Threat - Internal Restructuring and Territorial Expansion –Jalaluddin and AlauddinKhalji's approaches to the State – Changes among the ruling Classes –Conquest and Annexation.	**18 Hours**
Unit-II	**Problems of a Centralized State:** Ghiyasuddin and Muhammad bin Tughlaq– Administrative and Political Measures – Economic and Agrarian Reforms – Token Currency Transfer of Capital- FirozTughlaq- Economic reforms- Military Expeditions - Impact of Sayyids and Lodis; Administration under the Delhi Sultanate	**18 Hours**
Unit-III	**The Foundation of Mughal Empire:** Central Asian experience of Babur - India on the eve of Babur's invasion– Struggle for empire in North India – Significance of the Afghan despotism- Rise of Sher Shah Sur; **Expansion and Consolidation**– Political phase of Akbar; new imperial system and administration; the Mughal nobility, Mansabdari system- Jagirdari system– NurJahan Junta – The Mughals and the North-Western frontier – Shah Jahan and his contribution.	**18 Hours**
Unit-IV	**Ideology and State in Mughal India:** Akbar's imperial agenda - Suhl-i-kul – Akbar's religion - Din ilahi; Aurangzeb's relation with religious groups and institutions.; Mughal-Rajput Relations – Mughal administration-**:** Aurangzeb - the Imperial elite- Deccan wars- Rise of Marathas under Shivaji- Popular revolts within the Mughal empire – Decline of the Mughal empire.	**18 Hours**
Unit-V	**Economic and Socio-Cultural Life in Medieval India:** Economy: Agricultural Production, Village Society and the Revenue System – Trade-– relations with the Europeans- Society- Ruling Classes, Merchants, Artisans and Slaves – Caste, Customs and Women – Religious Ideas and Beliefs- The Sufi Movement– The Bhakti Movement in North India – Culture- Architecture – Literature – Fine Arts – Music.	**18 Hours**

Books for Study

1. Chand, Tara, *Influence of Islam on Indian Culture*, Indian Press, 1954.

2. Chandra, Satish, *Medieval India: From Sultanate to the Mughals*,Har-Anand Pub., Delhi, 1998.

3. Habib, Mohammad and K.A. Nizami, *Comprehensive History of India: The Delhi Sultanate (A.D. 1206-1526)*, People's Publishing House, Delhi, 1970.

Books for Reference:

1. Ali, Athar. M., *Mughal India, Studies in Polity, Ideas, Society and Culture*, OUP, New Delhi, 2007

2. Chandra, Satish, *Essays on Medieval Indian History*, OUP, New Delhi, 2005

3. Habib, Mohammed and IrfanHabib, ed., *Studies in Medieval Indian Polity and Culture: The Delhi Sultanate and its Times*, OUP, New Delhi, 2016

4. Habibullah, A.B.M., *The Foundation of Muslim Rule in India*, Central Book Depot, 1967

Web Resources :

1. Medieval Indian History - Quick Guide | Tutorialspoint
2. (முகலாயப் பேரரசு I (tamildigitallibrary.in)
3. (முகலாயப் பேரரசு II (tamildigitallibrary.in)
4. https://indiaolddays.com
5. A forgotten empire (tamildigitallibrary.in)

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Understand the establishment of centralized monarchy	K2
CO 2	Evaluate the contributions of Alauddin Khalji and Muhammad bin Tughlaq	K5
CO 3	Analyze the religious and Deccan policy of Mughals .	K4
CO 4	Outline the advancements in art and architecture	K1
CO 5	Understand the facets of economic and socio-cultural life in Medieval India	K2

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S-Strong (3) M-Medium (2) L-Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S-Strong(3) M-Medium (2) L-Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITC22	**CORE COURSE VI**	**Socio Cultural History of Tamil Nadu - 1565 – 2000 C.E.**	**6**	**5**

Course Objectives

1. Narrate the social condition during the Nayak period.
2. Describe the contributions of Marathas to the culture of the Tamil region.
3. Analyse the Contribution of Sethupathis of Ramnad to Tamil society.
4. Appreciate the Growth of Western Education.
5. Examine the contribution of Dravidian movement to social transformation.

Unit.I	The Nayaks of Madurai – ThirumalaiNayak – the Nayaks of Senji – The Nayaks of Tanjore – social and cultural condition under the Nayaks – contribution of Nayaks to art and architecture and Tamil culture.	**18 Hours**
Unit.II	Tamilagam under Marathas – Society: caste system – status women – achievements of Raja Serfoji – Literature under the rule of Tanjore Marathas – SaraswathiMahal Library – Development of Art and Architecture under the Marathas.	**18 Hours**
Unit.III	The Marava country and the Sethupathis of Ramnad – society cultural contribution; Administration of the Nawabs – village administration – society – famines and diseases – status of women – economic and religious life – Social Impact of the Europeans; Religion: Saivism: St.Ramalinga. Vaishnavism: the Schism.	**18 Hours**
Unit.IV	Christianity: Policy of the Company. growth and	**18 Hours**

	impact. Introduction of Western education – Government education Professional and Technical education– Female education.	
Unit.V	Emergence of Administrative and Professional Elites – Justice Party and Non - Brahmin Movement – E.V.R, a social reformer – Self Respect Movement - Contribution of Dravidian Movement to social transformation – socio - cultural impact of the Dravidian parties.	**18 Hours**

Books for Study

1. Jagadeesan, P, *Marriage and Social Legislations in Tamil Nadu,* Elatchaiappan Pub., 1990
2. Sastri, V.S. Ramasamy, *The Tamils, The People, Their History and Culture in 5 Volumes*, Cosmo Pub., New Delhi, 2002
3. Prof. J. Dharmaraj, *Tamil Nadu History from Sangam Age to 2015 A.D,* Tenssy Publications, Sivakasi, 2015.

Books for Reference:

1. KrishnaswamyDr.A. : The Tamil country under Vijayanagar
2. Rajayyan Dr.K : History of Tamil Nadu (1565 – 1982)
3. Subramanian N : History of Tamil Nadu Vol.II
4. Varghese JeyarajS : Socio Economic History of Tamil Nadu

Web Resources :

1. https://archive.org/stream/in.ernet.dli.2015.65475/2015.65475.Social.And.Cultural.History.Of.Tamil.Nadu_djvu.txt
2. https://www.tnarch.gov.in/Library%20BOOk%20PDF/The%20Cultural%20Heritage%20of%20Tamilnadu.pdf
3. https://www.jetir.org/papers/JETIR1805898.pdf
4. https://www.wikiwand.com/en/Christianity_in_Tamil_Nadu
5. https://researchgate.net/publication/343229727_DRAVIDIAN_MOVEMENT_Adi_Dravida_Movement_Justice_Party_Self-Respect_Movement

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Narrate the social condition during the Nayak period	K2
CO 2	Evaluate the contributions of Marathas to the culture of the Tamil region	K5
CO 3	Analyse the Contribution of Sethupathis of Ramnad to Tamil society.	K4
CO 4	Appreciate the Growth of Western Education	K3
CO 5	**Assess** the contribution of Dravidian movement to social transformation	K5

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S.Strong (3) M.Medium (2) L.Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S.Strong(3) M.Medium (2) L.Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITC23	**CORE COURSE VII**	**Historiography and Historical Methods**	**6**	**4**

Course Objectives

1. To explain the concepts related to history and its relationship with other disciplines; y
2. To discuss various philosophies and interpretations of history
3. To explain the processes and procedures involved in the conduct of historical research
4. To examine the evolution of historical writing in the West
5. To examine the contribution of various historians to the development of Indian historiography

Unit.I	Meaning, Nature and Scope of History – Kinds of History and Allied Subjects – Lessons of History; Uses and Abuses of History – Role of Individuals, Role of Institutions and Role of Ideas in History	**18 Hours**
Unit.II	Philosophy of History – Positivist History – Marxist Interpretation of History – Annales Paradigm – Subaltern History – Subjectivity and Need for	**18 Hours**

	Objectivity in History	
Unit.III	Historical Research: Pre.requisites of a Researcher – Choice of Topic – Review of Literature – Hypothesis – Sources of History– External and Internal Criticism of Sources– Collection of Data, Synthesis, Exposition and Writing – Use of Footnotes and preparation of Bibliography	**18 Hours**
Unit.IV	Development of Historical writing in the West – Herodotus,Thucydides, St. Augustine, IbnKhaldun, L.V. Ranke, Arnold Toynbee,E.H. Carr, FernandBraudel, E.P. Thompson, Eric Hobsbawm	**18 Hours**
Unit.V	Historians of India – V.A. Smith, D.D. Kosambi, RomilaThapar, JadunathSarkar,Bipan Chandra, RanajitGuha, K.A. NilankantaSastri, R. SathianathaAyyar, S. KrishnaswamiAyyangar, C.S. Srinivasachari,K.K. Pillai	**18 Hours**

Books for Study

1. Ali, Sheik, *History: Its Theory and Method*, Laxmi Publications, 2019
2. Carr, E.H., *What is History?*, Penguin Books Ltd., New Delhi, 2018.
3. Manikam, S., *On History & Historiography*, Padumam Publishers, Madurai

Books for Reference:

1. Bloch, Marc, *The Historian's Craft*, Aakar Books, Delhi, 2017
2. Collingwood, R.G., *The Idea of History*, OUP, Delhi, 1994
3. Dray, W.H., *Philosophy of History*, Prentice.Hall, New Jersey, 1964
4. Jenkins, Keith, *Why History? Ethics and Postmodernity*, Routledge, London, 1999

Web Resources :

1. https://edwardseducationblog.files.wordpress.com/2013/07/historical.method.pdf
2. http://ndl.ethernet.edu.et/bitstream/123456789/79254/3/History..%20Research%20Metholog y%20in%20writing%20steps.pdf
3. https://www.britannica.com/biographies/history/history

4.Historiography - Critical Analysis, Sources, Interpretation | Britannica

5.Historiography | Definition, History, Branches, & Methodology | Britannica

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Explain the meaning and scope of history	K2
CO 2	Outline the various theories and philosophical approaches to history	K1
CO 3	Undertake historical research	K1
CO 4	Analyse the contributionof western historians	K4

CO 5	Highlight the historical writings of important Indian historians	K2

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S.Strong (3) M.Medium (2) L.Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S.Strong(3) M.Medium (2) L.Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITE21	**DISCIPLINE CENTRIC ELECTIVE III**	**HISTORY OF JOURNALISM**	**4**	**3**

Course Objectives

1. To explain the origins and the role of press in social awakening
2. To present the role of the press in the freedom movement
3. To explain the government reaction to the role of the press
4. To present the role of prominent personalities for the growth of journalism
5. To explain the contribution of various newspapers

Unit.I	The Origin of Press: Invention of Printing Press – Gutenberg Press – Role of Printing in evolution of modern newspapers; Growth of newspapers in India: Hickey's Gazette, Early journalism in Bengal, Bombay and Madras presidencies.	**12 Hours**
Unit.II	Growth of Press and Indian Independence Movement; Role of Newspapers in Indian Freedom struggle; Contribution of Anglo.Indian and	**12 Hours**

	Nationalist Press to the field of Journalism in India; Role and responsibility of press in Modern India	
Unit.III	Government and the press: reaction and regulation – Press laws	**12 Hours**
Unit.IV	Contribution of Eminent Personalities to Indian Journalism: BalaGangadharaTilak – Gandhi – – S. Sadanand; Contributions of Eminent personalities to Tamil journalism. G. SubramaniaIyer. Peiryar.Aditanar. Kalaignar	**12 Hours**
Unit.V	Contribution of Important News Papers: AmritBazarPatrika, The Times of India – The Hindu; Contemporary News Papers in Tamil. Dinamani. DhinaThanthi.Dinamalar.Dinakaran. Viduthalai.Murasoli	**12 Hours**

Books for Study

1. MohitMoitra: A History of Indian Journalism; National Book Agency.
2. J. Natarajan: History of Indian Journalism; Publication Division
3. J.N. Basu: Romance of Indian Journalism; University of Calcutta

Books for Reference:

1. Nadig Krishna Murthy : Indian Journalism, Mysore University Press
2. . R. Parthasarathi: Modern Journalism in India. Sterling Publishers.
3. J. V. SeshagiriRao. Studies in the history of journalism
4. Rangaswami Parthasarathy, *The History of Journalism in India*

Web Resources :

1. https://www.publicationsdivision.nic.in/index.php?route=product/product&product_id=2150
2. https://www.epw.in/system/files/pdf/1955_7/11/the_story_of_the_indian_press.pdf
3. https://www.studocu.com/in/document/aligarh.muslim.university/modern.indian.history/growth.of.press.in.india/21000143
4. The elements of journalism - American Press Institute
5. ttps://archive.org/stream/in.ernet.dli.2015.149341/2015.149341.A-History-Of-Indian-Journalism_djvu.txt

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Understand the origins and the and role of press in social awakening	K2
CO 2	Analyse the role of the press in the freedom movement at the national level	K4
CO 3	Evaluate the government reaction to the role of the press	K5
CO 4	Remembering the role of prominent personalities for the growth of journalism	K1
CO 5	Understand the contribution of various newspapers	K2

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S.Strong (3) M.Medium (2) L.Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S.Strong(3) M.Medium (2) L.Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITE22	**DISCIPLINE CENTRIC ELECTIVE III**	**International Migrations and Diasporic Studies**	**4**	**3**

Course Objectives

1. Explain the theories of international migrations and diaspora
2. Outline the position of Indian diaspora worldwide
3. Examine the issues of identity among the Indian diaspora
4. Evaluate the policies towards diaspora
5. present the perspectives of sending and receiving countries

Unit.I	**International Migrations** Theories of International Migrations – History of International Migration – Ethnicity and Gender in International Migrations	**12 Hours**
Unit.II	**Theories of Diaspora** Definitions and Theories of Diaspora – Major Diasporas: Jewish, African, Chinese and Indian – Globalisation and Diaspora	**12 Hours**

Unit.III	**The Indian Diaspora: A Survey** The Indian Diaspora in South East Asia – The Indian Diaspora in Africa and the Caribbean – The Indian Diaspora in North America, Europe and Australasia	**12 Hours**
Unit.IV	**Issues of Identity in the Indian Diaspora** Religion and Caste – Language and Culture – Institutions and Associations	**12 Hours**
Unit.V	**Indian Diaspora and Policy Perspective** Sending Country's Perspective – Receiving Country's Perspective	**12 Hours**

Books for Study

1. Stephen Castles and Mark J. Miller. 1998. *The Age of Migration: International Populations*
Movements in the Modern World. London: Macmillan.
2. Ajaya Kumar Sahoo and BrijMaharaj (eds.), *Sociology of Diaspora: A Reader*, New Delhi: Rawat
Publications.
3. Cohen, Robin 1997. *Global Diaspora: An Introduction*. London: UCL Press.

Books for Reference:

1. Lal, Brij V., Peter Reeves and Rajesh Rai (eds.). 2007. *The Encyclopedia of the Indian Diaspora*.
Singapore: Editions Didier Millet
2. Parekh, Bhikhu, Gurhapal Singh and Steven Vertovec (eds.). 2003. *Culture and Economy in theIndian*
Diaspora. London: Routledge.
3. Raghuram, Parvati, Ajaya Kumar Sahoo, BrijMaharaj and Dave Sangha (eds.). 2008. *Tracing an Indian*
Diaspora: Contexts, Memories, Representations. New Delhi: Sage Publications.
4. Bhatia, Sunil. 2007. *American Karma: Race, Culture, and Identity in the Indian Diaspora*. NewYork:
New York University Press.

Web Resources :

1. www.iom.int
2. https://www.researchgate.net/publication/260096281_Theories_and_Typologies_of_Migration_An_Overview_and_A_Primer
3. https://www.mea.gov.in/images/pdf/1.executive.summary.pdf
4. https://www.researchgate.net/publication/42798817_Gender_and_International_Migration_in_Europe_Employment_Welfare_and_Politics
5. https://openresearch-repository.anu.edu.au/bitstream/1885/53560/2/01_Lal_Indian_Diaspora_in_2009.pd

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CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Explain the theories of international migrations and diaspora	K2
CO 2	Outline the position of Indian diaspora worldwide	K1
CO 3	Examine the issues of identity among the Indian diaspora	K3
CO 4	Evaluate the Indian policies towards diaspora	K5
CO 5	Understand the perspectives and policies of receiving countries	K1

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S.Strong (3) M.Medium (2) L.Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S.Strong(3) M.Medium (2) L.Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITE23	**GENERIC ELECTIVE IV**	**Indian Constitution**	**4**	**3**

Course Objectives

1. Explain the historical background of the Indian Constitution.
2. Compare and contrast the fundamental rights, directive principles of state policy and fundamental duties.
3. Evaluate the nature of Indian federalism and the rationale for emergency provisions.
4. Describe the powers and functions of the various units of the government.
5. Evaluate the nature of the State constitutional machinery and its functions

Unit.I	Historical background . Sources of the Indian Constitution . Preamble.citizenship	**12 Hours**
Unit.II	Fundamental Rights–Directive Principles of State Policy – Fundamental Duties.important amendments to the Constitution	**12 Hours**
Unit.III	Indian Federalism: Distribution of powers: Legislative – Administrative and Financial relation. Emergency Provisions	**12 Hours**
Unit.IV	Union Government – President: Election – Powers and Functions – Cabinet: Prime Minister – Parliament Composition, Powers and functions. Process of lawmaking – Speaker – Parliamentary Committees – Supreme Court of India:Composition, powers and functions	**12 Hours**
Unit.V	State Government: Role of the Governor . State Legislature – Cabinet. High Courts	**12 Hours**

Books for Study

1. Austin Granville, The Indian Constitution: Cornerstone of A Nation,Oxford University Press,1999

2. Agarwal, R.C. Constitutional Development and National Movement of India, S. Chand & Co. 1996

3. Durga Das Basu,An Introduction to Indian Constitution,Wadha& Company, 2001

Books for Reference:

1. Bhargava Rajeev, *Politics and Ethics of the Indian Constitution*, Oxford University,2009

2. Durga Das Basu, *Commentary on the Constitution of India*,Wadha& Company,2000

3. Gautam Bhatia, *Transformative Constitution: A Radical Biography in Nine Acts*, Harper Collins India, 2019

4. Misra, B.R., *Economic Aspects of Indian Constitution*, Orient Longman,1952

Web Resources :

1. https://legislative.gov.in/constitution.of.india
2. https://www.constitutionofindia.net/constitution_of_india
3. https://www.loc.gov/item/57026883
4. https://books.google.co.in/books/about/Politics_and_Ethics_of_the_Indian_Consti.html?id=6HpaPwAACAAJ&redir_esc=y
5. https://archive.org/details/in.ernet.dli.2015.260200

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	Understandthe historical background of the Indian Constitution.	K2
CO 2	Compare and contrast basic features of the constitution	K4
CO 3	Evaluate the nature of Indian federalism and the rationale for emergency provisions.	K5
CO 4	Describe the powers and functions of the various units of the government.	K2
CO 5	Explain the structure at the state level	K1

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S.Strong (3) M.Medium (2) L.Low (1)

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S.Strong(3) M.Medium (2) L.Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHITE24	**GENERIC ELECTIVE IV**	**Environmental History of India**	**4**	**3**

Course Objectives

1. Examine the various schools of thought in ecological studies.
2. Trace the impact of eco systems from a historical perspective.
3. Evaluate the impact of British ecological imperialism.
4. Detail India's environmental policy
5. Examine the role and impact of various movements

Unit.I	Introduction To Environmental History – Habitats in Human History: Modes of Production and Modes of Resource Use – Schools of Thought in Ecology: Marxist, Gandhian, Eco.Feminism, Anthropocene.	**12 Hours**
Unit.II	Prehistoric Environment in India – Role of Climate in Indus Valley Civilization – Forest In Ancient India – Iron Tools and Deforestation in the Vedic Period – Eco.Systems of the Sangam Age In South India – Asoka And Ecology – Mughals And Hunting.	**12 Hours**
Unit.III	Ecological Imperialism – Forest Policy: Forest Acts of 1865, 1878 and 1927 – Protest Against British Forest Acts and Policies of Monoculture – Plantation – Public Works – Railways –Hill Stations – Systematic Conservation versus Exploitation Debate.	**12 Hours**
Unit.IV	Independent India's Environmental Policy– Forest Policy – Resolutions And Acts of 1952, 1980, 1988 and 2018 – Development Versus Environment–Big Dams And Hydro.Electric Power Projects –Bhopal Gas Tragedy – Tsunami and its Impact –Move Towards Sustainable Development – National Environment Policy – National Conservation Strategy and the Policy Statement of Environment And Development 1992 – National Environment Tribunal – National Green Tribunal.	**12 Hours**
Unit.V	Environmental Movements: Bishnoi Movement – Chipko Movement – Appiko Movement – Narmada BacchaoAndolan – Silent Valley Movement – Jungle BachaoAndolan	**12 Hours**

Books for Study

1. IrfanHabib, *Man and Environment: Vol.36: Ecological History of India*, New Delhi: Tulika

Books, 2011

2. Donald Hughes.J., *What is Environmental History?*,Polity Press: Cambridge, U.K. 2006.

3. MadhavGadgil and RamchandraGuha, *The Fissured Land: An Ecological History of India* OUP: Berkeley and Los Angeles, California, USA 1992

Books for Reference:

1. Christopher Hill, South Asia: *An Environmental History*, ABC.CLIO, Inc: California, US, 2008

2. Crosby, Alfred. "*Ecological Imperialism: The Overseas Migration of Western Europeans as biological*

phenomenon." In *The Ends of the Earth: Perspectives on Modern Environmental History*, edited by

Donald Worster and Alfred Crosby, 103.17. Cambridge: Cambridge University Press, 1988.

3. David L Gosling, *Religion and Ecology in India and South East Asia*, Routledge: London, U.K.,

Web Resources :

1. https://www.mids.ac.in/assets/doc/WP_203.pdf
2. https://www.researchgate.net/publication/343547680_ENVIRONMENT_IN_EARLY_INDIA_A_HISTORICAL_PERSPECTIVE
3. https://www.jstor.org/stable/41949868
4. https://www.academia.edu/40195040/Man_and_Environment_The_Ecological_History_of_India_By_Irfan_Habib
5. https://www.semanticscholar.org/paper/Nature-and-power-%3A-a-global-history-of-the-Radkau/3eb258da612384b34bd7dfb9931b5582f32e6fff

CO No.	Course Outcomes *The students on completion of the course will be able to:*	Cognitive Level
CO 1	**Understand** the various schools of thought in ecological studies.	K2
CO 2	Trace the impact of eco systems from a historical perspective.	K4
CO 3	Evaluate the impact of British ecological imperialism.	K3
CO 4	Examine the impact of various environmental movements in India	K5
CO 5	Examine the role of various movements	K5

CO Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	2	3	3	2	3
CO 2	3	3	2	2	3	3	2	3
CO 3	3	3	2	2	3	3	2	3
CO 4	3	3	2	2	3	2	2	3
CO 5	3	3	2	2	3	3	2	3
Total	15	15	10	10	15	14	10	15
Average	3	3	2	2	3	2.8	2	3

S.Strong (3) **M.Medium (2)** **L.Low (1)**

CO Mapping with Programme Specific Outcomes

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	3	2
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Total	15	15	13	15	13
Average	3	3	2.6	3	2.6

S.Strong(3) M.Medium (2) L.Low (1)

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PCHISE11	**Skill Enhancement Course I**	**GROWTH OF PANCHAYATI RAJ INSTITUTIONS IN INDIA (WITH SPECIAL REFERENCE TO TAMIL NADU)**	**4**	**2**

Course Objectives

1. To study about the evolution of Local-Self Government in Ancient and British India.
2. To know the progress of Local-Self Government after Independence.
3. To study about the Acts passed before the Tamil Nadu Panchayat Act 1994.
4. To study about the State Finance Commission and State Election Commission.
5.To study about theDevelopment from 1994 to 2010.

Unit-I	Evolution: Origin and Growth of Self-Governing Village Institutions in Ancient India - Local Self-Government under the Imperial Cholas: Uttiramerur Inscriptions - Village Assemblies - Village Autonomy - Qualification and Disqualification of Members in Village Assembly - Kudavolai System - Decline and Revival of Rural Local Self-Government in British Period - Lord Mayo and Financial Decentralization - Lord Ripon and Local Self-Government - Royal Commission on Decentralization	18 Hours
Unit-II	Progress After Independence: Mahatma Gandhi and Local Self-Government - Balwant Rai Mehta Committee - Stagnation and Decline (1965-1977) - Ashok Mehta Committee - L.M. Singhvi Committee - Sarkaria Commission - G.V.K. Rao Committee - 73rd Constitutional Amendment Act 1992	18 Hours
Unit-III	Prelude to Tamil Nadu Panchayat Act 1994: Article 40 - Madras Village Panchayat Act 1950 - Tamil Nadu Panchayat	18 Hours

	Act 1958 - Tamil Nadu District Development Council Act 1958	
Unit-IV	Tamil Nadu Panchayat Act 1994: Powers and functions of Gram Sabah - Three-tier System of Panchayati Raj: Village Panchayat, Panchayat Union and District Panchayat - Salient Features of Tamil Nadu Panchayat Act 1994	18 Hours
Unit-V	State Finance Commission and State Election Commission: Establishment - Powers and Functions - District Planning Committee: Powers and Functions - Critical Evaluation of Tamil Nadu Panchayat Act 1994 - Development from 1994 to 2010	18 Hours

Books for Study

1. Goel, S.L. Shalini Rajneesh: *Panchayati Raj in India, Theory and practice*, Deep & Deep

Publications PVT. Ltd., New Delhi, 2003.

2. Palanidurai, G., Vallinayagam, K. Chidambaram, N.S. Subramanian, K: *A Hand Book for Panchayati Raj Administration (Tamil Nadu),* Concept Publishing Company, New Delhi, 2004.

3. Palanidurai.G.,*Power to the powerless, A study on panchayat Raj Act.*

Books for Reference

1. Pillay K.K., - *History of Local self - Government in Tamil Nadu.*
2. Rathiesh Retnam, *Local Government in Medieval Tamil Nadu*, Ajantha Achagam, Madurai, 2000.
3. State Institute for panchayat administration, Govt. of Tamil Nadu - *A Review- A Manual for*
panchayat Administration in Tamil Nadu.
4. Venkata Rao R., - *History of local self- Government in the Madras Presidency.*

CLOs	**COURSE LEARNING OUTCOMES** **By the end of the course the students will be able to**	**Knowledge Level**
CLO1	Understand the genesis and growth of self-governing village institutions in Ancient India.	K2
CLO2	Explain the recommendations of various committees for the development of Panchayati Raj institutions in India.	K1
CLO3	Articulate the Provisions of the Acts passed before 1994.	K3
CLO4	Evaluate the features of the Tamil Nadu Panchayat's Act 1994.	K5
CLO5	Relate the Powers and functions of State Finance Commission and State Election Commission.	K4

CO Mapping with Programme Outcomes

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	3	3	3	3	2	3	3	3
CO 2	3	3	3	3	2	3	3	3
CO 3	3	3	2	3	2	2	3	3

CO 4	3	3	2	3	2	2	3	2
CO 5	3	3	2	3	3	2	3	2
Total	15	15	12	15	11	12	15	13
Average	3	3	2.4	3	2.2	2.4	3	2.6

S.Strong (3) **M.Medium (2)** **L.Low (1)**

CO Mapping with Programme Specific Outcomes

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	3	2	3	2	3
CO 2	3	2	3	3	3
CO 3	2	3	3	3	3
CO 4	2	2	3	3	3
CO 5	2	2	3	3	3
Total	12	11	15	15	15
Average	2.4	2.2	3	3	3

S.Strong(3) **M.Medium (2)** **L.Low (1)**

B.B.A			
UCBATC11	**Principles of Management**		
Learning Objectives			
CLO1	To impart knowledge about evolution of management		
CLO2	To provide understanding on planning process and importance of decision making in organization		
CLO3	To learn the application of principles in organization		
CLO4	To study the process of effective controlling in organization		
CLO5	To familiarize students about significance of ethics in business and its implications.		
UNIT	**Details**	**No. of Hours**	**Learning Objectives**
I	Management: Importance – Definition – Nature and Scope of Management - Process – Role and Functions of a Manager – Levels of Management – Development of Scientific Management and other Schools of thought and approaches.	15	CLO1
II	Planning: Nature – Importance – Forms – Types – Steps in Planning – Objectives – Policies – Procedures and Methods – Natures and Types of Policies – Decision –making – Process of Decision – making – Types of Decision.	15	CLO2
III	Organizing: Types of Organizations – Organization Structure – Span of Control and Committees – Departmentalization – Informal Organization- Authority – Delegation – Decentralization – Difference between Authority and Power – Responsibility.	15	CLO3
IV	Direction – Nature and Purpose. Co- ordination – Need, Type and Techniques and requisites for excellent Co-ordination – Controlling – Meaning and Importance – Control Process.	15	CLO4
V	Definition of Business ethics - Types of Ethical issues -Role and importance of Business Ethics and Values in Business - Ethics internal - Ethics External - Environment Protection - Responsibilities of Business	15	CLO5
	Total	**75**	
Course Outcomes			
Course Outcomes	On completion of this course, students will;	**Program Outcomes**	
CO1	Describe nature, scope, role, levels, functions and approaches of management	PO5	
CO2	Apply planning and decision making in management	PO2, PO5, PO6,PO8	
CO3	Identify organization structure and various organizing techniques	P01, PO4	

CO4	Understand Direction, Co-ordination & Control mechanisms	PO2,PO6
CO5	Relate and infer ethical practices of organisation.	PO3, PO8
Reading list		
1.	JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.	
2.	Griffin, T.O., Management, Houghton Mifflin Company, Boston, USA, 2014.	
3	.Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011	
4	Stoner, Freeman, Gilbert Jr. (2014). Management (6th edition), New Delhi: Prentice Hall India	
5	Robbins, S., Coulter, M., Sidani, D., and Jamali, D., Management: Arab World Edition, Pearson, 2014.	
Reference Books		
1.	P.C. Tripathi& P.N Reddy; Principles of Management, Sultan Chand& Sons,6th Edition, 2017	
2.	L.M.Prasad; Principles & Practice of Management, Sultan Chand & Sons, 8 th Edition.	
3.	Stephen P. Robbins & Mary Coulter; Management, Pearson Education, 13th Edition, 2017	
4.	Dr.C.B.Gupta; Principles of Management, Sultan Chand& Sons, 3 rd Edition.	
5.	Harold Koontz, Hienz Weihrich, A Ramachandra Aryasri; Principles of Management, McGraw Hill, 2nd edition, 2015	
Web Resources		
1	https://www.toolshero.com/management/14-principles-of-management/	
2	https://open.umn.edu/opentextbooks/textbooks/693	
3	https://open.umn.edu/opentextbooks/textbooks/34	
4	https://openstax.org/subjects/business	
5	https://blog.hubspot.com/marketing/management-principles	

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze	Problem-solving questions, Finish a procedure in many steps, Differentiate	

(K4)	between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M	L	S	S	S	S	M	S
CO 2	M	S	S	S	M	M	L	S
CO 3	M	S	S	M	S	S	M	S
CO 4	S	M	S	S	S	S	L	S
CO 5	M	S	S	S	S	S	M	S

S –Strong M-Medium L-Low

CO-PO Mapping with program specific outcomes

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	**15**	**15**	**15**	**15**	**15**
Weighted percentage	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

UABATC12	**ACCOUNTING FOR MANAGERS I**		
Learning Objectives			
CLO1	To impart knowledge about basic concepts of accounting its applications		
CLO2	To analyze and interpret financial reports of a company		
CLO3	To understand the gross profit and net profit earned by organization		
CLO4	To foster knowledge on Hire Purchase system		
CLO5	To understand the procedures of Accounting under Single entry system.		
UNIT	**Details**	**No. of Hours**	**Learning Objectives**
I	Meaning and scope of Accounting, Basic Accounting Concepts and Conventions – Objectives of Accounting – Accounting Transactions – Double Entry Book Keeping – Journal, Ledger, Preparation of Trial Balance	15	CLO1
II	Subsidiary book – Preparation of cash Book – Bank reconciliation statement – rectification of errors – Suspense account	15	CLO2
III	Preparation of Final Accounts – Adjustments – Closing stock, outstanding, prepaid and accrued, depreciation, bad and doubtful debts, provision and discount on debtors and creditors, interest on drawings and capital.	15	CLO3
IV	Hire Purchase System – Default and Repossession –	15	CLO4

	Hire Purchase Trading Account – Installment System.		
V	Single Entry – Meaning, Features, Defects, Differences between Single Entry and Double Entry System – Statement of Affairs Method – Conversion Method	15	CLO5
	Total	**75**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	**Program Outcomes**
CO1	Prepare Journal, ledger, trial balance and cash book	PO2, PO1
CO2	Classify errors and making rectification entries	PO1
CO3	Prepare final accounts with adjustments	PO2, PO6
CO4	To understand Hire Purchase system	PO2, PO6
CO5	Prepare single and double entry system of accounting.	PO6

Reading List	
1.	Goel.D.K and Shelly Goel, 2018, Financial Accounting, Arya Publications, 2nd edition.
2.	Jain .S.P &Narang .K, 1999, Financial Accounting, Kalyani Publishers, Ludhiana, 4th edition
3.	Rakesh Shankar. R &Manikandan.S, Financial Accounting, SCITECH, 3rd edition.
4.	Shukla&Grewal, 2002, Advanced Accounting, Sultan Chand &Sons,New Delhi, 15th edition.
5.	Tulsian P.C., 2006, Financial Accounting, Pearson Education
References Books	
1.	Dr.K.Ganesan & S.Ushena Begam – Accounting for Managers - Volume 1, Charulatha Publications, Chennai
2.	TS Reddy & amp; A.Murthy; Financial Accounting -Margham Publications , 6th Edition, 2019
3.	David Kolitz; Financial Accounting – Taylor and Francis group, USA 2017
4.	M N Arora; Accounting for Management- Himalaya Publications House 2019.
5.	SN Maheswari; Financial Accounting - Vikas Publishing House, Jan 2018.
6.	T. Horngren Charles, L. Sundern Gary, A. Elliott John; Introduction to Financial Accounting, Pearson Publications Oct 2017.
Web Resources	
1.	https://ebooks.lpude.in/management/mba/term_1/DMGT403_ACCOUNTING_FOR_MANAGERS.pdf
2.	https://www.drnishikantjha.com/booksCollection/Accounting%20for%20Management%20for%20MBA%20.pdf
3.	https://www.accountingtools.com/articles/2017/5/15/basic-accounting-principles
4.	https://en.wikipedia.org/wiki/Single-entry_bookkeeping_system\
5.	https://www.profitbooks.net/what-is-depreciation

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	

	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	**100 Marks**

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with program outcomes

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	**15**	**15**	**15**	**15**	**15**
Weighted percentage	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

CO-PO Mapping with **Program Specific Outcomes (Course Articulation Matrix)**

Level of Correlation between PSO's and CO's

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	M	M	M	M	M	S	L	M
CO 2	S	M	M	M	M	S	L	S
CO 3	S	M	M	M	M	S	L	S
CO 4	S	M	M	M	M	S	L	M
CO 5	S	M	M	M	M	S	L	M

S-Strong M-Medium L-Low

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	**100 Marks**
Methods of Assessment		

Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	S	M	M	M	S	L	M
CO2	S	L	M	M		S		S
CO3	S	S	M	M	M	S		M
CO4	S	S	M	M		S		M
CO5		S	M	M		S		S

CO-PO Mapping (Course Articulation Matrix)

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	**15**	**15**	**15**	**15**	**15**
Weighted percentage	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

Subject Code	Subject Name	Category	L			O	Marks		
							CIA	External	Total
UCBATF11	**Basics of Event Management**	SKC	Y	2	2	-	25	75	100
Learning Objectives									
CLO1	To know the basic of event management its concepts								
CLO2	To make an event design								
CLO3	To make feasibility analysis for event.								
CLO4	To understand the 5 Ps of Event Marketing								
CLO5	To know the financial aspects of event management and its promotion								

UNIT	Details	No. of Hours	Learning Objectives
I	Introduction: Event Management – Definition, Need, Importance, Activities.	6	CLO1
II	Concept and Design of Events: Event Co-ordination, Developing &, Evaluating event concept – Event Design	6	CLO2
III	Event Feasibility: Resources – Feasibility, SWOT Analysis	6	CLO3
IV	Event Planning & Promotion – Marketing & Promotion – 5Ps of Event Marketing – Product, Price, Place, Promotion, Public Relations	6	CLO4
V	Event Budget – Financial Analysis – Event Cost – Event Sponsorship	6	CLO5
	Total	**30**	

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	To understand basics of event management	PO1, PO6
CO2	To design events	PO5, PO6
CO3	To study feasibility of organizing an event	PO2, PO6
CO4	To gain Familiarity with marketing & promotion of event	PO6
CO5	To develop event budget	PO6, PO8

Reading List

1.	Event Management: A Booming Industry and an Eventful Career by Devesh Kishore, Ganga Sagar Singh - Har-Anand Publications Pvt. Ltd.
2.	Event Management by Swarup K. Goyal - Adhyayan Publisher - 2009
3.	Event Management & Public Relations by Savita Mohan - Enkay Publishing House
4	Event Planning - The ultimate guide - Public Relations by S.J. Sebellin Ross
5	Event Management By Lynn Van Der Wagen & Brenda R Carlos, Pearson Publishers

References Books

1.	Event Management By Chaudhary, Krishna, Bio-Green Publishers
2.	Successful Event Management By Anton Shone & Bryn Parry
3.	Event management, an integrated & practical approach By Razaq Raj, Paul Walters & Tahir Rashid

4.	Event Planning Ethics and Etiquette: A Principled Approach to the Business of Special Event Management by Judy Allen , Wiley Publishers
5.	Event Planning: Management & Marketing For Successful Events: Management & Marketing for Successful Events: Become an Event Planning Pro & Create a Successful Event Series by Alex Genadinik CreateSpace Independent Publishing Platform, 2015
Web Resources	
1.	https://ebooks.lpude.in/management/bba/term_5/DMGT304_EVENT_MANAGEMENT.pdf
2	https://www.inderscience.com/jhome.php?jcode=ijhem International Journal of Hospitality & Event Management
3	https://www.emeraldgrouppublishing.com/journal/ijefm International Journal of Event and Festival Management
4	https://www.eventbrite.com/blog//?s=roundup
5	https://www.eventindustrynews.com/

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	M	S	M	S	S	S
CO 2	S	S	S	S	S	S	M	M
CO 3	M	S	S	S	S	S	S	M
CO 4	S	S	M	S	S	S	M	S
CO 5	M	M	S	S	S	S	S	S

S-Strong M-Medium L-Low

CO-PO Mapping with program specific outcomes (Course Articulation Matrix)
Level of Correlation between PSO's and CO's

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage	3.0	3.0	3.0	3.0	3.0

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	Ext.	Int.
UCBATA11	**Allied : Managerial Economics**	**Generic Elective**	**Y**	**-**	**-**	**-**	**3**	**4**	**25**	**75**	**100**

Learning Objectives	
CLO1	To familiarize students with concepts of managerial economics and its relevant concepts of economics in current business scenario
CLO2	To understand the applications & implications of economics and its knowledge of the mechanics of supply and demand markets in decision-making and problem solving.
CLO3	To Understand the optimal point of cost analysis and production factors of the firm.
CLO4	To describe the pricing methods and strategies that are consistent with evolving marketing needs.
CLO5	To Provide insights to the various market structures in an economy.

UNIT	Details	No. of Hours	Learning Objectives
I	Introduction - **Nature and scope of managerial economics – definition of economics – important concepts of economics – relationship between micro, macro and managerial economics – nature and scope – objectives of firm.**	12	CLO1
II	Demand analysis **– Theory of consumer behavior – Marginal utility analysis – indifference curve analysis Meaning of demand – Law of demand – Types of demand-Determinants of demand – Elasticity of demand –Demand forecasting.**	12	CLO2
III	Production and cost analysis **– Production – Factors of production – production function – Concept – Law of variable proportion – Law of return to scale and economies of scale – cost analysis – Different cost concepts – Cost output relationship short run and long run – Revenue curves of firms – Supply analysis.**	12	CLO3
IV	Pricing methods and strategies **– Objectives – Factors – General consideration of pricing – methods of pricing – Dual pricing – Price discrimination**	12	CLO4
V	Market classification **– Perfect competition – Monopoly – Monopolistic competition – Duopoly – Oligopoly.**	12	CLO5
	Total	60	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Analyze & apply the various managerial economic concepts in individual & business decisions.	PO2, PO6,PO8
CO2	Explain demand concepts, underlying theories and identify demand forecasting techniques.	PO6, PO8
CO3	Employ production, cost and supply analysis for business decision making.	PO1, PO2,PO6
CO4	Identify pricing strategies.	PO1, PO2,PO6
CO5	Classify market structures under competitive scenarios.	PO2, PO6, PO8

Reading List	
1.	Journal of Economic Literature – American Economic Association
2.	Arthasastra Indian Journal of Economics & Research
3.	Mithani D.M. (2016) -Managerial Economics –Himalaya Publishing House – Mumbai
4.	Indian Economic Journal/Sage Publications
5.	Mehta P.L (2016) – Managerial Economics – Sultan Chand & Sons – New Delhi
References Books	
1.	**Dr. S. Sankaran; Managerial Economics; Margham Publication, Chennai, 2019**
2.	**Thomas and Maurice; Managerial Economics: Foundations of Business Analysis and Strategy, McGraw Hill Education, 10 editions, 2017.**
3.	**D N Dwivedi; Managerial Economics: Vikas Publishing House, 8 th edition, 2015.**
4.	**H L Ahuja; Managerial Economics, S. Chand, 9th Edition,2017.**
5.	**Dominick Salvatore; Managerial Economics: Principles and Worldwide Applications, Oxford University Press, Eighth edition, 2016**
Web Resources	
1	**https://www.studocu.com/row/document/azerbaycan-dovlet-iqtisad-universiteti/business-and-management/lecture-notes-on-managerial-economics/6061597**
2	**https://www.intelligenteconomist.com/profit-maximization-rule**
3	**http://www.economicsdiscussion.net/laws-of-production/laws-of-production-laws-of- returns-to-scale-and-variable-proportions/5134**
4	**http://www.simplynotes.in/e-notes/mbabba/managerial-economics/**
5	**https://businessjargons.com/determinants-of-elasticity-of-demand.html**

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	**100 Marks**
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or	

	Presentations

Mapping with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	S	M	M	M	S	L	M
CO2	S	L	M	M		S		S
CO3	S	S	M	M	M	S		M
CO4	S	S	M	M		S		M
CO5		S	M	M		S		S

CO-PO Mapping (Course Articulation Matrix)

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage	3.0	3.0	3.0	3.0	3.0

Course Code	Course Name	Category		Credit	Hours		CIA	External	Total
UCBATS12	**Managerial Communication**	Core	Y	2	2	-	25	75	100
Course Objectives									
CLO1	To educate students role & importance of communication skills								
CLO2	To build their listening, reading, writing & speaking communication skills.								
CLO3	To introduce the modern communication for managers.								
CLO4	To understand the skills required for facing interview								
CLO5	To facilitate the students to understand the concept of Communication.								
UNIT	**Details**						**No. of Hours**		**Course Objectives**
I	Definition – Methods – Types – Principles of effective Communication – Barriers to Communication – Communication etiquette.						6		CLO1
II	Business Letter – Layout- Kinds of Business Letters: application, offer, acceptance/ acknowledgement and promotion letters. Business Development Letters – Enquiry, Replies, Order, Sales, circulars, Grievances.						6		CLO2
III	Interviews- Direct, telephonic & Virtual interviews- Group discussion – Presentation skills – body language						6		CLO3
IV	Communication through Reports – Agenda- Minutes of Meeting - Resume Writing						6		CLO4

V	Modern Forms of Communication: podcasts, Email, virtual meetings – Websites and their use in Business – social media- Professional Networking sites	6	CLO5
	Total	**30**	
Course Outcomes			
Course Outcomes	On completion of this course, students will;	**Program Outcomes**	
CO1	Understand communication process and its barriers.	PO1,PO2,PO3,PO4, PO8	
CO2	Develop business letters in different scenarios	PO1,PO2,PO3,PO4, PO5,PO6	
CO3	Develop oral communication skills & conducting interviews	PO2,PO3,PO4,PO5, PO6,PO7	
CO4	Use managerial writing for business communication	PO1,PO2,PO4,PO5, PO6,PO8	
CO5	Identify usage of modern communication tools & its significance for managers	PO3,PO4,PO5,PO6, PO7,PO8	
Reading List			
1.	Krishan Mohan & Meena Banerji, Developing Communication Skills, Macmillan India Ltd, 2008		
2.	Mallika Nawal –Business Communication – CENGAGE		
3.	Bovee, Thill, Schatzman, Business Communication Today - Peason Education		

	Private Ltd - New Delhi.
4.	Michael Brown, Making Presentation Happen, Allen & Unwin, Australia, 2008
5.	Sundar K.A, Business communication Vijay Nicole imprints Pvt. Ltd., Chennai.
References Books	
1.	Rajendra Paul & J S Kovalahalli, Essentials of Business Communication, Sultan Chand & Sons, New Delhi, 2017
2.	Dr. C B Gupta, Basic Business Communication, Sultan Chand & Sons, New Delhi, 2017
3.	R C Sharma & Krishan Mohan, Business Correspondance and Report Writing, Mc Graw Hill, India Pvt Ltd., New Delhi, 2006
4.	Kevin Galaagher, Skills Development for Business and Management Students, Oxford University Press, Delhi, 2010
5.	R C Bhatia, Business Communication, Ane Books Pvt Ltd., Delhi, 2015
Web Resources	
1.	https://www.managementstudyguide.com/business_communication.html
2.	https://studiousguy.com/business-communication/
3.	https://www.oercommons.org/curated-collections/469

4.	https://www.scu.edu/mobi/business-courses/starting-a-business/session-8-communication-tools/	
5.	https://open.umn.edu/opentextbooks/textbooks/8	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	M	S	M	S	S	S
CO 2	S	S	S	S	S	S	M	M
CO 3	M	S	S	S	S	S	S	M
CO 4	S	S	M	S	S	S	M	S
CO 5	M	M	S	S	S	S	S	S

S-Strong M-Medium L-Low

CO-PO Mapping with program specific outcomes (Course Articulation Matrix)
Level of Correlation between PSO's and CO's

CO /PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage	3.0	3.0	3.0	3.0	3.0

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
UCBATC21	**MARKETING MANAGEMENT**	Core	Y	-	-	-	4	5	25	75	100

Learning Objectives	
CLO1	To understand the marketplace.
CLO2	To identify the market segmentation and the Product mix
CL03	To select the different pricing methods and channels of distribution.
CLO4	To know the communication mix and sales promotion tools
CLO5	To prepare according to the latest trends in market.

UNIT	Details	No. of Hours	Learning Objectives
I	Fundamentals of Marketing – Role of Marketing – Relationship of Marketing With Other Functional Areas- Concept of Marketing Mix – Marketing Approaches – Various Environmental Factors Affecting the Marketing Functions.	15	CLO1

II	Segmentation – Need And Basis of Segmentation -Targeting – Positioning. Product – Characteristics – Benefits – Classifications – Consumer Goods – Industrial Goods. Product Mix-New Product Development Process - Product Life Cycle. Branding – Packaging.	15	CLO2
III	Pricing – Factors Influencing Pricing Decisions – Pricing Objectives. Market Physical Distribution: Importance – Various Kinds of Marketing Channels – Distribution Problems.	15	CLO3
IV	A Brief Overview of Communication Mix- Types of Media & its Characteristics- Print - Electronic - Outdoor – Internet- A tool to customer loyalty. Sales Promotion tools- IMC (Integrated marketing communication) - Definition, Process, Need & Significance - CRM – Importance.	15	CLO4
V	Sales Force Management: Personal Selling Process- Motivation, Compensation and Control of Sales Force– Digital Marketing: Introduction- Applications & Benefits.	15	CLO5
		75	

Course Outcomes	On Completion of the course the students will	**Program Outcomes**
CO1	To list and identify the core concepts of Marketing and its mix.	PO1, PO2, PO3
CO2	To sketch the market segmentation, nature of product, PLC	PO1, PO2, PO3,PO6, PO8
CO3	To analyze the appropriate pricing methods	PO1 PO2, PO3, PO4, PO8
CO4	To determine the importance of various media	PO1, PO2, PO6
CO5	To assess the sales force and applications of digital marketing	PO1, PO2, PO7

Reading List

1.	Philip Kotler & Gary Armstrong, Principles of Marketing: A South Asian Perspective, Pearson Education, 2018.
2.	Rajan Saxena, Marketing Management, Tata Mc Graw Hill, 2017.
3.	L.Natarajan, Marketing, Margham Publications, 2017.
4.	J P Mahajan & Anupama Mahajan, Principles of Marketing, Vikas Publishing House, 2017.
5.	K Karunakaran, Marketing Management, Himalaya Publishing House,2017.

References Books

1.	C.B.Gupta & Rajan Nair Marketing Management, Sultan Chand &Son 2020

2.	V.S. Ramaswamy & S. Namakumari, 2002, Principles of Marketing, first edition, S.G. Wasani / Macmillan India Ltd,	
3.	Cranfield, Marketing Management, Palgrave Macmillan.	
4.	Harsh V Verma & Ekta Duggal, Marketing, Oxford University Press, 2017.	
5.	Sontakki C.N, Marketing Management, Kalyani Publishers, Ludhiana.2016	
Web Resources		
1.	http://eprints.stiperdharmawacana.ac.id/24/1/%5BPhillip_Kotler%5D_Marketing_Management_14th_Edition%28BookFi%29.pdf	
2.	https://mrcet.com/downloads/MBA/digitalnotes/Marketing%20Management.pdf	
3.	https://www.enotesmba.com/2013/01/marketing-management-notes.html	
4.	Industrial Marketing Management | Journal | ScienceDirect.com by Elsevier	
5.	Journal of Marketing Management | Taylor & Francis Online (tandfonline.com)	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	M	M	M	S	M	M
CO 2	S	S	M	S	M	S	M	S
CO 3	S	S	M	M	M	S	M	S
CO 4	S	S	M	M	M	S	M	M
CO 5	S	S	M	M	M	S	M	S

S-Strong M-Medium L-Low

CO-PO Mapping with Programme Specific Outcomes (Course Articulation Matrix): Level of Correlation between PSO's and CO's

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	2	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	2	3
Weightage	14	15	15	14	15
Weighted Percentage	2.8	3.0	3.0	2.8	3.0

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
UCBATC22	**Accounting for Managers II**	Core	Y	-	-	-	4	5	25	75	100

Learning Objectives	
CLO1	To provide basic understanding of cost concepts and classification.
CLO2	To develop skills in tools & techniques and critically evaluate decision making in business.
CLO3	To understand various ratios and cash flow related to finance
CLO4	To recognize the role of budgets and variance as a tool of planning and control.
CLO5	To gain insights into the fundamental principles of accounting and use them in day-to-day business scenarios

UNIT	Details	No. of Hours	LearningObjectives
I	Cost accounting – Meaning, nature, scope and functions, need, importance and limitations- Cost concepts and classification – Cost sheets – Tenders & Quotation.	12	CLO1
II	Management accounting – Meaning, nature, scope and functions, need, importance and limitations – Management Accounting vs. Cost Accounting. Management Accounting vs. Financial Accounting. Analysis and Interpretation of financial statements – Nature, objectives, essentials and tools, methods – Comparative Statements, Common Size statement and Trend analysis.	12	CLO2
III	Ratio Analysis – Interpretation, benefits and limitations. Classification of ratios - Liquidity, Profitability, turnover. Cash flow and Funds flow statement.	12	CLO3
IV	Budgets and budgetary control – Meaning, objectives, merits and demerits – Sales, Production, flexible budgets and cash budget	12	CLO4

V	Marginal Costing – CVP analysis – Break even analysis	12	CLO5
	Total	**60**	

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Interpret cost sheet & write comments.	PO1, PO2, PO4
CO2	Compare cost, management & financial accounting	PO6
CO3	Analyze the various ratio and compare it with standards to assess deviations	PO2, PO6
CO4	Estimate budget and use budgetary control	PO1, PO2,PO8
CO5	Evaluate marginal costing and its components	PO2, PO6

Reading List	
1.	Gupta, R.L and M. Radhaswamy.AdvancedAccountancy,Sultan Chand & Sons, 2016.
2.	T. S. and A .Murthy.ManagementAccounting.Chennai: Margham, 2007.
3.	Jain S.P and K.L Narang.Advanced Accountancy (Part II).Kalyani, 2007.
4	Maheshwari S.N, Advanced Accountancy (Part1I). Vikas, 2007.
5	Man Mohan and S.N. Goyal. Principles of Management Accounting. Agra: SahityaShawan, 2017.
References Books	
1.	Dr.K.Ganesan & S. Ushena Begam, Accounting for Managers – Volume II, Charulatha Publications, Chennai
2.	T. S. Reddy and Hari Prasad Reddy- Management Accounting, Margham Publication, 2016
3.	Antony Atkinson, Rebert S Kalpan, Advance Management Accounting, Pearson Publications,2015.
4.	HorngrenSunderu Stratton, Introduction to Management Accounting, Pearson Education,2013.
5.	Rajiv Kumar Goel&IshaanGoel, Concept Building Approach to Management Accounting ,2019
6.	Colin Drury, Management and Cost Accounting (with CourseMate and eBook Access), Cengage, 2015.
Web Resources	
1	https://www.toppr.com/guides/fundamentals-of-accounting/fundamentals-of-cost-accounting/meaning-of-management-accounting/
2	https://efinancemanagement.com/financial-accounting/management-accounting
3	http://www.accountingnotes.net/management-accounting/management-accountingmeaning-limitations-and-scope/5859
4	https://www.wallstreetmojo.com/ratio-analysis/
5	http://www.accountingnotes.net/cost-accounting/variance-analysis/what-is-varianceanalysis-cost-accounting/10656

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	M	M	M	M	M	S	L	M
CO 2	S	M	M	M	M	S	L	S
CO 3	S	M	M	M	M	S	L	S
CO 4	S	M	M	M	M	S	L	M
CO 5	S	M	M	M	M	S	L	M

S-Strong M-Medium L-Low

CO-PO Mapping with program specific outcomes (Course Articulation Matrix)
Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage	3.0	3.0	3.0	3.0	3.0

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
UCBATA21	**Allied: INTERNATIONAL BUSINESS**	Generic Elective		-	-	-	3	4	25	75	100

Learning Objectives	
CLO1	To familiarize students with basic concepts of International Business
CLO2	To impart knowledge about theories of international trade
CLO3	To know the concepts of foreign exchange market and foreign direct investment
CLO4	To understand the global environment
CLO5	To gain knowledge on the Contemporary Issues of International Business

UNIT	**Details**	**No. of Hours**	**Learning Objectives**
I	Introduction to International Business: Importance, nature and scope of international business- Internationalization process and Approaches - Modes of entry- Multinational Corporations and their involvement in International Business- Advantage and problems of MNCs.	12	CLO1
II	Introduction of Trade theories— Mercantilism — Absolute Advantage — Comparative Advantage — Heckscher-Ohlin Theory — The New Trade Theory — Porter's Diamond Competitive Advantage Theory.	12	CLO2
III	Foreign Investments-Pattern, Foreign exchange rates and their impact on trade and investment flows- Functions of Foreign Exchange Market- Foreign Direct Investments — Factors influencing FDI — Modes of FDI entry - Horizontal and Vertical Foreign Direct Investment — Advantages of Host and Home Countries.	12	CLO3
IV	Drivers in Globalisation - Globalisation of Markets, production, investments and Technology. World trade in goods and services — Major trends and developments- World trade and protectionism — Tariff and non-tariff barriers.	12	CLO4
V	Regional Economic Groupings in Practice- Levels of Regional Economic Integration Regionalism vs. Multilateralism- Important Regional Economic Groupings in the World. Contemporary Issues in International Business- Institutional support to international business like BREXIT, IMF, World Bank, ILO and WTO.	12	CLO5
	Total	**60**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Discuss the modes of entry to International Business	PO1, PO5, PO6
CO2	Explain international trade theories	PO3, PO4, PO5
CO3	Understand Foreign exchange market and FDI	PO1, PO2

CO4	Outline the Global Business Environment	PO4, PO5, PO6
CO5	Identify the relevance of international institutions and trading blocs.	PO7, PO8

Reading List	
1.	Gupta CB, International Business, S Chand & Co. Ltd, 2014
2.	Bhattacharya, B., Going International: Response Strategies of the Indian Sector, Wheeler Publishing, New Delhi.
3.	Hill, C.W.L. and Jain, A.K., International Business: Competing in the Global Marketplace, 11th Edition, Tata McGraw-Hill Education, 2018.
4.	Cherunilam, F., International Business: Text and Cases, 5th Edition, PHI Learning, 2010
5.	Paul, J., International Business, 5th Edition, PHI Learning, 2010
References Books	
1.	Deresky, H., International Management: Managing Across Borders and Cultures, 6th Edition, Pearson, 2011.
2.	Griffin, R., International Business, 7th Edition, Pearson Education, 2012.
3.	Tamer Cavusgil S, Gary Knight, John Riesenberger, International Business The New Realities, 4th edition, Pearson ,2017
4.	Aswathappa K , International Business , 7th Edition, McGraw-Hill, 2020
5.	Subba Rao P,International Business, (Text and Cases), Himalaya Publishing House, 2016
Web Resources	
1	https://online.hbs.edu/blog/post/international-business-examples
2	https://saylordotorg.github.io/text_international-business
3	https://www.imf.org/en/home
4	https://courses.lumenlearning.com/suny-internationalbusiness/chapter/reading-what-is-international-business/
5	http://www.simplynotes.in/e-notes/mbabba/international-business-management/

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate

	between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	M	M	M	S	S	M	M
CO 2	M	M	S	S	S	S	M	S
CO 3	S	S	M	M	M	S	M	M
CO 4	S	S	M	S	S	S	M	S
CO 5	M	M	M	M	M	M	S	S

S-Strong M-Medium L-Low

CO-PO Mapping with Programme Specific Outcomes (Course Articulation Matrix): Level of Correlation between PSO's and CO's

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	2
Weightage	15	15	15	15	14
Weighted Percentage	3.0	3.0	3.0	3.0	2.8

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
UCBATS21	**MANAGERIAL SKILL DEVELOPMENT (NME)**	NME	Y	-	-	-	2	2	25	75	100

Learning Objectives	
CLO1	To improve the self-confidence, groom the personality and build emotional competence
CLO2	To address self-awareness and the assessment of core management skills such as communication, working with teams and creating a positive environment for change.
CLO3	To assess the Emotional intelligence
CLO4	To induce critical-thinking and analytical skills to investigate complex problems to propose viable solutions
CLO5	To improve professional etiquettes

UNIT	Details	No. of Hours	Learning Objectives
I	Self: Core Competency, Understanding of Self, Components of Self— Self-identity, Self-concept, Self - confidence and Self-image. Skill Analysis and finding the right fit. Self-learning styles, attitude towards change and applications of skills	6	CLO1
II	Self Esteem: Meaning & Importance, Components of self-esteem, High and low self-esteem, measuring our self-esteem and its effectiveness, Personality mapping tests, Appreciative Intelligence.	6	CLO2
III	Building Emotional Competence: Emotional Intelligence — Meaning, Components, Importance and Relevance, Positive and Negative Emotions., Healthy and Unhealthy expression of Emotions, The six-phase model of Creative Thinking: ICEDIP model.	6	CLO3
IV	Thinking skills: The Mind/Brain/Behaviour, thinking skills, Critical Thinking and Learning, Making Predictions and Reasoning, Memory and Critical Thinking, Emotions and Critical Thinking. Creativity: Definition and meaning of creativity, The nature of creative thinking, Convergent and Divergent thinking, Idea generation and evaluation (Brain Storming), Image generation and evaluation.	6	CLO4
V	Communication related to course: How to make oral presentations, conducting meetings, reporting of projects, reporting of case analysis, answering in Viva	6	CLO5

	Voce, Assignment writing Debates, presentations, role plays and group discussions on current topics. Audio and Video Recording of the above exercises to improve the non-verbal communication and professional etiquettes.		
	Total	**30**	

Course Outcomes

Course Outcomes	On completion of this course, students will;	**Program Outcomes**
CO1	Identify the personal qualities that are needed to sustain in the world of work.	PO1, PO2, PO6, PO7
CO2	Explore more advanced Management Skills such as conflict resolution, empowerment, working with teams and creating a positive environment for change.	PO1, PO2, PO5
CO3	Acquire practical management skills that are of immediate use in management or leadership positions.	PO6, PO7
CO4	Employ critical-thinking and analytical skills to investigate complex business problems to propose viable solutions.	PO1, PO2
CO5	Make persuasive presentations that reveal strong written and oral communication skills needed in the workplace.	PO4

Reading List

1.	Managerial Skill Articles
2.	The Management Skills of SALL Managers - SiSAL Journal
3.	Managerial Skills by Dr.K.Alex S.CHAND
4.	Managerial Skills 2 by Cynthia Menezes Prabhu, Pen to Print Publishing LLP
5.	Gallagher (2010), Skills Development for Business & Management Students, Oxford University Press. PROF. SANJIV

References Books

1.	Joshi, G. (2015), Campus to Corporate-Your Roadmap to Employability, Sage Publication
2.	McGrath E. H. (9 Ed. 2011), Basic Managerial Skills, Prentice Hall India Learning Private Limited.
3.	Whetten D. (e Ed. 2011), Developing Management Skills, Prentice Hall India Learning Private Limited.
4.	**P. Varshney** , **A. Dutta**, Managerial Skill Development, Alfa Publications, 2012
5.	EQ- soft skills for Corporate Carrer by Dr. Sumeet Suseelan

Web Resources	
1.	https://www.ipjugaad.com/syllabus/ggsip-university-bba-4th-semester-managerial-skill-development-syllabus/63
2.	https://www.academia.edu/4358901/managerial_skill_development_pdf
3	https://www.academia.edu/4358901/managerial_skill_development_pdf
4	https://rccmindore.com/wp-content/uploads/2015/06/Managerial-SkillsAll-Units-AC.pdf
5	https://www.aisectuniversityjharkhand.ac.in/PDFDoc/StudyNotes/MBA/SEM%201/MBA-1-MSD(Managerial%20skill%20development).pdf

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

<u>Mapping with program outcomes</u>

CO-PO Mapping with Programme Specific Outcomes (Course Articulation Matrix):

Level of Correlation between PSO's and CO's

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	**15**	**15**	**15**	**15**	**15**
Weighted Percentage	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

S-Strong M-Medium L-LowM

Subject Code	Subject Name	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
UCBATS22	**Business Etiquette and Corporate Grooming**	SEC	Y	-	-	-	2	2	25	75	100

Learning Objectives	
CLO1	To impart knowledge about basic etiquettes in professional conduct
CLO2	To provide understanding about the workplace courtesy and ethical issues involved
CLO3	To suggest on guidelines in managing rude and impatient clients
CLO4	To familiarize students about significance of cultural sensitivity and the relative business attire
CLO5	To stress on the importance of attire

UNIT	Details	No. of Hours	Learning Objectives
I	Introduction to Business Etiquette: Introduction- ABCs of etiquette- meeting and greeting scenarios- principles of exceptional work behavior – role of good manners in business – professional conduct and personal spacing.	6	CLO1
II	Workplace Courtesy and Business Ethics: Workplace Courtesy- Practicing common courtesy and manners in a workplace - Etiquette at formal gatherings- Professional qualities expected from an employer's perspective - Hierarchy and Protocol. Ethical issues - preventing sexual harassment - conflict resolution strategies-Choosing appropriate gift in the business environment - real life workplace scenarios – company policy for business etiquette	6	CLO2
III	Telephone Etiquette – Email etiquette - Disability Etiquette - Mastering the telephone courtesy - handling rude or impatient clients - internet usage in the workplace - email etiquette - online chat etiquette guidelines - Basic disability Etiquette practices.	6	CLO3
IV	Diversity and Cultural Awareness at Workplace Impact of diversity- Cultural Sensitivity- Taboos and Practices- Inter-Cultural Communication.	6	CLO4
V	Business Attire and Professionalism Business style and professional image – dress code- guidelines for appropriate business attire – grooming for success.	6	CLO5
	Total	**30**	

Course Outcomes

Course Outcomes	On completion of this course, students will;	Program Outcomes
CO1	Describe basic concepts of business etiquette and corporate grooming.	PO5, PO6,
CO2	Outline the etiquette and grooming standards followed in business environment and the significance of communication.	PO4, PO2, PO5, PO6
CO3	Create cultural awareness and moral practices in real life workplace scenarios.	PO8, PO6
CO4	Analyze workplace courtesy and resolve ethical issues with respect to etiquette and grooming for success.	PO1, PO3, PO8, PO6
CO5	Apply the professionalism in the workplace considering diversity and courtesy.	PO3, PO8, PO6
Reading List		
1.	Journal of Computer Mediated Communication By ICA	
2.	Business and Professional Communication by Sage Journals	
3.	Business Etiquette Made Easy: The Essential Guide to Professional Success by Myka Meier, Skyhorse	
4.	Emily Post's The Etiquette Advantage in Business: Personal Skills for Professional Success by Peggy Post and Peter Post, William Morrow	
5.	Shital Kakkar Mehra, “Business Etiquette: A guide for the Indian Professional”, Harper Collins Publisher (2012)	
References Books		
1.	Indian Business Etiquette, Raghu Palat, JAICO Publishers	
2.	Nina Kochhar, “At Ease with Etiquette”, B. Jain Publisher,2011	
3.	Nimeran Sahukar, Prem P. Bhalla, “The Book of Etiquette and manners”, Pustak Mahi Publishers, 2004	
4.	Sarvesh Gulati (2012), Corporate Grooming and Etiquette, Rupa Publications India Pvt. Ltd.	
5.	The Essentials of Business Etiquette: How to Greet, Eat, and Tweet Your Way to Success by Barbara Pachter , Mc Graw Hill Education	
Web Resources		
1.	http://osou.ac.in/eresources/DIM-08-BLOCK-3.pdf	
2.	https://www.columbustech.edu/skins/userfiles/files/Training%20Manual%20-%20Business%20Etiquette%20(1).pdf	
3	https://www.sbu.edu/docs/default-source/life-at-sbu-documents/professional-wardrobe-nbsp-.pdf	
4	https://www.tutorialspoint.com/business_etiquette/grooming_etiquettes.htm	
5	https://wikieducator.org/Business_etiquette_and_grooming	

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminar	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	M	M	S	S	S
CO 2	M	M	S	S	S
CO 3	S	S	S	S	S
CO 4	S	S	S	S	S
CO 5	M	M	S	S	S

S-Strong M-Medium L-LowM

CO-PO Mapping with Programme Specific Outcomes (Course Articulation Matrix): Level of Correlation between PSO's and CO's

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	**15**	**15**	**15**	**15**	**15**
Weighted Percentage	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**

FIRST YEAR – SEMESTER – I

CORE – I: FINANCIAL ACCOUNTING I

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTC11	5	-	-	-	4	5	25	75	100

Learning Objectives	
LO1	To know various Concepts of Accounting.
LO2	To comprehend Accounting Principles & Conventions.
LO3	To acquire practical knowledge in the basics of Accounting.
LO4	To understand the Depreciation a/c, Bill of Exchange and Accounting for Incomplete Records.
LO5	To learn Royalty Account and calculation of Fire Insurance Claims.

Prerequisites: Should have studied Accountancy in XII Std

Unit	Contents	No. of Hours
I	**Fundamentals of Financial Accounting** Financial Accounting – Meaning – Definition – Objectives - Basic Accounting Concepts and Conventions – Journal - Ledger Accounts - Subsidiary Books - Trial Balance - Classification of Errors - Rectification of Errors - Preparation of Suspense Account.	**15**
II	**Final Accounts** Final Accounts of Sole Trading Concern - Capital Expenditure and Capital Receipts – Revenue Expenditure and Revenue Receipts - Preparation of Trading, Profit and Loss Account and Balance Sheet with Adjustments - Bank Reconciliation Statement - Need and Preparation.	**15**
III	**Depreciation and Bills of Exchange** Depreciation – Meaning – Objectives - Accounting Treatments – Types - Straight Line Method - Diminishing Balance Method - Conversion Method - Units of Production Method – Cost Model Vs Revaluation Model. **Bills of Exchange** – Definition – Specimens – Discounting of Bills – Endorsement of Bill – Collection – Noting – Renewal – Retirement of Bill under rebate.	**15**
IV	**Accounting from Incomplete Records - Single Entry System** Incomplete Records - Meaning and Features - Limitations - Difference between Incomplete Records and Double Entry System - Methods of Calculation of Profit - Statement of Affairs Method.	**15**

V	**Royalty and Insurance Claims** Meaning – Minimum Rent – Short Working – Recoupment of Short Working – Lesser and Lessee – Accounting Treatment. **Insurance Claims** – Calculation of Claim Amount - Average clause (Loss of Stock only).	**15**
THEORY 20% & PROBLEM 80%		
CO	**Course Outcomes**	
CO1	Pass Journal Entries, prepare Ledger Account and prepare Trial Balance.	
CO2	Prepare Trading, Profit and Loss a/c and Balance Sheet	
CO3	Prepare Depreciation Account	
CO4	Prepare Statement of Profit or Loss and Statement of Affairs.	
CO5	Prepare Royalty Account and Calculate Insurance Claims under Fire Insurance.	
Textbooks		
1.	**S. P. Jain and K. L. Narang,** Financial Accounting- I, Kalyani Publishers, New Delhi.	
2.	**Shukla Grewal and Gupta,** Advanced Accounts, volume 1, S.Chand and Sons, New Delhi.	
3.	**R.L. Gupta and V.K. Gupta**, Financial Accounting, Sultan Chand, New Delhi.	
4.	**S.N. Maheshwari,** Financial Accounting, Vikas Publications, Noida.	
5.	**Radhaswamy and R.L. Gupta,** Advanced Accounting, Sultan Chand, New Delhi.	
Reference Books		
1.	**S. Thothadri & S. Nafees,** Financial Accounting, McGraw Hill Education (India) Private Limited, Chennai.	
2.	**T.S. Reddy and Murthy,** Financial Accounting, Margham Publications, Chennai.	
3.	**S.M. Shukla,** Financial Accounting, Sahitya Bhawan Publications, Agra.	
4.	**Mukherji & M. Hanif,** Financial Accounting, Tata McGraw Hill Pub. Co. Ltd., New Delhi.	
5.	**V.K.Goyal,** Financial Accounting, Excel Books, New Delhi.	
NOTE: Latest Edition of Textbooks May be Used		
Web Resources		
1.	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1	
2.	https://www.slideshare.net/ramusakha/basics-of-financial-accounting	
3.	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html	

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	2	3	3	3	2	2	2	3	2	2
TOTAL	15	10	15	15	13	11	10	10	15	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	2	3	2	2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – I

CORE – II: PRINCIPLES OF MANAGEMENT

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTC12	**5**	**-**	**-**	**-**	**4**	**5**	**25**	**75**	**100**

Learning Objectives	
LO1	To understand the basic management concepts and functions
LO2	To know the various techniques of planning and decision making
LO3	To familiarize with the concepts of organisation structure
LO4	To gain knowledge about the various components of staffing
LO5	To enable the students in understanding the control techniques of management

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to Management** Meaning - Definitions – Nature and Scope - Levels of Management – Importance - Functions of Management – Management Vs. Administration – Management: Science or Art – Evolution of Management Thoughts – F. W. Taylor, Henry Fayol, Peter F. Drucker, Elton Mayo - Trends and Challenges of Management. Managers – Qualification – Duties & Responsibilities.	**15**

II	**Planning** Planning – Meaning – Definitions – Nature – Scope and Functions – Importance and Elements of Planning – Types – Planning Process - Tools and Techniques of Planning – Management by Objective (MBO). Decision Making - Meaning – Characteristics – Types - Steps in Decision Making – Forecasting.	**15**
III	**Organizing** Meaning - Definitions - Nature and Scope – Characteristics – Importance – Types - Formal and Informal Organization – Organization Chart – Organization Structure - Meaning and Types – Departmentalization – Authority and Responsibility – Centralization and Decentralization – Span of Management.	**15**
IV	**Staffing** Introduction - Concept of Staffing - Staffing Process – Recruitment – Sources of Recruitment – Modern Recruitment Methods - Selection Procedure – Test - Interview – Training - Need – Types – Promotion – Management Games – Performance Appraisal - Meaning and Methods – 360 degree Performance Appraisal - Assessment Centre Method – Critical Incident Method – Work from Home - Managing Work from Home [WFH].	**15**
V	**Directing** Motivation – Meaning – Theories of Motivation – Maslow's Need Hierarchy Theory – Herzberg's Two Factor Theory –McGregor's Theory X and Theory Y. Leadership – Nature - Types and Theories of Leadership – Styles of Leadership - Qualities of a Good Leader – Successful Women Leaders – Challenges faced by women in workforce - Supervision. **Co-ordination and Control** Co-ordination – Meaning - Techniques of Co-ordination. Control - Characteristics - Importance – Stages in the Control Process - Requisites of Effective Control and Controlling Techniques – Management by Exception [MBE].	**15**
	Total	**75**
Course Outcomes		
CO1	Demonstrate the importance of principles of management.	
CO2	Paraphrase the importance of planning and decision making in an organization.	
CO3	Comprehend the concept of various authorizes and responsibilities of an organization.	
CO4	Enumerate the various methods of Performance appraisal	
CO5	Demonstrate the notion of directing, co-coordination and control in the management.	
Textbooks		

1	**Gupta.C.B,** Principles of Management L.M. Prasad, S.Chand& Sons Co. Ltd, New Delhi.
2	**Dinkar Pagare,** Principles of Management, Sultan Chand & Sons Publications, New Delhi.
3	**P.C.Tripathi & P.N Reddy,** Principles of Management. Tata McGraw, Hill, Noida.
4	**L.M. Prasad,** Principles of Management, S.Chand &Sons Co. Ltd, New Delhi.
5	**R.K. Sharma, Shashi K. Gupta, Rahul Sharma,** Business Management, Kalyani Publications, New Delhi.
Reference Books	
1	**K Sundhar,** Principles Of Management, Vijay Nichole Imprints Limited, Chennai
2	**Harold Koontz, Heinz Weirich,** Essentials of Management, McGraw Hill, Sultan Chand and Sons, New Delhi.
3	**Grifffin,** Management Principles and Applications, Cengage learning, India.
4	**H.Mintzberg** - The Nature of Managerial Work, Harper & Row, New York.
5	**Eccles, R. G. & Nohria, N. Beyond the Hype**, Rediscovering the Essence of Management, Boston The Harvard Business School Press, India.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	http://www.universityofcalicut.info/sy1/management
2	https://www.managementstudyguide.com/manpower-planning.htm
3	https://www.businessmanagementideas.com/notes/management-notes/coordination/coordination/21392

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	3	3	2	2	2	3	2	3
CO2	3	2	3	3	2	2	2	2	3	2	2
CO3	3	2	2	3	2	2	2	1	3	2	2
CO4	3	2	2	3	2	2	2	2	3	2	2
CO5	3	2	3	3	2	2	2	1	3	2	2

TOTAL	15	10	12	15	11	10	10	8	15	10	11
AVERAGE	3	2	2.4	3	2.2	2	2	1.6	3	2	2.2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – I

GENERIC ELECTIVE – I(A) : BUSINESS ECONOMICS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTA11	**4**	**-**	**-**	**-**	**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To understand the approaches to economic analysis
LO2	To gain knowledge on utility analysis and market structure
LO3	To know the various determinants of demand and supply
LO4	To learn the laws of variable proportions
LO5	To enable the students to understand profit theories & national income
Prerequisites: Should have studied Commerce in XII Std	

Unit	Contents	No. of Hours
I	**Introduction to Economics** Introduction to Economics – Wealth, Welfare and Scarcity Views on Economics – Positive and Normative Economics - Definition – Scope and Importance of Business Economics – Differences between Micro and Macro Economics – Role and Responsibilities of Business Economists – Economic System and its Types.	**12**
II	**Utility Analysis and Market Structure** Utility - Meaning – Characteristics – Cardinal – Ordinal – Indifference Curve – Assumptions - Significance and Properties - Total Utility – Marginal Utility – Law of Diminishing Marginal Utility – Law of Equi-Marginal Utility. Market Structure - Monopoly – Duopoly - Oligopoly - Monopolistic Competition – Perfect Competition- Meaning and Features.	**12**
III	**Demand & Supply Functions** Demand – Meaning - Demand Analysis - Demand Determinants - Law of Demand and its Exceptions - Elasticity of Demand - Definition – Types - Measurement and Significance - Demand Forecasting - Factors Governing Demand Forecasting - Methods of Demand Forecasting – Supply – Elasticity of Supply - Law of Supply and Determinants.	**12**

IV	**Production and Cost Functions** Production – Factors – Production Function – Iso-quants - Law of Variable Proportions – Economies of Scale – Laws of Returns to Scale - Break-Even Analysis. Cost and Revenue Functions – Types – Short Run – Long Run – Areas of Cost Control.	**12**
V	**Profit Theories and National Income** Theories of Profit – Rent - Risk and Uncertainty - National Income - Definition – Circular Flow – Measurement of National Income – Gross Domestic Product – National Domestic Product – Gross National Product – Net National Product – National Income and Welfare.	**12**
	TOTAL	**60**
Course Outcomes		
CO1	Explain the positive and negative approaches in economic analysis	
CO2	Describe the utility analysis & market structure	
CO3	Understood the factors of demand forecasting and supply	
CO4	Outline the internal and external economies of scale	
CO5	Understand the theories of profit & national income	
Textbooks		
1	**H.L. Ahuja,** Business Economics Micro & Macro, Sultan Chand & Sons, New Delhi.	
2	**C.M. Chaudhary,** Business Economics RBSA Publishers , Jaipur-03.	
3	**Aryamala.T,** Business Economics, Vijay Nocole, Chennai.	
4	**T.P Jain,** Business Economics, Global Publication Pvt. Ltd, Chennai.	
5	**D.M. Mithani,** Business Economics, Himalaya Publishing House, Mumbai.	
Reference Books		
1	**S.Shankaran,** Business Economics, Margham Publications, Chennai.	
2	**P.L.Mehta,** Managerial Economics, Analysis, Problems & Cases, Sultan Chand & Sons, New Delhi.	
3	**Peter Mitchelson and Andrew Mann,** Economics for Business-Thomas Nelson Australia	
4	**Ram singh and Vinaykumar**, Business Economics, Thakur Publication Pvt. Ltd, Chennai.	
5	**Saluram and Priyanka Jindal,** Business Economics, CA Foundation Study Material, Chennai.	
NOTE: Latest Edition of Textbooks May be Used		
Web Resources		

1	https://youtube.com/channel/UC69_-P77nf5-rKrjcpVEsqQ
2	https://www.icsi.edu/
3	https://www.yourarticlelibrary.com/marketing/pricing/product-pricing-objectives-basis-and-factors/74160

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	2	2	1	2	2
CO2	3	2	3	3	2	2	2	2	2	2	2
CO3	3	2	3	3	2	2	2	2	2	2	2
CO4	3	2	2	3	2	2	2	2	2	2	2
CO5	3	2	3	3	2	2	2	2	2	2	2
TOTAL	15	10	13	14	11	10	10	10	10	10	10
AVERAGE	3	2	2.6	2.8	2.2	2	2	2	2	2	2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER - I

GENERIC ELECTIVE – I(B) : INDIAN ECONOMIC DEVELOPMENT

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTA12	4	-	-	-	3	4	25	75	100

Learning Objectives	
LO1	To understand the concepts of economic growth and development
LO2	To know the features and factors affecting economic development
LO3	To gain understanding about the calculation of national income
LO4	To examine the role of public finance in economic development
LO5	To understand the causes of inflation

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Economic Development and Growth** Meaning & Definition - Concepts of Economic Growth and Development - Differences between Growth and Development - Measurement of Economic Development - Per Capita Income - Basic Needs - Physical Quality of Life Index - Human Development Index and Gender Empowerment Measure - Factors affecting Economic Development.	**12**
II	**Classification of Nations on the basis of Development** Characteristics of Developing Countries and Developed Countries - Population and Economic Development - Theories of Demographic Transition - Human Resource Development and Economic Development - Human Development Index (HDI) – Classification - Economic Reforms Since1991 - Features and Appraisals of Liberalisation Globalisation and Privatisation (LPG Policy) - Concepts of Demonetization and GST.	**12**
III	**National Income** Meaning – Importance - National Income – Concept - Types of measurement - Comparison of National Income at Constant and Current Prices - Aggregates related to National Income - GNP, NNP, GDP and NDP - At market price, at factor cost - Real and Nominal GDP - GDP Deflator - Sectorial Contribution to National Income. National Income and Economic Welfare – Study of economic policies adopted by the Indian government, including fiscal policy, monetary policy, and trade policy.	**12**

IV	**Public Finance** Meaning – Importance - Role of Public Finance in Economic Development - Public Revenue-Sources - Direct and Indirect taxes - Impact and Incidence of Taxation - Public Expenditure - Classification and Cannons of Public Expenditure - Public Debt – Need - Sources and Importance – Budget – Importance - Types of Deficits – Revenue – Budgetary - Primary and Fiscal - Deficit Financing.	**12**
V	**Money Supply** Theories of Money and Its Supply - Types of Money - Broad, Narrow and High Power - Concepts of M1, M2 and M3 - Inflation and Deflation - Types, Causes and Impact - Price Index - CPI and WPI - Role of Fiscal Policy in Controlling Money supply - Money Creation by the Commercial Banking System - Central Bank and its Functions (Example of the Reserve Bank of India) - Crypto currency and its impact on the global financial system.	**12**
TOTAL		**60**
Course Outcomes		
CO1	Elaborate the role of State and Market in Economic Development	
CO2	Explain the Sectorial contribution to National Income	
CO3	Illustrate and Compare National Income at constant and current prices.	
CO4	Describe the canons of public expenditure	
CO5	Understand the theories of money and supply	
Textbooks		
1	**Dutt and Sundaram,** Indian Economy, S.Chand, New Delhi	
2	**V.K. Puri, S.K. Mishra,** Indian Economy, Himalaya Publishing house, Mumbai	
3	**Remesh Singh,** Indian Economy, McGraw Hill, Noida.	
4	**Nitin Singhania,** Indian Economy, McGraw Hill, Noida.	
5	**Sanjeverma,** The Indian Economy, unique publication, Shimla.	
Reference Books		
1	**Ghatak Subrata,** Introduction to Development Economics, Routledge Publications, New Delhi.	
2	**Sukumoy Chakravarthy**, Development Planning- Indian Experience, OUP, New Delhi.	
3	**Ramesh Singh**, Indian Economy, McGraw Hill, Noida.	
4	**Mier, Gerald M**, Leading issues in Economic Development, OUP, New Delhi.	
5	**Todaro & Micheal P**, Economic Development in the third world, Orient Longman, Hyderabad	

NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	http://www.jstor.org
2	http://www.indiastat.com
3	http://www.epw.in

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	2	2	2	2	2
CO2	3	2	3	3	2	2	2	2	2	3	2
CO3	3	2	3	3	2	2	2	2	2	2	2
CO4	3	2	3	3	2	2	2	2	2	2	2
CO5	3	2	3	3	2	2	2	2	2	2	2
TOTAL	15	10	14	15	10	10	10	10	10	13	10
AVERAGE	3	2	2.8	3	2	2	2	2	2	2.2	2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – I

GENERIC ELECTIVE – I (C) : BUSINESS ORGANISATION

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTA13	**4**	**-**	**-**	**-**	**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To impart knowledge on concept of business organization
LO2	To make the students understand the size of business units
LO3	To familiarize the different forms of business organisation
LO4	To gain knowledge about the business combination & trade association
LO5	To know the concept of organizational structure

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction** Business Organization – Definition - Concept – Characteristics – Objectives – Significance – Functions – Principles of Organization – Features of Business Organization – Benefits of Business Organisation – Limitations of Business Organisation	**12**

II	**Size of Business Units** Criteria for measuring Size of Business – Factors determining the Size – Classification of business according to Size – Micro – Small – Medium – Large – Importance of MSME units – Benefits available to MSMEs	**12**
III	**Forms of Business Organisations** Sole Proprietorship – Features - Merits and Limitations - Partnership – Features – Types of Partners – Merits and Limitations of Partnership - Registration of a Partnership Firm - Partnership Deed – HUF – Features - LLP – Features - Merits & Limitations – Company – Features, Merits and Limitations of various Types – Public Co. – Private Co. – OPC – MNC's.	**12**
IV	**Business Combinations and Trade Association** Business Combinations – Meaning – Advantages – Limitations – Types - Merger – Acquisition – Amalgamation. Trade Association – Trade Union - Chamber of Commerce - FICCI - Difference between Trade Association and Chamber of Commerce.	**12**
V	**Organisational Structure** Concept - Importance - Types of Structure – Hierarchical - Functional - Flat – Line Organisation – Divisional - Matrix - Team-Based - Network - Mintzberg's five types of Organisational structure - Formal and Informal Organisation – Delegation - Elements - Importance – Decentralization - Importance – Delegation Vs. Decentralisation.	**12**
	TOTAL	**60**

Course Outcomes	
CO1	Understand the concept of business organisation
CO2	Analyse various size of business units.
CO3	Analyse different forms of business organizations.
CO4	Comprehend various business combinations & trade association
CO5	Understand the different types of organizational structure
Textbooks	
1	**M.C. Shukla,** Business Organisation and Management, S.Chand Publishing, New Delhi.
2	**Robbins, S. T., Judge, T. A., & Hasham, E. S.** (2013). Organisational Behavior. Pearson.
3	**Singh, K.** (2015), Organisational Behavior, Texts & Cases (3rd Edition ed.). India: Pearson.
4	**P.N.Reddy,** Principles of Business Organisation and Management, S.Chand Publishing, New Delhi.
5	**Bhushan Y.K.,** Fundamental of Business Organisation & Management, Sultan Chand Sons, New Delhi.

Reference Books	
1	**C.B.Gupta,** Business Organisation and Management, Sultan Chand & Sons, New Delhi.
2	**C.D. Balaji and G.Prasad,** Business Organisation, Margham Publication, Chennai.
3	**Dr. K. Sundar,** Business Organisation, Vijay Nicole Imprints (P) Led., Chennai.
4	**Dr. F.C Sharma,** Business Organisation, SBPD Publications
5	**Sahitya Bhawan Class 11 Business Studies book based on NCERT**
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.investopedia.com/terms/e/ecommerce.asp
2	https://www.webfx.com/industries/retail-ecommerce/ecommerce/basic-ecommerce-marketing-concepts/
3	https://techbullion.com/the-importance-of-ethics-in-ecommerce/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	2	2	2	2	2	2
CO2	3	3	2	3	2	2	2	3	2	2	2
CO3	3	3	2	3	2	2	2	2	2	2	2
CO4	3	3	2	3	2	2	2	2	2	2	2
CO5	3	3	2	3	2	2	2	2	2	2	2
TOTAL	15	15	15	15	10	10	10	11	10	10	10
AVERAGE	3	3	3	3	2	2	2	2.2	2	2	2

3 – Strong, 2- Medium, 1- Low

SKILL ENHANCEMENT COURSE –I (NME) : E- BUSINESS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTS11	2	-	-	-	2	2	25	75	100

Learning Objectives	
LO1	To know the goals of Electronic Commerce
LO2	To understand the various Business models in emerging E-Commerce areas
LO3	To have an insight on the Internet Marketing Technologies
LO4	To understand the benefits and implementation of EDI
LO5	To examine the ethical issues of E-Commerce

Prerequisite: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to E-Business** E-Business – E-Commerce – Features – Components – Business Intelligence – E-CRM – E-Supply Chain Management - ERP Traditional Commerce Vs. E-Commerce – Advantages – Limitations – Ethical, Social & Political Issues.	**6**
II	**E-Commerce Business Models** Models based on Transacting Parties – B2B – B2C – C2C –B2G – G2B – G2C- Models based on Transaction Types – Storefront – Marketplace - Online Auction - Online Advertising - Info-mediary - Online Brokerage – Freemium - Virtual Communities – Subscription - Access Charge Models.	**6**
III	**E-Commerce Marketing Concepts** Basic E-Marketing Concepts – E-Marketing Strategy – E-Services - Categories of e-services - Web Enabled Services - Information – Selling on the Web.	**6**
IV	**Electronic Data Interchange & Security** EDI – Scope – Components – Process – Benefits – Security - Online Shopping & E-Tailing – Product Delivery Modes – Advantages – Disadvantages – Modes of Payment - Threats in Computer Systems – Virus - Cyber Crime - Proxy Server.	**6**
V	**Modern E-Commerce Terminologies and Ethics in E-Commerce** Modern E-Commerce Terminologies - M-Commerce – U-Commerce – O2O – IoT – Intelligent Assistants – Artificial Intelligence - Deep Learning & Machine Learning – Ethics in E-Commerce - Ethical Issues in E- commerce.	**6**
	TOTAL	**30**

CO	Course Outcomes
CO1	Understand the role and features of E- Commerce
CO2	Understand the Different Models of E -Tailing
CO3	Use the web enabled services
CO4	Tackle the threats in internet security system

CO5	Know about the Ethical Scenario of E- Commerce.
Textbooks	
1	**Kenneth C. Laudon,** E-Commerce: Business, Technology, Society, 4 the Edition, Pearson Education Limited, New Delhi
2	**S. J. Joseph,** E-Commerce: an Indian perspective, PHI Learning Pvt. Ltd., New Delhi
3	**David Whitley,** E-Commerce-Strategy, Technologies & Applications, TMI, McGraw-Hill, London
4	**Kamlesh K. Bajaj,** E-Commerce- The cutting edge of business, TMH, McGraw-Hill, Noida
5	**W Clarke,** E-Commerce through ASP - BPB, Wrox Publisher, Mumbai
Reference Books	
1	**Agarwala, K.N. and D. Agarwala,** Business on the Net : What's and How's of E-Commerce, McMillan Publisher India Pvt. Ltd., Chennai
2	**Ravi Kalkota,** Frontiers of E-Commerce, TM, Pearson Education Limited, New Delhi
3	**Elias M** Awad, Electronic Commerce : From Vision to Fulfilment, PHI Learning Pvt. Ltd., New Delhi
4	**Mathew Reynolds,** Beginning E-Commerce with Visual Basic, ASP, SQL Server 7.0 & MTS, Wrox Publishers, Mumbai
5	**J. Christopher West I and Theodore H. K Clark** ,Global Electronic Commerce-Theory and Case Studies, The MIT Press, Cambridge, London
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.investopedia.com/terms/e/ecommerce.asp
2	https://www.webfx.com/industries/retail-ecommerce/ecommerce/basic-ecommerce-marketing-concepts/
3	https://techbullion.com/the-importance-of-ethics-in-ecommerce/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	2	2	3	3	2
CO2	3	2	2	2	3	2	2	2	3	3	2
CO3	3	2	3	2	3	2	2	2	3	3	2
CO4	3	2	2	2	3	2	2	2	3	3	2
CO5	3	2	3	2	3	2	2	2	3	3	2

TOTAL	15	10	13	10	15	10	10	10	15	15	10
AVERAGE	3	2	2.6	2	3	2	2	2	3	3	2

3 – Strong, 2- Medium, 1- Low

SKILL ENHANCEMENT COURSE (FC) : BASICS OF COMMERCE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTF12	**2**	**-**	**-**	**-**	**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	To impart knowledge about of business
LO2	To familiarize the classification of business activities
LO3	To make the students understand about business finance
LO4	To familiarize the ethical practices of business
LO5	To gain knowledge about social responsibility of business

Unit	Contents	No. of Hours
I	**Nature & Scope of Business** Concept of Business – Objectives of Business – Importance - Characteristics – Scope - Business Risk – Qualities of Successful Businessman – Source of Profit in Business – Business Vs. Profession – Business Vs. Employment.	**6**
II	**Classification of Business Activities** Industry – Types - Commerce – Scope of Commerce – Causes of Hindrance to Trade – Removal Mechanism – Trade – Types of Trade – Difference between Trade and Commerce	**6**
III	**Business Finance** Business Finance - Meaning and Nature – Significance - Objectives and Scope – Functions - Financial Executive in an Organisation - Sources of Business Finance – Factors influencing choice of Business Finance.	**6**
IV	**Business Ethics** Ethics – Meaning – Definition – Characteristic - Business Ethics – Importance – Ethical Practices in Business – Unethical Practices in Business.	**6**
V	**Social Responsibility of Business** Concept of Social Responsibility – Need for Social Responsibility – Kinds of Social Responsibility – Business and Environmental Protection – Role of Business in Environmental Protection.	**6**
	TOTAL	**30**

Course Outcomes	
CO1	Understand the various concepts of Business

CO2	Comprehend the various Business Activities
CO3	Know the concept of Business Finance
CO4	Acquire knowledge on Business Ethics
CO5	Realise the Social Responsibility of Business
Textbooks	
1	**Stephen J. Skripak,** Fundamentals of Business, Virginia Tech Libraries.
2	**Anunay Nanda , Anubhav Nanda ,** Business Studies Class 12 Book, Nanda Bros; Third Edition (1 January 2021)
3	**Arihant Experts,** Handbook of Business Studies, Arihant Publications;
4	**Poonam Gandhi,** Business Studies, VK Global Publications Pvt Ltd, 2022nd edition
5	**Dr. T. V. Raju, Dr. K. Sheshamurthy,** Business Studies, Sapna Book House

Reference Books	
1	**Alka Dhawan,** Business Studies, Avichal Publishing Company (1 February 2022)
2	**C B Gupta,** I.S.C Business Studies, Goyal Brothers Prakashan, Special Edition (1 January 2022)
3	**NCERT**, Class 11 Business Studies & Accountancy
4	**Dr. R. S. Kulshreshtha, Dr. V. S. Singh,** Business Finance, SBPD Publishing House, Agra
5	**Hardcover, M.V. Rodriques,** Business Ethics and Corporate Social Responsibility, Concept Publishing Company Pvt. Ltd.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.youtube.com/watch?v=9Oz8TdKwUG8&pp=ygUQYnVzaW5lc3Mgc3R1ZGllcw%3D%3D
2	https://www.youtube.com/watch?v=0ly_Q8DtL2U&pp=ygUQYnVzaW5lc3Mgc3R1ZGllcw%3D%3D
3	https://www.youtube.com/watch?v=oXmdG6ZcVoc&pp=ygUQYnVzaW5lc3Mgc3R1ZGllcw%3D%3D

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	2	3	3	2	2	2	3	2	2

CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	3	3	3	3	3	3	3	3	3	3
TOTAL	16	11	14	15	14	12	11	11	15	11	11
AVERAGE	3.2	2.2	2.8	3	2.8	2.4	2.2	2.2	3	2.2	2.2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER - II

CORE – III: FINANCIAL ACCOUNTING-II

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTC21	**5**	**-**	**-**	**-**	**4**	**5**	**25**	**75**	**100**

Learning Objectives	
LO1	To understand the concepts of Hire Purchase and Instalment Purchase System.
LO2	To impart knowledge of Accounting for Branches.
LO3	To gain knowledge in the preparation of Accounts during Admission & Retirement of a Partner.
LO4	To comprehend the Accounting process of Partnership Dissolution.
LO5	To enlighten the students about the Indian Accounting Standards and IFRS.

Prerequisites: Should have studied Accountancy in XII Std

Unit	Contents	No. of Hours
I	**Hire Purchase and Instalment System** Hire Purchase System – Accounting Treatment – Calculation of Interest - Default and Repossession - Hire Purchase Trading Account - Instalment System – Meaning – Hire Purchase System Vs Instalment Purchase System.	**15**
II	**Branch Accounts and Departmental Accounts** Branch – Dependent Branches: Accounting Aspects - Debtors System - Stock and Debtors system – Distinction between Wholesale Profit and Retail Profit (Independent Branch & Foreign Branches excluded). Departmental Accounts: Basis of Allocation of Expenses – Inter-Departmental Transfer at Cost or Selling Price.	**15**

III	**Partnership Accounts - I** Partnership Accounts – Admission of a Partner – Calculation of New Ratio – Calculation of Sacrificing Ratio - Calculation of Goodwill – Retirement of a Partner – Calculation of Gaining Ratio - Preparation of Revaluation a/c, Capital a/c and Balance Sheet during Admission of a Partner and Retirement of a Partner.	**15**
IV	**Partnership Accounts - II** Dissolution of Partnership - Methods – Settlement of Accounts – Preparation of Realisation a/c and Capital a/c (Simple Problems Only) – Insolvency of Partners – Application of Garner Vs Murray Rule (Concept only).	**15**
V	**Accounting Standards for Financial Reporting (Theory only)** Objectives and Uses of Financial Statements for Users - Role of Accounting Standards - Role of IFRS- IFRS Adoption vs Convergence Implementation Plan in India- Ind AS- An Introduction - Difference between Ind AS and IFRS.	**15**
	TOTAL	**75**
THEORY 20% & PROBLEMS 80%		
Course Outcomes		
CO1	Distinguish between Hire Purchase System and Instalment Purchase System.	
CO2	Prepare Branch Account and Departmental Trading, Profit & Loss a/c.	
CO3	Prepare Revaluation a/c, Capital a/c and Balance Sheet.	
CO4	Prepare Realization a/c and Capital a/c.	
CO5	Discuss Ind AS and IFRS.	
Textbooks		
1	**S. P. Jain and K. L. Narang,** Financial Accounting- I, Kalyani Publishers, New Delhi.	
2	**Shukla Grewal and Gupta,** Advanced Accounts, Volume 1, S.Chand and Sons, New Delhi.	
3	**R.L. Gupta and V.K. Gupta,** Financial Accounting, Sultan Chand, New Delhi.	
4	**S.N. Maheshwari,** Financial Accounting, Vikas Publications, Noida.	
5	**Radhaswamy and R.L. Gupta,** Advanced Accounting, Sultan Chand, New Delhi.	
Reference Books		
1	**S. Thothadri & S. Nafees,** Financial Accounting, McGraw Hill Education (India) Private Limited, Chennai.	
2	**T.S. Reddy and Murthy,** Financial Accounting, Margham Publications, Chennai.	
3	**S.M. Shukla, Financial Accounting**, Sahitya Bhawan Publications, Agra.	
4	**Mukherji & M. Hanif,** Financial Accounting, Tata McGraw Hill Pub. Co. Ltd., New Delhi.	

5	**V.K.Goyal,** Financial Accounting, Excel Books, New Delhi.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	2	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	3	3	3	3	3	3	3	3	3	3
TOTAL	16	11	14	15	14	12	11	11	15	11	11
AVERAGE	3.2	2.2	2.8	3	2.8	2.4	2.2	2.2	3	2.2	2.2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – II

CORE – IV: BUSINESS LAW

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTC22	5	-	-	-	4	5	25	75	100

Learning Objectives	
LO1	To know the nature and objectives of Mercantile law and the essentials of Valid Contract
LO2	To gain knowledge on the Performance and Discharge of Contracts
LO3	To comprehend the rules of the Indemnity and Guarantee
LO4	To acquire knowledge on the essentials of Bailment and pledge
LO5	To understand the provisions relating to the Sale of Goods and the Contract of Agency

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Elements of Contract** Indian Contract Act 1872 - Definition of Contract - Essentials of a Valid Contract - Classification of Contract - Offer and Acceptance – Consideration – Capacity to Contract – Free Consent - Legality of Object – Contingent Contracts – Void Contract.	**15**
II	**Performance of Contract** Performance - Meaning - Offer to Perform - Devolution of Joint Liabilities & Rights - Time and Place of Performance - Reciprocal Promises - Assignment of Contracts – Termination and Discharge of Contract - Remedies for Breach of contract - - Quasi Contract.	**15**
III	**Contract of Indemnity and Guarantee** Contract of Indemnity - Contract of Guarantee – Contract of Indemnity Vs Contract Guarantee - Extent of Surety's Liability - Kinds of Guarantee - Rights of Surety - Discharge of Surety.	**15**
IV	**Bailment and Pledge** Bailment and Pledge – Bailment – Concept – Essentials - Classification of Bailment - Duties and Rights of Bailor and Bailee – Pledge – Meaning – Essentials of Valid Pledge - Pledge and Lien - Rights and Duties of Pawner and Pawnee.	**15**

V	**Sale of Goods Act 1930 & Contract of Agency** Definition of Contract of Sale – Formation - Essentials of Contract of Sale - Conditions and Warranties - Transfer of Property – Contracts involving Sea Routes - Sale by Non-owners - Rights and Duties of Buyer - Rights of an Unpaid Seller. Law of Agency – Essentials of an Agency – Duties and Rights of an Agent- Duties and Rights of Principal – Termination of Agency.	**15**
	TOTAL	**75**
Course Outcome		
CO1	Explain the Objectives and significance of Mercantile law	
CO2	Understand the clauses and exceptions of Indian Contract Act.	
CO3	Outline the contract of indemnity and guarantee	
CO4	Familiar with the provision relating to Bailment and Pledge	
CO5	Explain the various provisions of Sale of Goods Act 1930	
Textbooks		
1	**N.D. Kapoor ,** Business Laws- Sultan Chand and Sons, New Delhi.	
2	**R.S.N. Pillai ,** Business Law, S.Chand, New Delhi.	
3	**M C Kuchhal& Vivek Kuchhal,** Business Law, S Chand Publishing, New Delhi	
4	**M.V. Dhandapani,** Business Laws, Sultan Chand and Sons, New Delhi.	
5	**Shusma Aurora,** Business Law, Taxmann, New Delhi.	
Reference Books		
1	**Preethi Agarwal,** Business Law, CA foundation study material, Chennai.	
2	**Saravanavel, Sumathi, Anu, Business Law** Himalaya Publications, Mumbai.	
3	**Kavya and Vidhyasagar,** Business Law, Nithya Publication, New Delhi.	
4	**D.Geet,** Business Law Nirali Prakashan Publication, Pune.	
5	**M.R. Sreenivasan ,** Business Laws, Margham Publications, Chennai.	
NOTE: Latest Edition of Textbooks May be Used		
Web Resources		
1	www.cramerz.comwww.digitalbusinesslawgroup.com	
2	http://swcu.libguides.com/buslaw	
3	http://libguides.slu.edu/businesslaw	

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	2	2	2	2	2

CO2	3	2	3	3	2	2	2	2	2	2	2
CO3	3	2	2	3	2	2	2	2	2	2	2
CO4	3	2	3	3	2	2	2	2	2	2	2
CO5	3	2	3	3	2	2	2	2	2	2	2
TOTAL	15	10	13	15	10	10	10	10	10	10	10
AVERAGE	3	2	2.6	3	2	2	2	2	2	2	2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – II

GENERIC ELECTIVE – II (A): ALLIED BUSINESS ENVIRONMENT

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTA21	**4**	**-**	**-**	**-**	**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To understand the Nexus between Environment and Business.
LO2	To know the Political Environment in which the Businesses operate.
LO3	To gain an insight into Social and Cultural Environment.
LO4	To familiarize the concepts of an Economic Environment.
LO5	To learn the trends in Global Environment / Technological Environment

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to Business Environment** Business Environment – Concept - Nature and Significance – Elements of Environment - Interaction between Internal and External Environments – Techniques of Environment Analysis – Approaches and Significance of Environment Forecasting.	**12**
II	**Political Environment** Political Environment – Government and Business Relationship in India – Provisions of Indian Constitution Pertaining to Business – Political Factors affecting the Business.	**12**
III	**Social and Cultural Environment** Social and Cultural Environment – Impact of Foreign Culture on Business – Cultural Heritage – Culture and Organisational Behaviour - Social Groups – Business Ethics and Corporate Governance – Relationship between Society and Business - Social Responsibilities of Business.	**12**

IV	**Economic Environment** Economic Environment – Significance and Elements of Economic Environment - Economic Systems and their Impact of Business – Planning in India – Emergence and Objectives – Liberalisation, Privatization and Globalisation of Indian Economy (LPG) – Urbanization - Fiscal Deficit – Plan Investment – Per Capita Income and their Impact on Business Decisions.	**12**
V	**Technological Environment** Technological Environment – Concept - Meaning - Features of Technology- Status of Technology in India - Transfer of Technology – Channels – Methods – Limitations - Impact of Technology on Business.	**12**
	TOTAL	**60**
Course Outcomes		
CO1	Remember the nexus between environment and business.	
CO2	Apply the knowledge of Political Environment in which the businesses operate.	
CO3	Analyze the various aspects of Social and Cultural Environment.	
CO4	Evaluate the parameters in Economic Environment.	
CO5	Create Technological Environment for business to operate globally.	
Textbooks		
1	**C. B. Gupta,** Business Environment, Sultan Chand & Sons, New Delhi	
2	**Francis Cherunilam,** Business Environment, Himalaya Publishing House, Mumbai	
3.	**Dr. V.C. Sinha,** Business Environment, SBPD Publishing House, UP.	
4.	**Aswathappa.K,** Essentials of Business Environment, Himalaya Publishing House, Mumbai	
5.	**Rosy Joshi, Sangam Kapoor & Priya Mahajan,** Business Environment, Kalyani Publications, New Delhi	
Reference Books		
1.	**Veenakeshavpailwar,** Business Environment, PHI Learning Pvt Ltd, New Delhi	
2.	**Shaikhsaleem,** Business Environment, Pearson, New Delhi	
3.	**S. Sankaran,** Business Environment, Margham Publications, Chennai	
4.	**Namitha Gopal,** Business Environment, Vijay Nicole Imprints Ltd., Chennai	
5.	**Ian Worthington, Chris Britton, Ed Thompson,** The Business Environment, F T Prentice Hall, New Jersey	
NOTE: Latest Edition of Textbooks May be Used		
Web Resources		
1	www.mbaofficial.com	
2	www.yourarticlelibrary.com	
3	www.businesscasestudies.co.uk	

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	3	2	2	3	2	3	3
CO2	3	2	2	3	3	2	3	3	2	3	3
CO3	3	2	3	3	3	2	3	3	2	3	3
CO4	3	2	3	3	3	2	2	3	2	3	3
CO5	3	2	3	3	3	2	3	3	3	3	3
TOTAL	15	10	14	15	15	10	13	15	11	15	15
AVERAGE	3	2	2.8	3	3	2	2.6	3	2.2	3	3

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER - II

GENERIC ELECTIVE – II(B): ALLIED - INSURANCE AND RISK MANAGEMENT

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTA22	**4**	**-**	**-**	**-**	**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To know the Concepts and Principles of Contract of Insurance and Insurance Intermediaries.
LO2	To understand the Basic Concepts of Life Insurance and know the classification of Annuities.
LO3	To gain knowledge on the Principles of General Insurance.
LO4	To examine the Insurance Regulatory and Development Authority 1999 (IRDA) and its regulations for all Types of Insurance.
LO5	To know the Risk Management Process.

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to Insurance** Definition of Insurance - Characteristics of Insurance – Principles of Contract of Insurance – General Concepts of Insurance – Insurance and Hedging – Types of Insurance – Insurance Intermediaries - Role of Insurance in Economic Development.	**12**

II	**Life Insurance** Life Insurance Business - Fundamental Principles of Life Insurance – Basic Features of Life Insurance Contracts - Life Insurance Products – Traditional and Unit Linked Policies – Individual and Group Policies - Types of Life Insurance Policies – Annuities - Need of Annuity Contracts, Annuity V/s Life Insurance - Classification of Annuities – Reinsurance – Double Insurance – Health Insurance.	**12**
III	**General Insurance** General Insurance Business - Fundamental Principles of General Insurance – Types - Fire Insurance - Fire Insurance Coverage – Marine Insurance - Clauses in Marine Policy – Motor Insurance – Types of Motor Insurance - Factors to be considered for Premium Fixing.	**12**
IV	**Risk Management** Risk Management – Objectives – Process – Sources of Risk – Methods of handling Risk - Risk Reduction - Risk Transfer – Risk Financing - Level of Risk Management – Corporate Risk Management.	**12**
V	**IRDA Act 1999** Insurance Regulatory and Development Authority (IRDA) Act 1999 – Introduction – Purpose, Duties, Powers and Functions of IRDA – Operations of IRDA – IRDA Regulations for General Insurance- Reinsurance, Life Insurance - Micro Insurance – Insurance Sector Reforms in India - Liberalization of Insurance Markets.	**12**
	TOTAL	**60**
Course Outcomes		
CO1	Identify the workings of insurance and hedging	
CO2	Evaluate the types of insurance policies and settlement	
CO3	Settle claims under various types of general insurance	
CO4	Know the protection provided for insurance policy holders under IRDA	
CO5	Evaluate the assessment and retention of risk	
Textbooks		
1	**Neeti Gupta, Anuj Gupta and Abha Chopra,** Risk Management and Insurance, Kalyani Publishers, New Delhi.	
2	**Dr.N. Premavathy** – Elements of Insurance, Sri Vishnu Publications, Chennai.	
3	**M.N. Mishra & S.B. Mishra,** Insurance Principles and Practice, S Chand Publishers, New Delhi.	
4	**Michel Crouhy,** The Essentials of Risk Management, McGraw Hill, Noida.	
5	**Thomas Coleman,** A Practical Guide to Risk Management, CFA, India.	
Reference Books		

1	**John C.Hull,** Risk Management and Financial Institutions (Wiley Finance), Johnwiley & sons, New Jersey.
2	**P.K. Gupta, Insurance and Risk Management,** Himalaya Publications, Mumbai.
3	**Dr. Sunilkumar, Insurance and Risk Management**, Golgatia publishers, New Delhi.
4	**Nalini PravaTripathy, Prabir Paal,** Insurance Theory & Practice, Prentice Hall of India.
5	**Anand Ganguly,** Insurance Management, New Age International Publishers.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.mcminnlaw.com/principles-of-insurance-contracts/
2	https://www.investopedia.com/terms/l/lifeinsurance.asp
3	https://www.irdai.gov.in/ADMINCMS/cms/frmGeneral_Layout.aspx?page=PageNo108&flag=1

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	2	2	2	2	2	2	2
CO2	3	2	3	2	2	2	2	2	2	2	2
CO3	3	2	3	2	2	2	2	2	2	2	2
CO4	3	2	3	2	2	2	2	2	2	2	2
CO5	3	2	3	2	2	2	2	2	2	2	2
TOTAL	15	10	15	10	10	10	10	10	10	10	10
AVERAGE	3	2	3	2	2	2	2	2	2	2	2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – II

GENERIC ELECTIVE – II (C): ALLIED - INTERNATIONAL TRADE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTA23	4	-	-	-	3	4	25	75	100

Learning Objectives	
LO1	To enable students familiarise with the basics of International Trade.
LO2	To know the various theories of International Trade.
LO3	To impart knowledge about International Trade Policy and Investment
LO4	To understand Balance of Payment and Balance of Trades
LO5	To gain knowledge about International Economic Institutions

Prerequisite: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to International Trade** International Trade – Meaning – Definition - Difference between Internal and International Trade – Importance of International Trade in the Global context – Modes of Entry in International Trade – Emerging Issues in International Trade – FEMA.	12
II	**Theories of International Trade** Theories of International Trade - Classical Theories - Adam Smith's Theory of Absolute Advantage – Ricardo's Comparative Cost Theory - Modern Theories of International Trade - Haberler's Opportunity Cost Theory – Heckscher –Ohlin's Modern theory – International trade and Factor Mobility Theory – Leontiff's Paradox.	12
III	**Balance of Payments and Balance of Trade** Balance of Payments – Importance – Components of BOP - Current Account - Capital Account & Official Settlement Accounts - Balance of Trade – Terms of Trade – Meaning – Definition – Difference between BOP and BOT.	12
IV	**International Trade Policy and Investment** International Trade Policy – TRIPS and TRIMS – India's Foreign Trade Policy – Foreign Direct Investment (FDI) – Foreign Institutional Investors (FIIs) – Foreign Portfolio Investment (FPI).	12
V	**International Economic Institutions** GATT – International Monetary Fund (IMF) – Wold Bank and UNCTAD – Wold Trade Organisation (WTO) – Asian Development Bank – United National Industrial Development Organisation (UNIDO) – International Trade Centre (ITC) – Wold Economic Forum (WEF).	12

	TOTAL	**60**
Course Outcomes		
CO1	Distinguish between the concept of internal and international trade.	
CO2	Define the various theories of international trade.	
CO3	Comprehend international trade policy and investment	
CO4	Examine the balance of payment and balance of trade	
CO5	Appraise the role of international economic institution	
Textbooks		
1	**Francis Cherunilam,** International Trade and Export Management – Himalaya Publishing House - Mumbai.	
2	**Paul.R.Krugman and Maurice Obstfeld,** International Economics (Theory and Policy) - Pearson Education Asia - Addison Wesley Longman (P) Ltd., New Delhi	
3	**Robert J.Carbaugh,** International Economics - Thomson Information Publishing Group -Wadsworth Publishing Company, California.	
4	**H.G. Mannur,** International Economics – Vikas Publishing House (P) Ltd., New Delhi	
5	**BimalJaiswal & Richa Banerjee**, Introduction To International Business, Himalaya Publication, Mumbai	
Reference Books		
1	**Dr. T. Aryamala,**Vijay Nicole, International Trade, Chennai	
2	**Avadhani, V.A,** International Financial Management, Himalaya Publications, Mumbai	
3	**Punam Agarwal and Jatinder Kaur,** International Business, Kalyani Publications, New Delhi	
4	**S Sankaran ,** International Trade, Margham Publication, Chennai	
5	**C B Gupta,** International Business, S Chand Publishing, New Delhi	
NOTE: Latest Edition of Textbooks May be Used		
Web Resources		
1	https://opentext.wsu.edu/cpim/chapter/2-1-international-trade/	
2	https://www.economicsdiscussion.net/balance-of-payment/balance-of-payments-international-trade-economics/30644	
3	https://www.wto.org/english/thewto_e/countries_e/india_e.htm	

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	2	2	2	3	2
CO2	3	2	3	2	3	2	2	2	2	3	2
CO3	3	2	3	2	3	2	2	2	2	3	2
CO4	3	2	3	2	2	2	2	2	2	3	2
CO5	3	2	3	2	2	2	2	2	2	3	2
TOTAL	15	10	15	10	12	10	10	10	10	15	10
AVERAGE	3	2	3	2	2.4	2	2	2	2	3	2

3 – Strong, 2- Medium, 1- Low

SKILL ENHANCEMENT COURSE –II : COMPUTER LITERACY IN COMMERCE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTS21	**-**	**-**	**2**	**-**	**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	To understand generation and types of Computer
LO2	To impart knowledge on Internet and its Applications
LO3	To familiarize the windows and its Operating System
LO4	To understand the basic concepts of a Word processing
LO5	To understand the basics of Power Point Presentation

Unit	Contents	No. of Hours
I	**Introduction to Computer** Computer – Generations of Computer - Types of Computer - Basic Applications of Computer – Components of Computer – Concept of Hardware and Software – Input and Output Devices – Storage Devices.	**6**

II	**Introduction to Internet** World Wide Web and Web Browsers - Basic of Computer Networks - PAN – LAN – MAN - WAN - Concept of Internet - Applications of Internet - Connecting to Internet - Knowing the Internet - Basics of Internet Connectivity related Troubleshooting Search Engines - Understanding URL - Domain Name - IP Address - Surfing the Web – Creating mails – Virtual Meetings – Google Meet – Zoom Meeting.	**6**
III	**Introduction to Windows** Window - Types of windows - Windows as an Operating System – Mac OS – Linux – Android – IOS- Control Panel Function – Installing a Printer – System and Security – Hardware & Sound – Network & Internet.	**6**
IV	**Word Processing** Word Processing - Working with Word Document - Opening an Existing Document - Creating a New Document- Saving - Selecting Text- Editing Text - Finding and Replacing Text - Formatting Text - Bullets and Numbering – Tabs - Paragraph Formatting - Page Setup - Spell Check - Language Setting and Thesaurus - Mail Merge - Short Cut Keys - Printing of Word Document.	**6**
V	**Power Point Presentation** Creating Presentation – Master Template Creation-Importing Images - Insertion of Objects and Charts in slides -Transition and Build in Animation Effects - Types of Slides - Slide Views - Formatting – Custom Animation and Transition Making Slideshow - Creating Business Presentation.	**6**
	TOTAL	**30**

Course Outcomes	
CO1	Understand the basic concepts of a computer
CO2	Gain the knowledge about the usage of internet
CO3	Recall the windows operating system
CO4	Know the basics of word processing
CO5	Prepare Power-Presentation for various business requirements.
Textbooks	
1	**Parameswaran R,** Computer Applications in Business, S. Chand & Sons, New-Delhi
2	**Sanjay Saxena,** Introduction to Computers & MS Office, Vikas Publishing House Pvt. Ltd., New Delhi.
3	**Mansi Bansal, Sushil Kumar Sharma,** Computer Application In Business , Mumbai, Maharashtra.
4	**Peter Norton,** "Introduction to Computers" –Tata McGraw-Hill, Noida.

5	**Renu Gupta,** Computer Applications in Business, Shree Mahavir Book Depot (Publishers) New Delhi.

Reference Books	
1	**Gupta, Swati ,**Office Automation System, Lap Lambert Academic Publication. USA.
2	**Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons,** "Microsoft 2003", Tata McGraw Hill, Noida.
3	**Dr.R. Deepalakshmi, Computer Fundamentals and Office Automation, Charulatha Publications, Tamilnadu.**
4	**John Walkenbach,** MS Excel 2007 Bible, Wiley Publication, New Jersey, USA.
5	**Glyn Davis &BrankoPecar,** Business Statistics using Excel, Oxford publications, Chennai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.youtube.com/watch?v=Nv_Nnw01FaU
2	https://www.udemy.com/course/office-automation-certificate-course/
3	https://guides.lib.umich.edu/ld.php?content_id=11412285

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	2	3	3	3	2	2	2	3	2	2
TOTAL	15	10	15	15	13	11	10	10	15	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	2	3	2	2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – II

SKILL ENHANCEMENT COURSE –III: BUSINESS COMMUNICATION

	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCCOTS22	**2**	**-**	**-**	**-**	**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	To enable the students to know the basics of business communication
LO2	To develop the students to understand about business letters
LO3	To impart knowledge on enquiries and replies
LO4	To develop the students to write collection letters
LO5	To enable the learners to update with various types of interviews

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to Business Communication** Communication - Meaning – Objectives – Importance - Types – Verbal and Non-verbal – Formal and Informal – Directions of Communication - Principles – Barriers of Communication - The 7Cs of Communication – E-Communication - E-mail – Teleconference – Social Network – Video Conferencing – Blogs	**6**
II	**Business Letters** Business letter – Functions - Kinds of business letters – Essentials of an effective business letter – Lay-out of a business letter – Tips for writing an effective business letter – Etiquettes for E-Correspondence.	**6**
III	**Enquiries and Replies** Enquiries – Status Enquiry - Replies – Offers and Quotations – Important terms used in offers and Quotations – Orders and their execution – Collection Letters – Sales Letters – Promotional Letters.	**6**
IV	**Collection Letters** Collection letter – Effective Collection Letter – Collection Series - Replies of Debtors - Circular Letters - Objectives of Writing Circular Letters – Specimen of Circular Letter.	**6**
V	**Interview Preparation** Application Letters – Preparation of Resume/Bio-data – Types of Resume - References – Testimonials - Interview: Meaning – Objectives and Techniques of Various Types of Interviews – Creating & Maintaining Digital Profile – Letters of Appointment.	**6**
	TOTAL	**30**

Course Outcomes	
CO1	Acquire the basic concept of business communication.
CO2	Exposed to effective business letter
CO3	Paraphrase the concept of various correspondences.
CO4	Prepare various business letters.
CO5	Acquire the skill of preparing an effective resume
Textbooks	
1	**Rajendra Pal & J.S. Korlahalli,** Essentials of Business Communication, Sultan Chand & Sons- New Delhi.
2	**Gupta and Jain,** Business Communication, Sahityabahvan Publication, New Delhi.
3	**K.P. Singha,** Business Communication, Taxmann, New Delhi.
4	**R. S. N. Pillai and Bhagavathi. S,** Commercial Correspondence, Chand Publications, New Delhi.
5	**M. S. Ramesh and R. Pattenshetty,** Effective Business English and Correspondence, S. Chand & Co, Publishers, New Delhi.
Reference Books	
1	**V.K. Jain and Om Prakash,** Business communication, S.Chand, New Delhi.
2	**Rithika Motwani,** Business communication, Taxmann, New Delhi.
3	**Shirley Taylor,** Communication for Business-Pearson Publications, New Delhi.
4	**Bovee, Thill, Schatzman,** Business Communication Today, Pearson Education, Private Ltd- NewDelhi.
5	**Penrose, Rasbery,** Myers, Advanced Business Communication, Bangalore.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://accountingseekho.com/
2	https://www.testpreptraining.com/business-communications-practice-exam-questions
3	https://bachelors.online.nmims.edu/degree-programs

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	2	2	2	2	2	2
CO2	3	3	2	3	2	2	2	3	2	2	2

CO3	3	3	2	3	2	2	2	2	2	2	2
CO4	3	3	2	3	2	2	2	2	2	2	2
CO5	3	3	2	3	2	2	2	2	2	2	2
TOTAL	15	15	15	15	10	10	10	11	10	10	10
AVERAGE	3	3	3	3	2	2	2	2.2	2	2	2

3 – Strong, 2- Medium, 1- Low

First Year Core –I Semester I

BUSINESS FINANCE

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTC11	**BUSINESS FINANCE**	CC	6	-	-	-	4	6	25	75	100

	Learning Objectives
1	To outline the fundamental concepts in finance
2	To estimate and evaluate risk in investment proposals and managing interest rate risk
3	To evaluate leasing and determine the sources of startup financing
4	To examine cash and inventory management techniques
5	To appraise capital budgeting techniques for MNCs

Course Units

UNIT I **(18 Hrs.)**

Introduction to Business Finance and Time Vale of Money

Business Finance – Concept - Objectives - Scope - Time Value of Money – Meaning - Causes – Present and Future Value Of Single Payments, Annuities, Annuities and Perpetuities - Growth in Annuities and Perpetuities – Effective Rate of Interest – Doubling Period (Rule of 69 and Rule of 72) – Practical Problems.

UNIT II **(18 Hrs.)**

Risk Management

Risk and Uncertainty - Concept – Sources of Risk – Measurement of Risk & Return – General pattern of Risk & Return – Criteria for Evaluating Proposals to Minimise Risk (Single Asset and Portfolio) – Methods of Risk Management–Hedging Currency Risk – Managing Interest Rate Risk – Interest Rate Risk Management Instruments: Short Term and Long Term.

UNIT III **(18 Hrs.)**

Start-up Financing and Leasing

Start-up Financing - Concept – Sources - Modes (Bootstrapping, Angel Investors, Venture Capital Fund, Start up Culture) - Conducting the Feasibility Analysis – Business Licenses - Business Permits – Choosing a form of Business Organisation – Sole Proprietorship - Partnership – Corporations – Limited Liability Company – Leasing - Meaning – Types of Lease Agreements – Advantages and Disadvantages of Leasing.

UNIT IV **(18 Hrs.)**

Cash, Working Capital and Inventory Management

Cash Management – Meaning - Objectives - Importance – Cash Cycle – Minimum Operating Cash – Safety level of Cash – Optimum Cash Balance – Working Capital Management – Concept of Working Capital – Need for Working Capital – Determinants of Working Capital- Estimation of Working Capital Needs - Inventory Management - Meaning and Objectives – EOQ with Price Breaks - Practical Problems.

UNIT V **(18 Hrs.)**

Multi National Capital Budgeting

Multi National Capital Budgeting - Meaning - Steps - Complexities – Factors – International Sources of Finance – Techniques to Evaluate Multi-National Capital Expenditure Proposals - Discounted Pay Back Period - NPV - Profitability Index - Net Profitability Index and Internal Rate of Return – Evaluation of a Project - Factors affecting International Capital Budgeting - Risk Evaluation - Impact on Value - Practical Problems.

Theory 40%; Problems: 60%

Course Outcomes

Students will be able to

CO No.	CO Statement	Knowledge level
CO 1	Explain the important Finance Concepts	K2
CO 2	Estimate Risk and determine its impact on Return and Evaluate the Management Interest Rate Risk	K5
CO 3	Examine Leasing and Other Sources of Finance for Start-Ups	K4
CO 4	Summarise Cash, Working Capital and Inventory Management Techniques	K2
CO 5	Evaluate Techniques of Long Term Investment Decision incorporating Risk Factor	K5

Books for Study:

1. **Maheshwari S.N.,** (2019), "Financial Management Principles and Practices", 15th Edition, Sultan Chand &Sons, New Delhi.
2. **Khan M.Y &Jain P.K,** (2011), "Financial Management: Text, Problems and Cases", 8th Edition, McGraw Hill Education, New Delhi.
3. **Prasanna Chandra**, (2019), "Financial Management, Theory and Practice", 10thEdition, McGraw Hill Education, New Delhi.
4. **Apte P.G,** (2020), "International Financial Management" 8th Edition, Tata McGraw Hill, New Delhi.

5. **Dr. R. S. KulshreshthaDr. V. S. Singh**, Business Finance, SBPD Publishing House, Agra.

Books for Reference:

1. **Pandey I. M.,** (2021), "Financial Management", 12th Edition, Pearson IndiaEducation Services Pvt. Ltd, Noida.
2. **Kulkarni P. V. & Satyaprasad B. G**., (2015), "Financial Management", 14th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
3. **Rustagi R. P.,** (2022), "Financial Management, Theory, Concept, Problems", 6th Edition, Taxmann Publications Pvt. Ltd, New Delhi.
4. **Arokiamary Geetha Rufus, Ramani N. & Others,** (2017), "Financial Management", 1st Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
5. **Dr. Saroj Kumar, Mrs. Priyanka Singh**, Financial Management & Corporate Finance, Thakur Publication, Lucknow

Web References:

1. https://resource.cdn.icai.org/66674bos53808-cp8.pdf
2. https://resource.cdn.icai.org/66677bos53808-cp10u2.pdf
3. https://resource.cdn.icai.org/66592bos53773-cp4u5.pdf

Note: Latest edition of the books may be used

Mapping of Course Outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	3	3	1	3	3	3	2	2	2
CO2	3	3	2	3	3	3	3	3	3
CO3	2	2	1	2	2	2	3	2	2
CO4	2	2	1	2	2	2	2	2	2
CO5	3	3	2	3	3	3	3	3	3

High – 3 Medium – 2 Low – 1

First Year Core –II Semester I

DIGITAL MARKETING

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTC12	**DIGITAL MARKETING**	CC	6	-	-	-	4	6	25	75	100

	Learning Objectives
1	To enlighten students about various concepts in Digital Marketing.
2	To impart knowledge to students on Online Marketing Mix and Digital Media Channels.
3	To make the students understand Digital Media Channel
4	To teach the students about the Online Consumer Behaviour and Digital Analytics
5	To familiarize about Analytics and Gamification

Course Units

UNIT I **(18 Hrs.)**

Introduction to Digital Marketing

Digital Marketing – Transition from Traditional to Digital Marketing – Rise of Internet – Growth of E-Concepts – Growth of E-Business to Advanced E-Commerce – Emergence of Digital Marketing as a Tool – Digital Marketing Channels – Digital Marketing Applications, Benefits and Challenges – Factors for Success of Digital Marketing – Emerging Trends and Concepts - Big Data and IOT - Segments Based Digital Marketing - Hyper local Marketing - Opportunities for Digital Marketing Professionals.

UNIT II **(18 Hrs.)**

Online Marketing Mix

Online Marketing Mix – E-Product – E-Promotion – E-Price – E-Place – Consumer Segmentation – Targeting – Positioning – Consumers and Online Shopping Issues – Website Characteristics affecting Online Purchase Decisions – Distribution and Implication on Online Marketing Mix Decisions – Digitization and Implication on Online Marketing Mix Decisions.

UNIT III **(18 Hrs.)**

Digital Media Channels

Digital Media Channels – Search Engine Marketing – ePR – Affiliate Marketing – Interactive Display Advertising – Opt-in-Email Marketing and Mobile Text Messaging, Social Media and Viral Marketing – Online Campaign Management Using – Facebook, Twitter, Instagram, Snapchat, Pinteres, Youtube – Metaverse Marketing - Advantages and Disadvantages of Digital Media Channels.

UNIT IV

Online Consumer Behavior **(18 Hrs.)**

Online Consumer Behavior – Cultural Implications of Key Website Characteristics – Dynamics of Online Consumer Visit – Models of Website Visits – Web and Consumer Decision Making Process – Data Base Marketing – Electronic Consumer Relationship Management – Goals – Process – Benefits – Role – Next Generation CRM.

UNIT V **(18 Hrs.)**

Analytics and Gamification

Digital Analytics – Concept – Measurement Framework – Demystifying Web Data - Owned Social Metrics – Measurement Metrics for Facebook, Twitter, YouTube, Slide Share, Pinterest, Instagram, Snapchat and LinkedIn – Earned Social Media Metrics - Digital Brand Analysis – Meaning – Benefits – Components – Brand share Dimensions – Brand Audience Dimensions – Market Influence Analytics – Consumer Generated Media and Opinion Leaders – Peer Review – Word of Mouth – Influence Analytics – Mining Consumer Generated Media – Gamification and game based marketing – Benefits – Consumer Motivation for Playing Online Games.

Course Outcomes

Students will be able to

CO No.	CO Statement	Knowledge level
CO 1	Analyse the dynamics of Digital Marketing.	K1
CO 2	Examine Online Marketing Mix.	K3
CO 3	Evaluate Digital Media Channels.	K4
CO 4	Discuss Online Consumer Behaviour.	K5
CO 5	Analyse Social Media Data.	K2

Books for Study:

1. **Vandana Ahuja**, Digital Marketing, Oxford University Press. London.
2. **Ryan Deiss & Russ Henneberry**, Digital Marketing, John Wiley and Sons Inc. Hoboken.
3. **Alan Charlesworth**, Digital Marketing - A Practical Approach, Routledge, London.
4. **Simon Kingsnorth**, Digital Marketing Strategy - An Integrated approach to Online Marketing, Kogan Page Ltd. United Kingdom.
5. **Maity Moutusy**, Digital Marketing 2nd Edition, Oxford University Press, London.

Books for Reference:

1. **Puneet Singh Bhatia**, Fundamentals of Digital Marketing, 2nd Edition,Pearson Education Pvt Ltd, Noida.
2. **Dave Chaffey**, Fiona Ellis-Chadwick, Digital Marketing, Pearson Education Pvt Ltd, Noida.
3. **Chuck Hemann & Ken Burbary**, Digital Marketing Analytics, Pearson Education Pvt Ltd, Noida.
4. **Seema Gupta**, Digital Marketing, 3rd Edition, McGraw Hill Publications, Noida.
5. **Kailash Chandra Upadhyay**, Digital Marketing: Complete Digital Marketing

Tutorial, Notion Press, Chennai.
Web References: 1. https://www.digitalmarketer.com/digital-marketing/assets/pdf/ultimate-guide-to-digital-marketing.pdf 2. https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/educational-technologies/all/gamification-and-game-based-learning 3. https://journals.ala.org/index.php/ltr/article/download/6143/7938

Note: Latest edition of the books may be used

Mapping of Course Outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	3	3	2	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	3
CO3	3	3	2	2	3	2	3	3	2
CO4	3	3	2	2	3	3	3	3	3
CO5	3	3	1	3	3	2	3	3	2

High – 3 **Medium – 2** **Low – 1**

First Year Core – III Semester I

BANKING AND INSURANCE

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTC13	**BANKING AND INSURANCE**	CC	5	-	-	-	4	5	25	75	100

	Learning Objectives
1	To understand the evolution of New Era Banking
2	To explore the Digital Banking Techniques
3	To analyse the role of Insurance Sector
4	To evaluate the mechanism of Customer Service in Insurance
5	To analyse Risk and its impact in Banking and Insurance Industry

Course Units

UNIT I **(15 Hrs.)** **Introduction to Banking**

Indian Banking System – Structure and Organisation of Bank – Progress of Banking in India - Rapid Transformation in Banking: Customer Shift - Fintech Overview - The Financial Disruptors - Digital Financial Revolution - New Era of Banking. Digital Banking – Electronic Payment Systems – Electronic Fund Transfer System – NEFT – RTGS –VSAT– SFMS– SWIFT.

UNIT II **(15 Hrs.)**

Contemporary Developments in Banking

Distributed Ledger Technology – Block chain: Meaning - Structure of Block Chain - Types of Block Chain - Differences between DLT and Block Chain - Benefits of Block Chain and DLT - Unlocking the potential of Block Chain – Crypto Currencies, Central Bank Digital Currency (CBDC) - Role of DLT in financial services - AI in Banking: Future of AI in Banking - Applications of AI in Banking - Importance of AI in banking – Core Banking Solution – Advantages of Core Banking Solutions - Cloud banking - Meaning - Benefits in switching to Cloud Banking.

UNIT III **(15 Hrs.)**

Indian Insurance Market

History of Insurance in India – Definition and Functions of Insurance–Insurance Contract – Indian Insurance Market – Importance of Insurance Industry - Insurance Organisation – Insurance Organisation Structure – Classes of Insurance – Assumptions — Insurance Forms - Proposal Forms – Cover Notes – Certificate of Insurance - Reforms in Insurance Sector - Insurance Intermediaries: Insurance Broker – Broker Remuneration – Functions of Reinsurance Broker - Insurance Agent - Surveyors and Loss Assessors.

UNIT IV **(15 Hrs.)**

Customer Services in Insurance

Customer Service in Insurance – Quality of Service - Role of Insurance Agents in Customer Service - Agent's Communication and Customer Service – Customer Relationship Management for Insurance Agents - Ethical Behaviour in Insurance – Grievance Redressal System in Insurance Sector –Integrated Grievance Management System - Insurance Ombudsman - Insurance Regulatory and Development Authority of India Act (IRDA) – Regulations and Guidelines.

UNIT V **(15 Hrs.)**

Risk Management

Risk Management and Control in Banking and Insurance Industries – Steps in Risk Management Process – Resources for Risk Management - Methods of Risk Management – Risk Management by Individuals and Corporations – Tools for Controlling Risk — Risk Mitigation Management.

Course Outcomes

Students will be able to

CO No.	CO Statement	Knowledge level
CO 1	Relate the Transformation in Banking from Traditional to New Age	K2
CO 2	Apply Modern Techniques of Digital Banking	K3
CO 3	Evaluate the Role of Insurance Sector	K5

CO 4	Examine the Regulatory Mechanism	K4
CO 5	Assess Risk Mitigation Strategies	K5

Books for Study:

1. **Indian Institute of Banking and Finance** (2021), "Principles & Practices of Banking", 5th Edition, Macmillan Education India Pvt. Ltd, Noida, Uttar Pradesh.
2. **Mishra M N & Mishra S B**, (2016), "Insurance Principles and Practice", 22nd Edition, S. Chand and Company Ltd, Noida, Uttar Pradesh.
3. **Emmett, Vaughan, Therese Vaughan M.**, (2013), "Fundamentals of Risk and Insurance", 11th Edition, Wiley & Sons, New Jersey, USA.
4. **Theo Lynn , John G. Mooney, Pierangelo Rosati, Mark Cummins** (2018), Disrupting Finance: FinTech and Strategy in the 21st Century (Palgrave Studies in Digital Business & Enabling Technologies), Macmillan Publishers, NewYork (US)
5. **Abinash Kumar Mandilwar**, Principles & Practice of Banking, Ramesh Publishing House, New Delhi

Books for Reference:

1. **Sundharam KPM & Varshney P. N.**, (2020), "Banking Theory, Law and Practice", 20th Edition, Sultan Chand & Sons, New Delhi.
2. **Gordon & Natarajan**, (2022), "Banking Theory, Law and Practice", 9th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
3. **Gupta P. K**. (2021), "Insurance and Risk Management" 6th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
4. **Susanne Chishti., & Janos Barberis** (2016), The Fintech book: The financial technology handbook for investors, entrepreneurs and visionaries. John Wiley & Sons.
5. **N.R. Mohan Prakash**, Banking, Risk And Insurance Management, Vikas Publishing House, New Delhi

Web References:

1. https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology
2. https://mrcet.com/downloads/digital_notes/CSE/IV%20Year/CSE%20B.TECH%20IV%20YEAR%20II%20SEM%20BCT%20(R18A0534)%20NOTES%20Final%20PDF.pdf
3. https://www.irdai.gov.in/ADMINCMS/cms/frmGeneral_Layout.aspx?page=PageNo108&flag=1

Note: Latest edition of the books may be used

Mapping of Course Outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	2	2	1	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3
CO3	2	2	1	2	2	2	2	3	2

CO4	3	2	2	1	2	2	2	3	2
CO5	3	3	1	3	3	3	3	3	3

High – 3 Medium – 2 Low – 1

First Year Core –I Semester I

ACCOUNTING FOR MANAGERIAL DECISIONS

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTC14	**ACCOUNTING FOR MANAGERIAL DECISIONS**	CC	5	-	-	-	4	5	25	75	100

	Learning Objectives
1	To equip the students with the concepts, methods and techniques of Management Accounting and Ratio Analysis.
2	To impart knowledge on Preparation of Fund Flow and Cash Flow Statements.
3	To gain knowledge about Budget and Budgetary Control
4	To understand concept of Marginal Costing and its Techniques
5	To familiarize the students with Standard Costing and Variance Analysis.

Course Units

UNIT I **(15 Hrs.)**

Management Accounting and Ratio Analysis

Management Accounting – Objectives – Merits and Demerits – Financial Accounting Vs. Management Accounting – Management Accounting Vs. Cost accounting – Role of Management Accountant – Ratio Analysis – Importance – Classification of Ratios – Computation of Ratios.

UNIT II **(15 Hrs.)**

Fund Flow and Cash Flow Analysis

Funds Flow Statement – Advantages and Limitations – Schedule of Changes in Working Capital – Calculation of Funds From Operations – Statement of Sources and Application of Fund – Cash Flow Statement – Distinction between Fund Flow Statement and Cash Flow Statement –Importance – Preparation of Cash Flow Statement as per AS–3 .

UNIT III **(15 Hrs.)**

Budget and Budgetary Control

Budget – Meaning – Objectives – Budgetary Control – Essentials of Budgetary Controls – Classification of Budgets – Preparation of Production Budget – Sales Budget – Material Budget– Cash Budget and Flexible Budget – Zero Base Budget (ZBB) .

UNIT IV **(15 Hrs.)**

Marginal costing

Marginal Costing – Advantages and Disadvantages – Profit Volume Ratio – Break Even Point – Margin of Safety – Applications of Marginal costing in Decision–making – Make or Buy – Own or Lease – Shutdown or Continue – Profitable Sales Mix – Export Decisions – Accepting Foreign Order or Offer - Limiting or Key factor.

UNIT V **(15 Hrs.)**

Standard Costing and Variance Analysis

Standard Costing – Merits and Demerits – Variance analysis– Importance–Computation of Material Variance – Labour Variance – Overhead Variance – Sales Variance.

Course Outcomes

Students will be able to

CO No.	CO Statement	Knowledge level
CO 1	Understand thoroughly the conceptual framework of Management Accounting and identification of differences between various branches of accounting.	K2
CO 2	Apply the Ratio analysis, Fund flow Analysis, and Cash flow Analysis to evaluate the financial performance of an organization.	K3
CO 3	Prepare various budgets and Compose reports and analysis and take decisions on Price fixation, Make or Buy and Product Mix.	K5
CO 4	Gain knowledge on the concept of Cost–volume–profit analysis, Break–even analysis and their applications in businesses.	K4
CO 5	Create the knowledge on Standard costing and Analysis of Variance.	K4

1. **R.K. Sharma, Shashi K Gupta (2015).**Cost& Management Accounting. New Delhi:Kalyani Publishers.
2. **R.S.N.Pillai Bagavathi** Management Accounting S. Chand & Company LTD. New Delhi.
3. **S N Maheswari,** Management Accounting, Sultan Chand & Sons, New Delhi.
4. **I M Pandey**, Management Accounting, Vikas Publishing House.
5. **Dr.S.P.Gupta,** Management Accounting, Sahitya Bhawan Publications , Agra

Books for Reference:

1. **Dr.R.Ramachandran and Dr.R. Srinivasan,** Management Accounting Sriram Publications– Trichy.
2. **Khan and Jain,** Management Accounting, Tata McGraw Hill, New Delhi
3. **Ravi M Kishore**, Management Accounting, Taxman Publication, New Delhi
4. **Robert S Kaplan and Anthony Atkinson**, Advance Management Accounting, Prentice Hall, New Delhi.

5. **Arora,M.N. (2012).**Cost and Management Accounting. Mumbai: Himalaya Publishing House
6. **R.K. Sharma, Shashi K Gupta (2015).**Cost& Management Accounting. New Delhi:Kalyani Publishers.
7. **R.S.N.Pillai Bagavathi** Management Accounting S. Chand & Company LTD. New Delhi.
8. **S N Maheswari,** Management Accounting, Sultan Chand & Sons, New Delhi.
9. **I M Pandey**, Management Accounting, Vikas Publishing House.
10. **Dr.S.P.Gupta,** Management Accounting, Sahitya Bhawan Publications , Agra.

Note: Latest edition of the books may be used

Mapping of Course Outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO 1	3	3	2	3	3	2	2	3	3
CO 2	3	3	1	3	3	3	3	3	3
CO 3	3	3	1	3	3	2	3	3	2
CO 4	3	3	2	3	3	3	3	3	3

High – 3 **Medium – 2** **Low – 1**

First Year **Elective –I A** **Semester I**

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTE11	**SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT**	DCE	4	-	-	-	2	4	25	75	100

	Learning Objectives
1.	To familiarize students with the working knowledge on Security Analysis for the purpose of Investments.
2.	To enlighten the students about the Fundamental and Technical Analysis of Securities.

3.	To impart knowledge on Valuation of Securities and Portfolio Analysis.
3.	To learn about long-term and short-term Investment Analysis Tools.
5.	To gain knowledge in Portfolio Performance Methods.

Course Units

UNIT I **(12 hrs)**

Introduction

Investment – Types – Speculation – Gambling – Importance of Investments – Features of an Investment Program – Kinds of Risk associated with an Investment – Investment related terminology –Bullish Market – Bearish Market – Market Indices – BSE Index (BSE 100, BSE 200, BSE 500, Mid Cap, Small Cap & BSE Bankex) – CNX Index (CNX Nifty, CNX 100, CNX 500, CNX Mid Cap, CNX Defty) and Other Indices- FOREX– Users and uses of Market Index.

UNIT II

(12hrs)

Security Analysis

Security Analysis – Meaning – Scope – Significance – Approaches – Fundamental Security Analysis– Types - Economic Analysis – Industry Analysis - Company Analysis.

UNITIII

Technical Analysis **(12 hrs)**

Technical Analysis – Technical Analysis Vs. Fundamental Analysis – Theories of Technical Analysis – The Dow Theory – Elliot Wave Principles – Kondratev Wave Theory – Chaos Market Theory – Forms of Efficient Market Hypothesis – Random Walk Theory.

UNIT IV

Valuation of Securities **(12hrs)**

Securities – Reasons for Issuing Securities – Features of Securities – Valuation of Securities – Equity Shares – Preference Shares – Bonds – Government Securities – Dividends – Gordon's Model – Walter's Model – Modigliani Miller's Model.

UNIT V **(12hrs)**

Portfolio Management

Portfolio Management – Portfolio Diversification – Portfolio Choice – Markowitz Portfolio Selection Model – Sharpe's Single Index Model – Capital Asset Pricing Model – Security Market Line (SML) – Capital Market Line (CML) – Estimating Beta – Beta Basics – Factor Models and Arbitrage Pricing Theory (APT) –Portfolio Investment Process – Investment Timing.

Course Outcomes

Students will be able to

CO No.	CO Statement	Knowledge level
CO 1	Explain various concepts in Security Analysis & Portfolio Management	K2, K3
CO 2	Understand Approaches to Security Analysis.	K2, K3

CO 3	Comprehend and Carryout Technical Analysis.	K2, K3
CO 4	Calculate the Value of Securities & comprehend various Dividend Decisions.	K2, K3, K4
CO 5	Discuss & Analyse various Models in Portfolio Management.	K2, K3, K4

Books for study:

1. **V.K. Bhalla,** Investment Management, S Chand & Co. Ltd., New Delhi.
2. **Dr. L. Natarajan,** Investment Management, Margham Publications, Chennai.
3. **Prasanna Chandra,** Investment Analysis and Portfolio Management, McGraw Hill Education.
4. **Dr. S. Gurusamy**, Security Analysis and Portfolio Management, Vijay Nicole Imprints Pvt Ltd., Chennai.
5. **Ambika Prasad Dash,** Security Analysis and Portfolio Management, I K International Publishing House Pvt. Ltd.

Books for Reference:

1. **Dr. Ranganathan and Madhumathi R,** Investment Analysis and Portfolio Management, Pearson Education, New Delhi.
2. **S. Kevin,** Portfolio Management, Prentices Hall of India (Pvt. Ltd) New Delhi.
3. **R.P. Rustogi,** Investment Analysis and Portfolio Management, Sultan Chand & Sons, New Delhi.
4. **Falguni H. Pandya,** Security Analysis and Portfolio Management, Jaico Publishing House.
5. **Maheshwari, Yogesh,** Investment Management, Prentice Hall India Learning Private Limited.

Web references:

1. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_SAPM_Lecture_Notes.pdf
2. https://www.studocu.com/in/document/galgotias-university/equity-portfolio-management/portfolio-management-lecture-notes-1-10/17701348
3. https://www.educba.com/fundamental-analysis-vs-technical-analysis

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	3	3	1	3	2	3	2	2	3
CO2	3	3	1	3	2	3	2	3	2
CO3	3	3	2	3	2	3	2	3	2
CO4	2	3	1	3	2	2	2	3	2

CO5	3	3	1	3	2	2	2	3	2

High – 3 **Medium – 2** **Low – 1**

First Year **Elective – I B** **Semester I**

OPERATIONS RESEARCH

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTE12	OPERATIONS RESEARCH	DCE	4	-	-	-	2	4	25	75	100

	Learning Objectives
1	To outline the fundamentals of operations research
2	To use OR models for problem solving
3	To examine the role of game theory
4	To design and apply network analysis
5	To apply modeling techniques

Course Units

UNIT I **(12 hrs)**

Introduction and Linear Programming Problem

Introduction to Operations Research – Uses and Limitations – Linear Programming Problem – Formulation - Solving LPP - Graphical Method - Simplex Method - The Big-M Method.

UNIT II **(12 hrs)**

Transportation and Assignment Problems

Transportation Problem - Introduction – Assumptions – Formulation of Transportation Models – Basic Feasible Solution (North-West Corner Method, Least Cost Method, Vogel's Approximation Method) – Optimal Solution (Stepping-Stone Method, Modified Distribution Method) – Degeneracy in Transportation Problem - Assignment Problem - Introduction – Comparison with the Transportation Problem – Formulation of Assignment Problems - The Hungarian Method of Solution.

UNIT III **(12 hrs)**

Game Theory

Game Theory - Introduction – Rules for Games theory – Pure strategies - Two person zero sum game without saddle point – Mixed Strategies (2xn games, mx2 games) – Odds Method – Dominance Property - Graphical Method (2xn, mx2 games).

UNIT IV **(12 hrs)**

Replacement and Network Analysis

Replacement - Introduction – Individual Replacement Problems – Group Replacement

Problems - Network Analysis – Concepts – Rules for plotting Network Diagrams – CPM Computations - EST – EFT – LFT – LST – TF – Finding Critical Path - PERT- Meaning – Steps Involved – Optimistic Time – Pessimistic Time – Most Likely Time – Estimation of Variability of Activity Times.

UNIT V **(12 hrs)**

Sequencing and Queuing Theory

Sequencing problem: Introduction – Assumptions –Processing n jobs through two machines – Processing of n jobs through three machines. Queuing - Introduction – Applications of queuing models, Waiting time and idle time costs – Single channel Poisson arrivals with Exponential Service - Infinite Population Model.

Course outcomes

Students will be able to

CO No.	CO Statement	Knowledge level
CO 1	Apply Linear Programming	K3, K4
CO 2	Identify models for problem solving	K3, K4
CO 3	Apply game theory	K3, K4
CO 4	Apply network analysis to enhance effectiveness	K3, K4
CO 5	Examine the models for decision making	K4

Books for study:

1. **Gupta P.Kand Hira D.S**.,(2022) "Operations Research", 7th Edition, S.Chand, Noida (UP).
2. **Kapoor V.K**., (2014) "Operations Research", 9th Edition, Sultan Chand, New Delhi.
3. **Natarajan, Balasubramani and Tamilarasi**, (2014) "Operations Research", 2nd Edition, Pearson Education India, Noida.
4. **Kothari C.R.**,(2022) "An Introduction to Operational Research", 3rd Edition, S.Chand, Noida (UP)
5. **Sudhir Kumar Pundir, Devi Prasad, K C Rao, S L Mishra,** (2020) "Operations Research", CBS Publishers & Distributors.

Books for reference:

1. **TulsianP.C. and Bharat Tulsian**, (2022) "Fundamentals of Operations Research(Theory and Practice)",3rd Edition, S. Chand, Noida (UP).
2. **Sharma J.K**.,(2016) "Operations Research", 6th Edition, Lakshmi Publications, Chennai.
3. **Nagarajan N.**,(2017) "Text Book of Operations Research: A Self Learning Approach", New Age Publications, Chennai.
4. **Rina Rani Rath**,(2021) "Operations Research", 2nd Edition, Bhavya Books, New Delhi.
5. **Vilda Purutçuoğlu, Gerhard-Wilhelm Weber, Hajar Farnoudkia,** (2022) "Operations Research: New Paradigms and Emerging Applications, CRC Press.

Web references:

1. https://www.bbau.ac.in/dept/UIET/EMER-601%20Operation%20Research%20Queuing%20theory.pdf
2. https://mdu.ac.in/UpFiles/UpPdfFiles/2021/Jun/4_06-11-2021_16-06-34_OPERATIONS%20RESEARCH%20TECHNIQUES(20MAT22C5).pdf
3. https://repository.up.ac.za/bitstream/handle/2263/25427/02chapter3.pdf?sequence=3

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO 1	3	3	2	3	3	2	2	3	3
CO 2	3	3	1	3	3	3	3	3	3
CO 3	3	3	1	3	3	2	3	3	2
CO 4	3	3	2	3	3	3	3	3	3
CO 5	3	3	1	3	3	2	3	3	2

High – 3 **Medium – 2** **Low – 1**

First Year **Elective –I A** **Semester I**

STRATEGIC HUMAN RESOURCE MANAGEMENT

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTE13	**STRATEGIC HUMAN RESOURCE MANAGEMENT**	GE	4	-	-	-	2	4	25	75	100

	Learning Objectives
1.	To make students realize the significance of strategic management in human resources.
2.	To familiarize the students with various HR Strategies.
3.	To make the students understand the components of various HR Strategies.
4.	To impart knowledge about Human Resource Policies
5.	To enlighten Latest trends in Strategic HRM

Course Units

UNIT I **(12 hrs)** **Introduction to SHRM** SHRM - Meaning – Features - Evolution – Objectives – Advantages - Barriers to SHRM - SHRM v/s Traditional HRM - Steps in SHRM - Roles in SHRM: Top Management - Front-Line Management - HR - Changing Role of HR Professionals.
UNIT II **(12 hrs)** **Models of SHRM** Models of SHRM – High Performance Working Model - High Commitment Management Model - High Involvement Management Model - HR Environment – Environmental trends and HR Challenges - Linking SHRM and Business Performance.
UNIT III **(12 hrs)** **Strategic Planning and Compensation** Resourcing Strategy: Meaning and Objectives - Strategic HR Planning: Meaning – Advantages - Interaction between Strategic Planning and HRP - Managing HR Surplus and Shortages - Strategic Recruitment and Selection: Meaning and Need - Strategic Human Resource Development: Meaning - Advantages and Process - Strategic Compensation as a Competitive Advantage - Rewards Strategies: Meaning, Importance - Employee Relations Strategy - Retention Strategies - Strategies for Enhancing Employee Work Performance.
UNIT IV **(12 hrs)** **Human Resource Policies** Human Resource Policies – Meaning – Features - Purpose of HR Policies - Process of Developing HR Policies - Factors affecting HR Policies - Areas of HR Policies in Organisation - Requisites of Sound HR Policies – Recruitment – Selection - Training and Development - Performance Appraisal – Compensation – Promotion – Outsourcing-Retrenchment - Barriers to Effective Implementation of HR Policies and Ways to Overcome these Barriers.
UNIT V **(12 hrs)** **Recent trends in Strategic HRM** Mentoring - Employee Engagement – Meaning - Factors Influencing Employee Engagement, Strategies for Enhancing Employee Engagement - Competency based HRM: Meaning - Types of Competencies and Benefits of Competencies for Effective Execution of HRM Functions -Human Capital Management: Meaning and Role - New Approaches to Recruitment – Employer Branding – E-HRM – Role of Artificial Intelligence in SHRM.

Course Out comes

Students will be able to

CO No.	CO Statement	Knowledge level
CO 1	Explain the significance of SHRM.	K1
CO 2	Discuss the SHRM Models.	K2
CO 3	Understand Strategic Recruitment and Selection.	K5
CO 4	Explain the requisites of sound HR Policies.	K4
CO 5	Discuss the latest trends in SHRM.	K2

Books for study:

1. **Mathur, SP Strategic Human Resource Management 1st Edition 2015, New Age International (P) Ltd Publishers,New Delhi.**
2. **Catherine Truss, David Mankin& Clare Kelliher,** Strategic Human Resource Management, Oxford University Press, India.
3. **Anuradha Sharma and Aradhana Khandekar**, Strategic Human Resource Management: An Indian Perspective, Sage Publications Pvt. Ltd, New Delhi.
4. **Michael Armstrong**, Strategic Human Resource Management – A Guide to Action, Kogan Page Limited, London.
5. **Mello Jeffrey A**, Strategic Human Resource Management, Thomson, India.

Books for reference:

1. **Jean M Phillips & Stan M Gully**, Strategic Staffing, Pearson International Edition, India.
2. **Ananda Das Gupta** (2021), Strategic Human Resource Management - Formulating and Implementing HR Strategies for a Competitive Advantage, Productivity Press; 1st edition, Routledge.
3. **K. Sundar & J. Srinivasan**, Essentials of Human Resource Management, Vijay Nicole Imprints Pvt. Ltd., Chennai.
4. **Michael & Baron Angela**, Handbook of Strategic HRM, Armstrong, Jaico Publishing House, New Delhi.
5. **S.S.Khanka**, Human Resource Management – Text and Cases, S.Chand & Co. Pvt. Ltd., New Delhi.

Web references:

1. https://hr.university/shrm/strategic-human-resource-management/
2. https://www.knowledgehut.com/blog/others/strategic-human-resource-management
3. https://www.forbes.com/advisor/business/strategic-human-resource-management/

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO 1	3	3	3	3	3	2	3	2	3
CO 2	3	3	3	3	3	2	3	2	3
CO 3	3	3	3	3	3	2	3	2	3
CO 4	3	3	3	3	3	2	3	2	3
CO 5	3	3	3	3	3	2	3	2	3

High – 3 Medium – 2 Low – 1

First Year Elective –II B Semester I

LABOUR LAWS

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTE14	**LABOUR LAWS**	GE	4	-	-	-	2	4	25	75	100

	Learning Objectives
1.	To Understand the provisions of Trade Unions Act
2.	To gain knowledge on various measures and provisions relating to employees as per the Factories Act and Equal Remuneration Act
3.	To become familiar with compensation payable to workmen under different situations and understand the provisions of the Employees State Insurance Act
4.	To learn different provisions relating to payment of wages and minimum wages to employees
5.	To understand employee welfare measures with respect to provident fund, gratuity and bonus

Course Units

UNIT I **(12 hrs)**

Introduction and The Trade Unions Act, 1926

Labour Legislations: Origin – Nature – Scope – Need – Objectives – Principles – Labour policy audits - Special features – Constitution as the basis for Labour Legislation – The Trade Unions Act, 1926:Definition – Objectives – Deficiencies – Registration of trade union – Cancellation of Registration and Appeal – Duties and Obligations – Rights and Privileges – Dissolution.

UNIT II **(12 hrs)**

The Factories Act, 1948 and Equal Remuneration Act, 1976

The Factories Act, 1948: Objects – Definition – Licensing and Registration of factories – Inspecting staff – Health, safety and welfare measures – Provisions relating to hazardous processes – Working hours – Holidays – Annual leave - Employment of women and young persons.

Equal Remuneration Act – Payment of remuneration at equal rates to men and women workers – Advisory committee – Offences and Penalties.

UNIT III **(12 hrs)**

The Workmen's Compensation Act, 1923 and The Employees' State Insurance Act, 1948

The Workmen's Compensation Act, 1923: Definitions – Objectives – Disablement – Employer's liability for compensation – Amount of compensation – Disbursement of compensation – Notice and claims – Penalties – The Employees' State Insurance Act 1948: Objects – Definitions –Administration of ESI Scheme – ESI Fund – ESI Corporation - Medical benefit council – Benefits under the Act – ESI court.

UNIT IV **(12 hrs)**

The Payment of Wages Act,1936 and The Minimum Wages Act, 1948

The Payment of Wages Act, 1936: Object and Scope –Definition – Procedure regarding payment of wages – Deduction from wages – Mode of payment of wages.

The Minimum Wages Act, 1948: Objects - Scope – Definition – Items to be included in the minimum wages – Fixation and revision of minimum wages – Norms to be followed in the payments of minimum wages.

UNIT V **(12 hrs)**

The Provident Fund and Miscellaneous Provision Act,1952, The Payment of Gratuity Act, 1972 and The Payment of Bonus Act, 1965

Provident Fund and Miscellaneous Provision Act, 1952: Definitions – Scope – Nature – Objects –Various schemes – The Payment of Gratuity Act, 1972: Definitions – Scope – Conditions and circumstances of payment- Wages for computing gratuity – Maximum gratuity – Nomination – Penalties – The Payment of Bonus Act: Applicability of the Act – Eligibility and rate of Bonus – Allocable surplus and available surplus - Set and set off – Offences and penalties.

Course Out comes

Students will be able to

CO No.	CO Statement	Knowledge level
CO 1	Recall the basic labour legislations pertaining to Trade Unions	K1
CO 2	Explain various provisions of the Factories Act and Equal Remuneration Act	K2
CO 3	Assess provisions relating to the workmen's compensation and state insurance.	K5
CO 4	Examine provisions relating to payment of wages and minimum wages.	K4
CO 5	Explain the provisions of provident fund, gratuity and bonus schemes.	K2

Books for study:

1. **Mishra S.N.** (2018), "Labour & Industrial Laws", 29th Edition, Central Law Publications, Classic Edition, Allahabad, UP.
2. **Srivastava S C** (2022), "Industrial Relations and Labour Laws", 8th Edition., Vikas Publishing, New Delhi
3. **Tripathi PC, Gupta CB, Kapoor ND** (2020), "Industrial Relations and Labour Laws", 6th Edition., Sultan Chand & Sons, New Delhi
4. **Taxmann** (2023), "Taxmann's Labour Laws", Taxmann Publications Private Limited
5. **Alysia Blackham, Miriam Kullmann, Ania Zbyszewska** (2019), "Theorising Labour Law in a Changing World: Towards Inclusive Labour Law", Bloomsbury Publishing.

Books for reference:

1. **Sinha P.R.N., Sinha InduBala, Shekhar Seema Priyadarshini** (2017), "Industrial Relations,Trade Unions and Labour Legislation", 3rd Edition., Pearson Education India

Pvt. Ltd., Noida
2. **Piyali Ghosh, Shefali Nandan** (2017), "Industrial Relations and Labour Laws", 1st Edition,McGraw Hill, Noida
3. **Sharma J.P.** (2018), "Simplified Approach to Labour Laws", 5th Edition., Bharat LawHouse Pvt. Ltd.
4. **H.L. Kumar** (2016), "Labour Laws", Universal Law Publishing
5. **Dr. Satish Kumar Saha, Anju Agarwal** (2020) "Industrial Relation & Labour Law", SBPD Publications.

Web references:

1. https://www.icsi.edu/media/webmodules/Labour_Laws_&_Practice.pdf
2. https://www.icsi.edu/media/webmodules/LabourLaws&Practice_June_2020.pdf
3. https://www.britannica.com/topic/labour-law/Elements-of-labour-law

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	1	3	3	2	1	3	1	1	3
CO2	1	3	3	2	1	3	1	1	3
CO3	1	3	3	3	1	3	1	1	3
CO4	1	3	3	3	2	3	2	1	3
CO5	1	3	3	3	1	3	1	1	3

High – 3 **Medium – 2** **Low – 1**

First Year **Core – IV** **Semester II**

STRATEGIC COST MANAGEMENT

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTC21	**STRATEGIC COST MANAGEMENT**	CC	6	-	-	-	5	6	25	75	100

	Learning Objectives
1	To analyse the aspects of strategic and quality control management
2	To analyse and select cost control techniques
3	To apply activity based costing for decision making
4	To utilise transfer pricing methods in cost determination

5	To apply cost management techniques in various sectors

Course Units

UNIT I (18 hrs) **Introduction to Strategic Cost Management** Introduction to Strategic Cost Management (SCM) – Need for SCM – Differences between SCM and Traditional Cost Management - Value Chain Analysis - Meaning and Steps - Quality Cost Management - Meaning of Quality - Quality Management – Cost of Quality – Indian Cost Accounting Standard 21 on Quality Control – TQM - Introduction to Lean System – Benefits of Lean System – Just in Time (JIT) – Kaizen Costing.
UNIT II(18 hrs) **Cost Control and Reduction** Cost Management Techniques- Cost Control- Meaning and Prerequisites - Cost Reduction - Meaning - Scope – Differences between Cost Control and Cost Reduction - Pareto Analysis - Meaning - Importance and Applications - Target Costing - Meaning - Steps - Principles – Life Cycle Costing - Meaning - Strategies for each Stage of Product Life Cycle - Benefits – Learning Curve – Meaning - Learning Curve Ratio and Applications.
UNIT III (18 hrs) **Activity Based Cost Management** Activity Based Cost Management - Concept – Purpose – Stages – Benefits - Relevance in Decision Making and its Application in Budgeting – Practical problems.
UNIT IV (18 hrs) **Transfer Pricing** Transfer Pricing - Meaning – Benefits – Methods - Pricing based on Cost - Market based Transfer Pricing - Negotiated Pricing and Pricing based on Opportunity Costs – Practical Problems.
UNIT V (18 hrs) **Cost Management in Agriculture and IT sector** Agriculture Sector: Features - Cost Structure - Cost Management - Tools to measure the Performance - Minimum Support Price and International Perspective – Information Technology Sector - Features - Cost Structure - Cost Management and International Perspective.

Course Outcomes

Students will be able to

CO No.	CO Statement	Knowledge level
1	Explain strategic cost management and QC	K2
2	Choose the appropriate technique for cost control	K3
3	Make use of activity based costing in practice	K3
4	Choose transfer pricing methods to solve problems	K3
5	Construct cost structure for Agriculture and IT sector	K3

Books for study:

1. **Ravi M Kishore** (2018), "Strategic Cost Management", 5th Edition, TaxmannPublications Pvt. Ltd, New Delhi.
2. **Bandgar P. K.**, (2017), "Strategic Cost Management", 1st Edition, HimalayaPublishing House Pvt Ltd, Mumbai.
3. **Sexena V. K.,** (2020), "Strategic Cost Management and PerformanceEvaluation", 1st Edition, Sultan Chand & Sons, New Delhi.
4. **CA KM Bansal, CA Meena Verma.** (2023) "Strategic Cost Management & Performance Evaluation" 4th Edition, Taxmann Publications Private Limited.
5. **Richard Malcolm Sano Wilson** (1997), "Strategic Cost Management", Ashgate.

Books for reference:

1. **John K Shank and Vijay Govindarajan** (2008), Strategic Cost Management, Simon & Schuster; Latest edition, UK
2. **Jawahar Lal**, (2015), "Strategic Cost Management", 1st Edition, Himalaya Publishing House Pvt Ltd, Mumbai.)
3. **Arora M. N.,** (2021), "A Text Book of Cost and Management Accounting", 11th Edition, Vikas Publishing House Pvt. Ltd., New Delhi.
4. **Shahid L. Ansari, Jan Bell** (1997), "Target Costing - The Next Frontier in Strategic Cost Management", Irwin Professional Pub.
5. **Gill Suveera,** "Cost and Management Accounting: Fundamentals and its Applications", Vikas Publishing House.

Web references:

1. https://www.accountingtools.com/articles/strategic-cost-management.html#:~:text=Strategic%20cost%20management%20is%20the,it%20or%20have%20no%20impact.
2. https://ca-final.in/wp-content/uploads/2018/09/Chapter-4-Cost-Management-Techniques.pdf
3. https://resource.cdn.icai.org/66530bos53753-cp5.pdf

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	3	3	3	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	3	3
CO4	3	3	2	3	3	3	3	2	3
CO5	3	3	1	3	3	3	3	3	3

High – 3 **Medium – 2** **Low – 1**

First Year **Core – V** **Semester II**

CORPORATE ACCOUNTING

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTC22	**CORPORATE ACCOUNTING**	CC	6	-	-	-	5	6	25	75	100

	Learning Objectives
1	To make the students understand the accounting treatment for corporate restructuring
2	To know concept of holding company and prepare consolidated financial statements
3	To impart knowledge on banking company accounts
4	To familiarize about insurance company accounts
5	To enable the students to know financial reporting standards

Course Units

UNIT 1 **(18 hrs)**

Accounting for Corporate Restructuring

Corporate Restructuring – Meaning of Amalgamation, Absorption and Merger (AS14) – Purchase Consideration – Computation of Purchase Consideration – Entries in the Books of Transferee Company and Transferor Company – Preparation of Post Amalgamated Balance Sheet (Excluding Inter-Company Holding) – Internal and External Reconstruction.

UNIT II **(18 hrs)**

Holding Company Accounts

Consolidated Financial Statements as per AS 21: Consolidated Profit and Loss Account– Minority Interest – Cost of Control – Capital Reserve – Inter-Company Holdings – Preparation of Consolidated Balance Sheet.

Unit III **(18 hrs)**

Accounts of Banking Companies

Accounts of Banking Companies – Meaning – Legal Requirement for Preparation of Profit and Loss Account – Preparation of Profit and Loss Account and Balance Sheet with Relevant Schedules (New Method) – Non-Performing Assets (NPA).

UNIT IV **(18 hrs)**

Insurance Company Accounts

Insurance Company Accounts: Types of Insurance - Final Accounts of Life Assurance Companies - Ascertainment of Profit - Valuation Balance Sheet -Final Accounts of Fire, Marine and Miscellaneous Insurance Companies.

UNIT V **(18 hrs)**

Financial Reporting

Financial Reporting – Meaning –Objectives - Characteristics – Indian Accounting Standards (AS 5, AS 10, AS 19, AS 20) – Corporate Social Responsibility - Meaning - Key Provisions of Companies Act, 2013 - Accounting for CSR Expenditure - Reporting of CSR -

Presentation and Disclosure in the Financial Statements.

Theory: 20%; Problems: 80%

Course Outcomes

Students will be able to

CO No.	CO Statement	Knowledge level
CO1	Understand the Concepts in Corporate Restructuring, Compute Purchase Consideration and Prepare Books of Accounts during Corporate Restructuring.	K3
CO2	Determine the overall profitability and financial position by preparing consolidated financial statements of holding companies in accordance with AS21.	K4
CO3	Draft Profit & Loss Account and Balance Sheet of Banking Companies.	K5
CO4	Apply the provisions of IRDA Regulations in the preparation of final accounts of Life Insurance and General Insurance Companies.	K5
CO5	Examine Financial Reporting based on appropriate Accounting Standards and provisions of Companies Act 2013 with respect to Corporate Social Responsibility	K4

Books for study:

1. **Gupta R. L. &Radhaswamy M.** (2021), "Corporate Accounting – Volume I & II", 14th Edition, Sultan Chand &Sons, New Delhi.
2. **Maheshwari S. N., Sharad K. Maheshwari &Suneel K. Maheshwari**, (2022),"Advanced Accountancy - Volume I &II", 11th Edition, Vikas PublishingHouse Pvt. Ltd., New Delhi.
3. **Jain S. P., Narang K. L., Simmi Agrawal and Monika Sehgal** (2019), "AdvancedAccountancy - Corporate Accounting – Volume - II", 22nd Edition, KalyaniPublishers, New Delhi.
4. **Reddy T. S. &Murthy A.**, (2022), "Corporate Accounting – Volume I &II", 17th Edition, Margham Publications, Chennai.
5. **CA & Dr. P C Tulsian, Tushar Tulsian & CA Bharat Tulsian** (2020), "Tulsian s Corporate Accounting", S. Chand Publishing.

Books for reference:

1. **Arulanandam M.A &Raman K.S.**, (2021), "Advanced Accounting (Corporate Accounting – II)", 8th Edition, Himalaya Publishing House Pvt Ltd, Mumbai.
2. **Shukla M C, Grewal T S and Gupta S C**, (2022), "Advanced Accounts Volume II",19th Edition, Sultan Chand &Sons, New Delhi.

3. **Gupta R. L.**, (2022), "Problems and Solutions in Company Accounts", 2nd Edition,Sultan Chand &Sons, New Delhi.
4. **Dr. S. K. Singh** (2022), "Corporate Accounting", SBPD Publications.
5. **V. K. Goyal, Ruchi Goyal** (2012), "CORPORATE ACCOUNTING", PHI Learning Pvt. Ltd.

Web references:

1. https://resource.cdn.icai.org/66550bos53754-p1-cp9.pdf
2. https://resource.cdn.icai.org/66545bos53754-p1-cp4.pdf
3. https://resource.cdn.icai.org/66638bos53803-cp1.pdf

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO 1	3	3	2	3	3	3	3	3	3
CO 2	3	3	3	3	2	3	2	3	3
CO 3	3	3	2	3	3	3	3	3	3
CO 4	3	3	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	3	3

High – 3 **Medium – 2** **Low – 1**

First Year **Core – VI** **Semester II**

SETTING UP OF BUSINESS ENTITIES

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTC23	**SETTING UP OF BUSINESS ENTITIES**	CC	6	-	-	-	4	6	25	75	100

	Learning Objectives
1	To understand the start-up landscape and its financing
2	To analyse the formation and registration of Section 8 company
3	To outline the concept of LLP and business collaboration
4	To understand the procedure for obtaining registration and license
5	To create awareness about the legal compliances governing business entities

Course Units

UNIT I **(18 hrs)** **Startups in India** Types of Business Organisations – Factors governing selection of an Organisation - Startups – Evolution – Definition of a Startup – Startup landscape in India – Startup India Policy – Funding support and Incentives – Indian States with Startup policies – Exemptions for Startups – Life cycle of a Startup – Important points for Startups – Financing options available for Startups – Equity Financing – Debt Financing – Venture Capital Financing – IPO – Crowd Funding – Incubators – Revenue Based Financing - Mudra Banks –Successful Startups in India.
UNIT II **(18 hrs)** **Not-for-Profit Organisations** Formation and Registration of NGOs – Section 8 Company – Definition – Features – Exemptions – Requirements of Section 8 Company – Application for Incorporation – Trust - Objectives of a Trust – Persons who can create a Trust – Differences between a Public and Private Trust – Exemptions available to Trusts – Formation of a Trust - Trust Deed – Society – Advantages – Disadvantages – Formation of a Society – Tax exemption to NGOs.
UNIT III **(18 hrs)** **Limited Liability Partnership and Joint Venture** Limited Liability Partnership - Definition – Nature and Characteristics – Advantages and Disadvantages – Procedure for Incorporation – LLP Agreement – Annual Compliances of LLP - Business Collaboration - Definition – Types – Joint Venture - Advantages and Disadvantages – Types – Joint Venture Agreement – PPP (Public Private Partnership) - Successful Joint Ventures in India– Special Purpose Vehicle – Meaning – Benefits – Formation.
UNIT IV **(18 hrs)** **Registration and Licenses** Registration and Licenses - Introduction – Business Entity Registration – Mandatory Registration – PAN – Significance – Application and Registration of PAN – Linking of PAN with Aadhar –TAN – Persons liable to apply for TAN – Relevance of TAN – Procedure to apply for TAN – GST - Procedure for Registration – Registration under Shops and Establishment Act – MSME Registration – Clearance from Pollution Control Board – FSSAI Registration and License – Trade mark - Patent and Design Registration.
UNIT V **(18 hrs)** **Environmental Legislations in India** Geographical Indication of Goods (Registration and Protection) Act, 1999 - The Environmental Protection Act, 1986 - The Water (Prevention And Control of Pollution) Act, 1974 -The Central and State Boards for Prevention and Control of Water Pollution - Powers and Functions of Boards - Prevention and Control of Water Pollution - The Air (Prevention and Control of Pollution) Act, 1981 - Central and State Boards for The Prevention and Control of Air Pollution - Powers And Functions - NGT (National Green Tribunal).

Course Outcomes

Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Compare the various avenues of acquiring finance to setup a business entity	K2
CO 2	Recall the legal requirements for Section 8 Company	K1
CO 3	Examine the provisions for LLP and joint venture	K4
CO 4	Analyse the registration and licensing procedure	K4
CO 5	Examine the compliance of regulatory framework regarding environment	K4

Books for study:

1. **Kailash Thakur**, (2007) "Environment Protection Law and Policy in India", 2nd Edition, Deep & Deep Publication Pvt. Ltd., New Delhi.
2. **Avtar Singh**, (2015), "Intellectual Property Law", Eastern Book Company, Bangalore
3. **Zad N.S and Divya Bajpai**, (2022) "Setting up of Business Entities and Closure" (SUBEC), Taxmann, Chennai
4. **Amit Vohra & Rachit Dhingra** (2022) "Setting Up Of Business Entities & Closure", 6th Edition, Bharath Law House, New Delhi
5. **Divya Bajpai** (2022), "Taxmann's Quick Revision Charts for Setting Up of Business Entities and Closure", Taxmann Publications Private Limited.

Books for reference:

1. **Setting up of Business Entities and Closure** (2021), Module 1, Paper 3, The Institute of Company Secretaries of India, MP Printers, Noida
2. **The Air (Prevention and Control of Pollution) Act**, 1981, Bare Act, 2022 Edition, Universal/LexisNexis, Noida
3. **The Water (Prevention and Control of Pollution) Act**, 1974, Bare Act, 2022 Edition, Universal/LexisNexis, Noida
4. **Cliff Ennico**, (2005) "Small Business Survival Guide Starting Protecting and Securing your Business for Long-Term Success", Adams Media, USA
5. **Daniel Sitarz**,(2011) "Sole Proprietorship: Small Business Start-up Kit", 3rdEdition, Nova Publishing, USA

Web references:

1. https://www.icsi.edu/media/webmodules/FINAL_FULL_BOOK_of_EP_SBEC_2018.pdf
2. https://www.mca.gov.in/MinistryV2/incorporation_company.html 3)
3. https://legislative.gov.in/sites/default/files/The%20Limited%20Liability%20 Partnership%20Act,%202008.pdf

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	3	3	3	3	3	3	3	1	3
CO2	3	2	2	3	2	3	2	3	3
CO3	3	3	2	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3

First Year **Elective – III A** **Semester II**

BUSINESS ETHICS AND CORPORATE SUSTAINABILITY

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTE21	**BUSINESS ETHICS AND CORPORATE SUSTAINABILITY**	DCE	4	-	-	-	3	4	25	75	100

	Learning Objectives
1.	To understand the concept and importance of business ethics
2.	To enable ethical decision making based on various theories
3.	To gain knowledge on moral issues relating to business, marketing, advertising, finance, HR and environmental protection
4.	To understand the concepts of corporate sustainability
5.	To analyse sustainability information and prepare reports

Course Units

UNIT I **(12 hrs)**

Introduction to Business Ethics

Business Ethics - Meaning - Definition - Nature - Elements of Business Ethics – Sources of Ethics - Role and importance of Business Ethics and values in Business - Principles of Business Ethics - Causes of Unethical Behaviour - Corporate Frauds and Cyber Crime - Ethical Issues .

UNIT II **(12 hrs)**

Ethical Theories

Ethical Decision Making - Decision Making (Normal Dilemmas and Issues) - Application of Ethical Theories in Business - Traditional Ethical Theories - Utilitarianism - Ethical Egoism - Ethics of Duties - Normative Theories of Business Ethics - Stakeholder Theory - Stockholder Theory - Lawrence Kohlberg's Theory Model Development.

Unit III **(12 hrs)**

Moral Issues in Business

Moral Issues in Business - Importance of Moral Issues and Reasoning - Whistle Blowing- Kinds of Whistle Blowing - Ethical Issues in Functional Areas of Business. Marketing and Advertising - Truth in Advertising - Manipulation – Coercion - Trade Secrets - Corporate Disclosure - Insider Trading. Finance - Fairness and Efficiency in Financial Market – Greenmail-Golden Parachute. HR - Workers Rights and Duties - Work Place Safety - Sexual Harassment - Equal Employment Opportunity - Preferential hiring. Environmental Protection - Safety and Acceptable Risk- Environmental Harm - Pollution and its Control – Product Safety and Corporate Liability.

UNIT IV **(12 hrs)**

Corporate Sustainability

Corporate Sustainability - Concepts of Sustainability - Social, Environmental and Economic Dimensions - Sustainability in a Business Context. Principles of Sustainable Development - History and Emergence of the Concept of Sustainable Development – Definitions - Environmental issues and Crisis - Resource Degradation - Greenhouse Gases – Desertification - Social Insecurity – Industrialization - Globalization and Environment.

UNIT V **(12 hrs)**

Sustainability Reporting

Sustainability Reporting – Investor – Customers - Government and Media - Disclosing Sustainability Information – Challenges in Sustainability Reporting - Report and Website - Transparency and Accountability - One Report Movement – Financial and Non-Financial together - Triple Bottom Line Concept for Sustainable Business - Sustainability Reporting - Flavour of GRI, BRR, BRSR.

Course Outcomes

Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Apply the concepts of business ethics in practice	K3
CO 2	Demonstrate ethical decision making by applying various theories	K2
CO 3	Evaluate moral issues relating to business, marketing, advertising, finance, HR and environmental protection	K5
CO 4	Explain the concepts of corporate sustainability	K2
CO5	Construct reports disclosing sustainability information	K3

Books for study:

1. **MuraleedharanK P and SatheeshE K** (2021), "Fernando's Business Ethics and Corporate Governance", 3rdEdition.,Pearson IndiaEducation Services Pvt. Ltd, Noida
2. **John G. Cullen** (2022), "Business, Ethics and Society: Key Concepts, Current Debates and Contemporary Innovations", Sage Publications Pvt. Ltd, New Delhi
3. **Khanka S S** (2013), "Business Ethics and Corporate Governance (Principles and Practice)", 1stEdition, S.Chand& Co. Ltd., New Delhi
4. **Antonio Tencati, Francesco Perrini**, (2011), "Business Ethics and Corporate Sustainability (Studies in TransAtlantic Business Ethics series)" Edward Elgar Publishing Ltd
5. **T.N Chhabra**, (2020), "Business Ethics and Corporate Social Responsibility", Sun India Publications.

Books for reference:

1. **ICSI Study Material**, "Governance, Risk Management, Compliances and Ethics", New Delhi
2. **David Chandler** (2016), "Strategic Corporate Social Responsibility: Sustainable Value Creation", 4th Edition., Sage Publications Pvt. Ltd, New Delhi
3. **Mandal S K** (2017), "Ethics in Business and Corporate Governance", 2ndEdition., McGraw Hill Education, India
4. **C B Gupta** (2019), "Business Ethics and Corporate Social Responsibility", Scholar Tech Press.
5. **Saroj Kumar & Veera Karoli**, "Business Ethics Corporate Social Responsibility & Governance", Thakur publication.

Web references:

1. https://www.icsi.edu/media/website/BUSINESS%20MANAGEMENT%20ETHICS%20&%20EN TREPRENEURSHIP.pdf
2. https://ddceutkal.ac.in/Syllabus/BECG-MBA.pdf
3. https://sdgs.un.org/topics/desertification-land-degradation-and-drought

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	3	3	3	2	2	3	2	1	3
CO2	3	3	3	2	2	3	2	1	3
CO3	3	3	3	2	2	3	2	1	3
CO4	2	2	2	3	3	3	3	3	3
CO5	2	2	2	3	3	3	3	3	3

High – 3 **Medium – 2** **Low – 1**

First Year Elective – III B Semester II

AUDIT AND DUE DILIGENCE

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTE22	**AUDIT AND DUE DILIGENCE**	DCE	4	-	-	-	3	4	25	75	100

	Learning Objectives
1	To understand different types of audit
2	To gain knowledge on secretarial audit
3	To understand the basics of due diligence
4	To analyse different types of due diligence
5	To understand due diligence for takeovers and due diligence report

Course Units

UNIT I **(12 hrs)**

Introduction to Audit

Audit - Meaning – Objectives - Types - Corporate Governance Audit - Meaning – Scope - Corporate Social Responsibility Audit - Meaning – Objectives - Insider Trading Audit - Meaning - Objectives – Labour Law Audit - Meaning - Process - Benefits – Environment Audit: Meaning - Need – Social Audit- Meaning - Implications –Takeover Audit.

UNIT II **(12 hrs)**

Secretarial Audit

Secretarial Audit - Meaning – Need – Applicability of Secretarial Audit under Companies Act, 2013 – Appointment of Secretarial Auditor - SEBI (Listing Obligations and Disclosure Requirements) Regulations, 2015 – Format of Secretarial Report - Process of Secretarial Audit – Scope - Benefits of Secretarial Audit.

UNIT III **(12 hrs)**

Introduction to Due Diligence

Due Diligence - Meaning – Need - Objectives - Scope – Factors to be considered while conducting Due Diligence – Stages in the Process of Due Diligence – Techniques of Due Diligence - Ethical Due Diligence.

UNIT IV **(12 hrs)**

Types of Due Diligence

Types of Due Diligence - Operational – Strategic – Financial – Technical – Legal – Management – Technical – Environmental - Human Resource.

UNIT V **(12 hrs)**

Due Diligence for Take over and Due Diligence Report

Due diligence for Mergers and Amalgamation - Introduction and Process - Preparation of Scheme of Amalgamation - Due Diligence for Takeover - Guidance on Diligence Reporting – Format of Diligence Report – Due Diligence Report for Bank – Period of Reporting .

Course outcomes:

Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Compare different types of audit	K2
CO 2	Assess the provisions relating to secretarial audit	K5
CO 3	Recall the basics of due diligence	K1
CO 4	Explain the various types of due diligence	K2
CO 5	Examine due diligence for takeovers and prepare due diligence report	K4

Books for study:

1. **Anoop Jain C. S**, (2022), "Secretarial Audit, Compliance Management and Due Diligence", 19th Edition, A J Publications Chennai, Tamilnadu.
2. **William J Gole; Paul J Hilger** (2009), "Due Diligence, An MA Value Creation", John Wiley & Sons, Inc., New Jersey
3. **Chatterjee B.D** (2020), "A Practical Guide to Financial Due diligence", Bloomsberry Publications, 1st Edition, New Delhi
4. **Anoop Jain C S** (2022), "Governance, Risk Management, Compliance and Ethics" 15th Edition, A J Publications, Chennai, Tamilnadu.
5. **CS Divya Bajpai**, "Secretarial Audit, Compliance Management & Due Diligence Book", Taxmann Publications Private Limited.

Books for reference:

1. **National Institute of Securities Market** (April 2022), "Depository Operations, An educational initiative of SEBI" ,Taxmann Publications, New Delhi
2. **Peter Howson** (2003), "Commercial Due Diligence", Gower Publications, England
3. **Justin J Camp** (2002), "Venture Capital Due Diligence",Wiley & Sons, Incorporated, John, New Jersey.
4. **Ankush Bansal** (2023), "Secretarial Audit Compliance Management and Due Diligence", ICSI Publishers.
5. **S. K. Aggarwal & Abha Aggarwal** (2019), "Secretarial Audit,Compiance Management&Due Diligence", Reliance Publisher.

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1. https://www.icsi.edu/media/portals/70/241120123.pdf
2. https://www.icsi.edu/media/webmodules/publications/FULL% 20BOOK-PP-DD&CCM-PDF%20FILE.pdf
3. https://www.sebi.gov.in/legal/regulations/jul-2022/securities-and-exchange-board-of-

india-issue-of-capital-and-disclosure-requirements-regulations-2018-last-amended-on-july-25-2022-_61425.html

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	3	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	2	3
CO4	3	3	3	3	3	3	3	2	3
CO5	3	3	3	3	3	3	3	2	3

High – 3 **Medium – 2** **Low – 1**

First Year **Elective – IV A** **Semester II**

RURAL AND AGRICULTURAL MARKETING

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTE23	**RURAL AND AGRICULTURAL MARKETING**	GE	4	-	-	-	3	4	25	75	100

	Learning Objectives
1.	To understand the concepts of Rural marketing and its environments.
2.	To understand the buying behaviour of rural consumers
3.	To gain knowledge on strategies relating to rural product, branding, packaging etc.
4.	To analyse the functioning of food processing industry including distribution and promotion in the rural market.
5.	To understand the principles and functioning of cooperative marketing

Course Units

UNIT I **(12 hrs)**
Introduction to Rural marketing

Rural Marketing – Meaning – Definition – Concept and Nature of Rural Marketing – Taxonomy of Rural Markets – Urban Vs. Rural Marketing – Rural Marketing Environment – Becoming a successful Rural Marketer - Emerging trends in Rural Marketing - Digitalization of Rural Markets – Influencer Marketing in Rural Areas – Financial Inclusion and Rural Banking.

UNIT II **(12 hrs)**

Rural Buyer Behaviour

Rural Buyer Behaviour – Aspects of Rural Buyer Behaviour – Rural Consumer Decision Making Process – Environmental factors affecting Rural Consumers – Buyer Characteristics and Innovation Adoption – Rural STP Approach – Guidelines for effective Segmentation and Emerging Rural Market Segments – Impact of E-Commerce on Rural Consumer Behaviour.

UNIT III **(12 hrs)**

Rural product strategy and pricing

Rural Product Strategy – Rural Product Classification and Decisions – Product Innovation Strategies – Customer Value Strategies – Rural Branding and Packaging Strategies – Role of Agricultural Price Commission in India (APC) - Introduction to APC - Basic Objectives of the Commission - Determination of Minimum Support Price (MSP) - Non Price Measures - Minimum Support Price of selected Commodities - Benefits to the Farmers - Rationale of Support Pricing - Limitations of MSP.

UNIT IV **(12 hrs)**

Food Processing Industry Infrastructure in India

Food Processing Industry Infrastructure in India - Meaning of Processing - Advantages of Food Processing - Processing of Agricultural Commodities (Wheat, Paddy, Pulses and Oilseeds) – Importance of Cold Chains - Rural Distribution Strategy – Rural Distribution and Logistics – Direct Vs. Indirect Marketing – Organised Rural Retailing – Types of Retail Outlets – Rural Malls – e-tailing and Training for Rural Retailers – Rural Supply Chain Management – ITC e-choupal – Rural Promotion Mix – Marketing Communication Challenge in Rural Markets.

UNIT V **(12 hrs)**

Cooperative marketing

Cooperative Marketing - Meaning - Role of Cooperatives - Structure of Cooperative Marketing Societies - Types of Co-operative Marketing Societies – Membership – Functioning – Agri export Zones – Agricultural Business - Small Farmers Consortium - eNAM – Tamil Nadu State Agricultural Marketing Board.

Course Outcomes

Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Recall the concepts of rural marketing	K1
CO 2	Analyze the buying behaviour of rural consumers	K4

CO 3	Develop the strategies relating to rural product, branding, packaging, etc.	K3
CO 4	Construct distribution and promotional mix in the rural market relating to food processing industry	K3
CO5	Explain the principles and functioning of cooperative marketing	K2

Books for study:

1. **Acharya S.S Agarwal N.L.,** (2019), "Agricultural Marketing in India", 6th Edition., BS Publishers & Distributors Pvt Ltd, India
2. **Ashok M. V** (2021), "Emerging Trends in Agricultural Marketing in India", Brillion Publishing, New Delhi
3. **Debarun Chakrabaorty, Soumya Kanti Dhara, Adrinil Santra** (2021), "Rural Marketing in India: Texts and Cases", Atlantic Publishers and Distributors Pvt Ltd, Chennai
4. **Dr. Badrinath M.N , Dr. Venkatesh S Shastry**, "Rural and Agricultural Marketing", Thakur Publications Pvt Ltd, Bengaluru.
5. **Dr. RamKishen Y**. (2002)," New Perspectives in Rural & Agricultural Marketing", Jaico Publishing House.

Books for reference:

1. **Rahman K S** (2019), "Rural Marketing in India", Himalaya Publishing House, Mumbai
2. **Dogra Balram and Karminder Ghuman** (2007), Rural Marketing: Concepts and Practices, McGraw Hill Education, Noida
3. **Dr. Saroj Kumar , Mr. Vikrant Verma**, "Rural and Agricultural Marketing", Thakur Publications Pvt Ltd, Bengaluru.
4. **Kiran Sankar Chakraborty** (2009), "Rural Markets and Agricultural Marketing", Mittal Publications.
5. **K.P. Singh**, "Agricultural Marketing And Rural Development", D.P.S. Publishing House

Web references:

1. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_RM_NOTES_2.pdf
2. https://www.mbaskool.com/business-concepts/marketing-and-strategy-terms/12992-cooperative-marketing.html
3. https://cacp.dacnet.nic.in/content.aspx?pid=32#content

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	2	2	1	2	3	3	3	1	3
CO2	3	3	3	3	3	3	3	1	3

CO3	3	3	3	3	3	3	3	1	3
CO4	3	3	2	3	3	3	3	2	3
CO5	2	2	2	3	3	3	3	1	3

High – 3 **Medium – 2** **Low – 1**

First Year **Elective – IV B** **Semester II**

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTE24	**LOGISTICS AND SUPPLY CHAIN MANAGEMENT**	GE	4	-	-	-	3	4	25	75	100

	Learning Objectives
1.	To identify the primary differences between logistics and supply chain management
2.	To understand the individual processes of supply chain management and their interrelationships within individual companies and across the supply chain.
3.	To evaluate the management components of supply chain management
4.	To analyse the tools and techniques applied in implementing supply chain management.
5.	To create awareness about the professional opportunities in supply chain management.

Course Units

UNIT I **(12 hrs)**

Logistic and Supply Chain

Logistics – Positioning of Information in Logistics and Supply Chain Management – Supply Chain Management - Concept – Features – Evolution – Importance - Process and Barriers of Supply Chain Management – Principles - Supply Chain Strategies – Organizations – Coordination - Innovation and Forecasting - Supply Chain Intermediaries – Concept and Types - Channels of Distribution for Industrial Goods and Consumer Goods - Channels of Distribution at Services Level - Factors for selection of suitable channels.

UNIT II **(12 hrs)**

Global Perspectives

Global perspective - Measuring and Analyzing the value and Efficiency of Global Supply Chain Networks - Global Market Forces - Types of Global Supply Chain - Indian Perspectives - Measuring and Analyzing the Value and Efficiency of Domestic Supply Chain Networks - Economic effects of Supply Chains - Customer Perspectives - Customer Values - Role of Customers and Ways of improving Customer Services in SCM.

UNIT III **(12 hrs)**

Logistics Management

Logistics Management - Concept - Process - Competitive Advantages and Three C's - Changing Logistics Environment - Reverse Logistics - Importance of Inventory Control - Elements of Inventory Management – Inbound and out Bound logistics - Bull- whip effect – Distribution and Warehousing Management - Transport Functions and Participants in Transportation Decisions - Transport Infrastructure. Packaging and Materials Management: Consumer and Industrial Goods Packaging - Factors influencing Materials Planning, Preservation Safety and Measures of Materials Handling.

UNIT IV **(12 hrs)**

SCM-Warehousing

SCM Warehousing – Concepts of Warehousing– Types of Warehouse – Functions of Warehousing– Strategic Warehousing - Warehouse Operations - Ownership Arrangements - Warehouse Decisions - Warehouse Management Systems - Supply Chain Logistics Design - Global Strategic Positioning- Global SC Integration - SC Security - International Sourcing - Distribution Control and Evaluation.

UNIT V **(12 hrs)**

SCM-Plan

SCM Plan - Demand Planning - Source of Procurement - Production or Assembly Steps - Sales return of Defective or Excess Goods - Use of Internet in SCM - Role of computer/ IT in Supply Chain Management –E- market Places - E-procurement - E-logistics - E-fulfillment - Operative Systems in SCM - Enterprise Resource Planning (ERP) - Performance Modeling of Supply Chains using Markov Chains - Inventory Control- Importance - Pareto's Law - Emerging Technologies in Logistics and Supply Chain Management - CRM Vs SCM. Benchmarking Concept - Features and Implementation – Outsourcing - Basic Concepts - Value addition in SCM – Concept of Demand Chain Management - Growth of Logistics and Supply Chain Management in National and International Scenarios.

Course Outcomes

Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Recall the concepts and features of SCM	K1
CO 2	Summaries global and Indian perspectives of SCM	K2
CO 3	Examine changing logistics environment pertaining to materials management, warehousing and distribution	K4
CO 4	Explain strategic warehousing for SCM	K2
CO5	Outline the role of internet in SCM	K2

Books for study:

1. **Christopher Martin**, "Logistics and Supply Chain Management" (2016) 5th Edition, FT Publishing International, India
2. **Chopra, Sunil, Meindl, Peter and Kalra, D.V.**; Supply Chain Management: Strategy,

Planning and Operation; Pearson Education Pvt. Ltd, Noida
3. **Saikumari V, Purushothaman S**, (2022), "Logistics and Supply Chain Management", Sultan Chand and Sons.
4. **Sisco Mbindi**, "Logistics and Supply Chain Management", creatspace self publisher.
5. **Raghuram** (2015), "Logistics And Supply Chain Management: Cases and Concepts", Laxmi Publications.

Books for reference:

1. **Sahay, B.S.**, Supply Chain Management, 2nd Edition; Macmillan Publishers India
2. **Ballou, R.H.** Business Logistics Management. Prentice-Hall Inc.
3. **Bowersox D.J.,Closs D.J, Bixby Cooper. M.**, Supply Chain Logistics Management, (2002), 9th Edition, McGraw-Hill Higher Education, Noida.
4. **L. Natarajan**, "Logistics and Supply Chain Management", Margham Publication.
5. **John Coyle, C. Langley, Robert Novack, Brian Gibson**, (2020), "Supply Chain Management: A Logistics Perspective", South-Western College Publishing.

Web references:

1. http://www.wisdomjobs.com/e-universit/production-and-operations-management-tutorial-295/principles-of-material-handling-9576.html
2. http://www.marketing91.com/logistics-activitiesw/
3. https://www.fcbco.com/services/warehouse-strategies.

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs						PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**
CO1	3	3	1	3	2	2	3	1	2
CO2	2	2	3	2	3	3	2	2	1
CO3	2	1	2	3	2	2	3	3	3
CO4	1	3	1	2	1	1	2	2	2
CO5	3	2	2	2	2	2	1	1	1

High – 3 **Medium – 2** **Low – 1**

First Year **Skill Enhancement Course - I** **Semester II**

Advanced Business Statistics

Course Code	Title of the Course	Category	L	T	P	O	Credits	Inst. Hours	Marks		
									CIA	External	Total
PCCOTS21	**Advanced Business Statistics**	SEC	4	-	-	-	2	4	25	75	100

	Learning Objectives
1	To familiarize students with concepts and applications of Statistics in Business
2	To enable the students to determine Association of Attributes
3	To determine the optimal decisions under uncertainty and risk
4	To acquaint students to the concepts of probability and its applications in business
5	To understand the applications of Probability Distributions

Course Units

UNIT I **(12 hrs)**

Statistics

Statistics – Definition – Features – Functions – Limitations – Misuse – Scope – Applications in Business – Statistics in the current Information Age – Applications in Business Analytics. Statistical Survey – Stages – Branches of Statistics – Descriptive Statistics – Inferential Statistics.

UNIT II **(12 hrs)**

Association of Attributes

Association of Attributes – Difference between Association and Correlation – Notation and Terminology – Association and Disassociation – Methods of studying Association – Comparison of Observed and Expected Frequencies method – Proportion method – Yule's Coefficient of Association – Coefficient of Colligation

UNIT III **(12 hrs)**

Statistical Decision Theory

Statistics Decision Theory – Elements of Decision Problem – Decision-Making Environment - Determining Optimal Decisions under Uncertainty, Risk – Decision Tree Analysis – Advantages.

UNIT IV **(12 hrs)**

Probability

Probability – Definition – Terminology – Additional Theorem – Multiplication Theorem – Conditional Probability – Baye's Theorem. (Proof of the Theorem excluded)

UNIT V **(12 hrs)**

Probability Distributions

Probability Distribution – Meaning – Concept – Assumptions, Applications of Binomial Distribution, Poisson Distribution, Normal Distribution.

Theory: 20%; Problems: 80%

Course Outcomes

Students will be able to:

CO No.	CO Statement	Knowledge level
CO 1	Define Statistics and discuss its Applications and Limitations	K2
CO 2	Determine the Association of Attributes	K4, K5
CO 3	Take scientific, informed decisions under Uncertainty and Risk	K3, K4, K5
CO 4	Understand the concepts of Probability and its applications in business	K2, K3
CO 5	Understand the concept of Probability Distributions and Derive Binomial, Poisson Distributions	K3, K4, K5

Books for study:

1. **Dr. S.P. Gupta,** Statistical Methods, Sultan Chand & Sons, New Delhi.
2. **C.R. Kothari**, Quantitative Techniques, Vikas Publishing Houses Pvt. Ltd., Noida.
3. **P.R. Vittal**, Business Statistics & Operations Research, Margham Publications.
4. **Sharad S. Johri, Rajendra Rathore**, "Advanced Business Statistics", Atlantic Publishers.
5. **N. P. Agarwal, Ankita Chaturvedi**, "Advanced Business Statistics and Mathematics", Ramesh Book House.

Books for reference:

1. **Morris Hamburg,** Statistical Analysis for decision making, Harcourt Trade publishers.
2. **R.S.N. Pillai and Bhagavathi,** Statistics – Theory & Practices, S. Chand & Co., New Delhi.
3. **Kirupa Priyadarsini et. al.,** Business Statistics – Workbook Using Excel, Laxmi Publications Pvt. Ltd.,
4. **J.K. Sharma**, Business Statistics, Vikas Publishing
5. **David M. Levine,** Business Statistics – A First Course, Pearson

Web references:

1. https://onlinelibrary.wiley.com/doi/book/10.1002/9781119672333
2. https://www.bestcolleges.com/business/what-is-business-statistics/
3. https://www.docsity.com/en/advanced-business-statistics/8823023/

Note: Latest edition of the books may be used

Mapping of course outcomes with POs and PSOs

	POs										PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**	**4**	**5**
CO1			2					1	2	2	2	2	1	2	1
CO2	3	2		1		2	2	1		1	3	2	3	3	2
CO3	3	3		1		2	2	1		1	3	3	3	3	1
CO4	2	1		1		2	2	1		1	2	2	3	3	2
CO5	3	3	2	2		3	3	1	1	2	3	3	3	3	2

High – 3 **Medium – 2** **Low – 1**

SEMESTER I				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCATC11	**Core Course 1**	**FINANCIAL ACCOUNTING I**	**5**	**4**

Course Objectives

1. To enlighten the students with various Concepts of Accounting.
2. To know the basis for calculating business profits.
3. To familiarize with the accounting treatment of depreciation.
4. To learn the methods of calculating profit for single entry system.
5. To gain knowledge on the accounting treatment of insurance claims.

COURSE OUTCOMES (CO's):

1. Remember the concept of rectification of errors and Bank reconciliation statements
2 .Apply the knowledge in preparing detailed accounts of sole trading concerns
3 .Analyse the various methods of providing depreciation.
4 .Evaluate the methods of calculation of profit
5 .Determine the royalty accounting treatment and claims from insurance companies in case of loss of Stock.

Unit-I	**Fundamentals of Financial Accounting**	**15 Hours**

Financial Accounting – Meaning, Definition, Objectives, Basic Accounting Concepts and Conventions - Journal, Ledger Accounts – Trial Balance - Classification of Errors – Rectification of Errors.

Unit-II	**Final Accounts and Bank Reconciliation of Statement**	**15 Hours**

Final Accounts of Sole Trading Concern – Preparation of Trading, Profit and Loss Account and Balance Sheet with Adjustments - Bank Reconciliation Statement- Meaning - Need and Preparation of Bank Reconciliation Statement.

Unit-III	**Depreciation and Bills of Exchange**	**15 Hours**

Depreciation – Causes – Methods of providing Depreciation – Straight Line Method – Diminishing Balance Method – Annuity Method – Sinking Fund Method (Simple Problems only).

Bills of Exchange – Definition – Specimens – Types of Bills of Exchange - Discounting of Bills – Endorsement of Bill – Collection – Noting – Renewal – Retirement of Bill under Rebate (Simple Problems Only).

Unit-IV	**Accounting from Incomplete Records – Single Entry System**	**15 Hours**

Incomplete Records - Meaning and Features - Limitations - Difference between Incomplete Records and Double Entry System - Methods of Calculation of Profit - Statement of Affairs Method – Preparation of Final Statements by Conversion Method.

Unit-V	**Royalty and Fire Insurance Claims**	**15 Hours**

Meaning – Minimum Rent – Short Working – Recoupment of Short Working – Methods of Recoupment – Accounting Treatment - Sublease – Accounting Treatment. **Insurance Claims** – Meaning – Calculation of Claim Amount-Average clause(Loss of Stock only)
Theory 20% & Problem 80%
Books for Study: 1. **T.S. Reddy and Murthy,** Financial Accounting, Margham Publications, Chennai. 2**. R.L.Gupta and M. Radhaswamy,** Financial Accounting, Sultan Chand & Sons., New Delhi. 3. **S. Thothadri and S. Nafeesa,** Financial Accounting, McGraw Hill Education, Chennai.
Books for Reference: 1. **M.C.Shukla, T.S.Grewal, S.C. Gupta,** Advanced Accounts – Volume I, S.Chand & Co., - New Delhi. 2. **S.P. Jain and K.L.Narang,** Financial Accounting, Kalyani Publishers, Ludhiana. 3. **V.K.Goyal**, Financial Accounting, Excel Books, New Delhi. 4. **S.M. Shukla**, Financial Accounting, Sahitya Bhawan Publications, Agra. 5. **Mukherji & M. Hanif,** Financial Accounting, Tata McGraw Hill Pub. Co. Ltd., New Delhi.

MAPPING WITH PROGRAMME OUTCOMESAND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	2	3	3	3	2	2	2	3	2	2
TOTAL	15	10	15	15	13	11	10	10	15	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	2	3	2	2

3 – Strong, 2- Medium, 1- Low

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UCCATC12	Core Course 2	PRINCIPLES OF MANAGEMENT	5	4

Course Objectives

1. To understand the basic management concepts and functions
2. To know the various techniques of planning and decision making
3. To familiarize with the concepts of organisation structure
4. To gain knowledge about the various components of staffing
5. To enable the students in understanding the control techniques of management.

COURSE OUTCOMES (CO's):

1. Demonstrate the importance of principles of management.
2. Paraphrase the importance of planning and decision making in an organization.
3. Comprehend the concept of various authorizes and responsibilities of an organization.
4. Enumerate the various methods of Performance appraisal.
5. Demonstrate the notion of directing, co-coordination and control in the management.

Unit 1	Introduction to Management	15 Hours

Meaning- Definitions – Nature and Scope - Levels of Management – Importance - Management Vs. Administration – Management: Science or Art –Evolution of Management Thoughts – F. W. Taylor, Henry Fayol, Peter F. Drucker, Elton Mayo - Functions of Management – Managers – Duties & Responsibilities.

Unit 2	Planning	15 Hours

Planning – Nature – Scope - Functions – Importance - Elements of Planning – Types – Planning Process - Tools and Techniques of Planning – Management by Objective (MBO) - Decision Making – Characteristics – Types - Steps in Decision Making – Forecasting.

Unit 3	Organizing	15 Hours

Organizing - Scope – Characteristics – Importance – Types - Formal and Informal Organization – Organization Chart – Organization Structure - Types- Departmentalization– Authority and Responsibility – Centralization and Decentralization – Span of Management.

Unit 4	Staffing	15 Hours

Staffing - Staffing Process – Recruitment – Sources of Recruitment – Modern Recruitment Methods - Selection Procedure – Test - Interview– Training – Need - Types– Promotion – Management Games – Performance Appraisal - Meaning and Methods – 360 degree Performance Appraisal – Work from Home - Managing Work from Home [WFH].

Unit 5	Directing, Co-ordination and Control	15 Hours

Motivation –Meaning - Theories – Communication – Types - Barriers to Communications – Measures to Overcome the Barriers. Leadership – Nature - Types and Styles of Leadership - Qualities of a Good Leader – Successful Women Leaders – Challenges faced by women in workforce – Supervision - Co-ordination – Meaning - Techniques of Co-ordination - Control - Characteristics - Importance – Stages in the Control Process - Requisites of Effective Control and Controlling Techniques – Management by Exception [MBE].

TEXTBOOKS

1.Gupta.C.B, -Principles of Management-L.M. Prasad, S.Chand& Sons Co. Ltd,New Delhi.
2.DinkarPagare, Principles of Management, Sultan Chand & Sons Publications, New Delhi.
3.P.C.Tripathi& P.N Reddy, Principles of Management. Tata McGraw, Hill, Noida.
44.L.M. Prasad, Principles of Management, S.Chand&Sons Co. Ltd, New Delhi.
55.R.K. Sharma, Shashi K. Gupta, Rahul Sharma, Business Management, Kalyani Publications, New Delhi.

Reference Books

1.K Sundhar, Principles Of Management, Vijay Nichole Imprints Limited, Chennai
2.Harold Koontz, Heinz Weirich, Essentials of Management, McGraw Hill, Sultan Chand and Sons, New Delhi.
3.Grifffin, Management principles and applications, Cengage learning, India.
4.H.Mintzberg - The Nature of Managerial Work, Harper & Row, New York.
5.Eccles, R. G. & Nohria, N. Beyond the Hype: Rediscovering the Essence of Management. Boston The Harvard Business School Press, India.

Web Resources

1	http://www.universityofcalicut.info/sy1/management
2	https://www.managementstudyguide.com/manpower-planning.htm
3	https://www.businessmanagementideas.com/notes/management-notes/coordination/coordination/21392

MAPPING WITH PROGRAMME OUTCOMESAND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	2	2	2	3	2	3
CO2	3	2	3	3	2	2	2	2	3	2	2
CO3	3	2	2	3	2	2	2	2	3	2	2
CO4	3	2	2	3	2	2	2	2	3	2	2
CO5	3	2	3	3	2	2	2	2	3	2	2
TOTAL	15	10	12	15	11	10	10	10	15	10	11
AVERAGE	3	2	2.4	3	2.2	2	2	2	3	2	2.2

3 – Strong, 2- Medium, 1- Low

SEMESTER I				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCAPA11	**Generic Elective 1**	**Allied: OFFICE AUTOMATION AND LAB**	**4**	**3**

Course Objectives

1. To make the students learn basic features of computers.

2. The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point. To teach the functioning of various parts of computers.

3.To acquire knowledge of using Internet

4. To acquire knowledge on editor, spread sheet and presentation software.

5. The course is highly practice oriented rather than regular class room teaching.

COURSE OUTCOMES (CO's):

1. Understand the Basic Application of Computer.
2. Understand the parts of Computer and their functioning.
3. Understand the basics of computer systems and its components.
4. Understand and apply the basic concepts of a word processing package.
5. Understand and apply the basic concepts of electronic spreadsheet software.
6. Understand and apply the basic concepts of database management system.
7. Understand and create a presentation using PowerPoint tool.

Unit-I	**AN OVERVIEW OF COMPUTER**	**12 Hours**

Introduction to Computer – Meaning – Characteristics of Computer – Generations of Computer – Classification of Computers – **Computer Hardware:** Meaning – Basic Components of Computer System – Control Units – ALU – Input and Output Devices - Introduction to Programming Languages.

Unit-II	**WORD PROCESSING**	**12 Hours**

Word Processing: Application of Word Processing - File Menu operations - Editing text – Tools, Formatting, bullets and numbering - Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, printing – Preview, options, merge.

Unit-III	**SPREAD SHEETS**	**12 Hours**

Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying

Unit-IV	**CHARTS**	**12 Hours**

Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.

Unit-V	**POWER POINT**	**12 Hours**

Power Point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.

Books for Study:

1. Fundamentals of Information Technology: Alexis Leon and Mathews Leon, Vikas Publishing House – 2000.
2. Information Technology Applications for Business: Dr. S. Sudalaimuthu, Himalaya Publications.
3. Computer Fundamentals: Anitha Goel, Pearson Publication
4. PC Software under Windows: Puneet Kumar, Kalyani Publications
5. MS Office 2000: Sanjay Saxsena, Vikas Publishing House, 2000.

Books for Reference :

1. Introduction to Information Technology: Turban, E, R.K. Rainner Jr., and R. E. Potter, New Delhi: John Wiley – 2000.
2. Introduction to computer: Peter Norton, McGraw Hill
3. Fundamentals of Information technology: D. NVN Chary, Kalyani Publications
4. Information Technology for Management: Henry c. Lucas, McGraw Hill/Irwin
5. Introduction to Information Technology: V. Rajaraman, Prentice Hall of India, 2003

MAPPING WITH PROGRAMME OUTCOMESAND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	2	2	3	3	3	2
CO2	3	2	3	3	2	3	2	3	3	3	3
CO3	3	2	3	3	2	2	2	2	3	3	2
CO4	3	2	3	3	3	2	2	3	3	3	2
CO5	3	2	3	3	3	2	2	2	3	3	2
CO6	3	3	2	3	3	2	2	3	3	3	2
CO7	3	3	3	3	2	3	2	2	3	3	3
TOTAL	21	16	20	21	18	16	14	18	21	21	16
AVERAGE	3	2.28	2.85	3	2.57	2.28	2	2.57	3	3	2.28

3 – Strong, 2- Medium, 1- Low

COURSE CODE	CATEGORY	COURSE TITLE	HR./WEEKS	CREDIT
UCCATS12	Skill Enhancement Course 1 (FC)	INDIAN CONSTITUTION	2	2

COURSE OBJECTIVES

1. To understand origin and nature of Indian Constitution
2. To familiarise with the functions of Union and State Executive
3. To acquaint with Union and State legislature
4. To know functions of judicial systems.
5. To analyze the functions of Local Self Government

COURSE OUTCOMES:

CO – 1: Discuss the nature of Indian Constitution

CO – 2: Explain the functions of Union and State Executive

CO – 3: Describe the functioning of Union & State legislature

CO – 4: Elaborate the functions of Supreme Court and High Courts

CO – 5: Analyze the features of Local Self Government

Unit-I	ORIGIN AND NATURE OF THE CONSTITUTION	6 Hours

Constituent Assembly and framing of the Constitution -Preamble – Salient Features of the Indian Constitution – Fundamental Rights – Fundamental Duties -Directive Principle of the State Policy

Unit-II	UNION AND STATE EXECUTIVE	6 Hours

President of India – Election – Qualifications – Term of Office – Emoluments – Powers and Duties of the President – Vice-President of India – Election – Qualifications – Term of Office – Emoluments – Powers and Duties of the Vice-President – Council of Ministers – Ministerial Responsibilities – Powers and Functions of State Governor-State Council of Ministers – Indian Federalism at work

Unit-III	UNION AND STATE LEGISLATURE	6 Hours

Nature of Bi-cameral Legislature – Composition of Rajya Sabha and Lok Sabha – Elections and Qualifications – Powers and Functions of the Legislature – Powers and Functions of the Speaker

and Deputy Speaker of Lok Sabha, Chairman and Vice- Chairman of Rajya Sabha – State Legislative Council and Assemblies – Procedure of Amendments and Important Amendments		
Unit-IV	JUDICIARY	6 Hours
Supreme Court – Composition, Powers and Functions – High Courts in the States – Judicial System of States – Impeachment procedure – Judicial Review- Important Judicial Decisions.		
Unit-V	LOCAL SELF-GOVERNMENT	6 Hours
73rd and 74th Amendments and its Features – State Election and Finance Commission – Three-Tier System of Rural Panchayats – Municipal and Corporation Administration – Reservation for Schedule Caste, Schedule Tribes and Women		

Books for Study

1. Basu, D.D. Introduction to the Constitution of India, LexisNexis Butter worths 2008.
2. Pylee,M.V. India's Constitution, S.Chand & Company, New Delhi, 2005.
3. Johari,J.C. The Constitution of India, Sterling Publishers Pvt Ltd, New Delhi, 2004.

Books for Reference :

1.Sujit Choudhry -The Oxford Handbook of the Indian Constitution, 2016

2.P.Bakshi – The Constitution of India, Universal Law Publishing, New Delhi ,2015

COURSE CODE	CATEGORY	COURSE TITLE	Hr./ WEEKS	CREDIT
UCCATF12	Generic Elective 1	**ECONOMICS FOR MANAGEMENT**	**2**	**2**

COURSE OBJECTIVES :

1. Use Economic tools to explain the optimal allocation of resources within the firm.
2. To understand analysis of demand and supply
3. To acquaint with production analysis.
4. Use the tools of economic theory to explain optimal production and pricing decisions by the firm in each market structure.
5. To know macro economic factors of business.

COURSE OUTCOMES (CO'S):

CO-1: Understand the nature and scope of Managerial Economics.

CO-2: Acquire knowledge of demand, supply concepts and forecasting techniques.

CO-3: Understand the cost concepts and economies scale.

CO-4: Acquaint with the market structure, price and output determination.

CO-5: Able to describe the concepts of trade cycles, inflation, fiscal & monetary policy etc.,

Unit-I	INTRODUCTION TO MANAGERIAL ECONOMICS	6 Hours

Economics – Nature of Economics – Scope of Economics – Managerial Economics – Features - Objectives – Scope – Roles and Responsibilities of Managerial Economist

Unit-II	DEMAND AND SUPPLY ANALYSIS	6 Hours

Demand – Determinants of Demand – Law of Demand – Exceptions – Changes in Demand – Elasticity of Demand – Types – Demand Forecasting – Supply Analysis – Determinants – Law of Supply

Unit-III	PRODUCTION ANALYSIS	6 Hours

Production – Production Function – Economies And Diseconomies Of Scale – Cost – Types Of Cost – Revenue – Types Of Revenue – Cost Out Put Relationship – Break Even Analysis.

Unit-IV	MARKET STRUCTURE	6 Hours

Market Structure – Perfect Competition – Imperfect Competition – Monopoly – Monopolistic – Oligopoly – Duopoly

Unit-V	MACRO ECONOMIC FACTORS OF BUSINESS	6 Hours

National Income – Determinants Of National Income - Inflation – Trade Cycle – Causes – Effects – Monitory Policy – Fiscal Policy.

BOOKS FOR STUDY:

1. Business Economics, K.P.M Sundaram and E.N. Sundaram, Sultan & Chand, New Delhi.
2. Business Economics, S. Sankaran, Margham Publications, Chennai
3. Managerial Economics, R.L. Varsheny and K.L. Maheshwari, Sultan & Chand. New Delhi.
4. Business Economics, H.L. Ahuja, S.Chand, NEW DELHI.
5. Business Economics , T. Aryamala, Vijay Nicole Imprints Pvt Ltd, Chennai.

BOOKS FOR REFERENCE :

1. Managerial Economics, P.L. Mehta, Sultan Chand & Sons - New Delhi.
2. Economics for Business, Peter Mitchelson and Andrew Mann, Thomas Nelson Australia.
3. Business Economics, C.M.Chaudhary, RBSA Publishers, Jaipur . Managerial Economics, Habibour Rahman, Himalaya Publishing House.

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	3	2	2	2	2	2
CO2	3	2	2	3	2	2	2	2	3	2	2
CO3	3	2	2	3	2	3	2	2	3	2	2
CO4	3	2	2	3	2	2	2	2	3	2	2
CO5	3	2	2	2	2	3	2	2	2	2	2
TOTAL	15	10	10	13	10	13	10	10	13	10	10
AVERAGE	3	2	2	2.6	2	2.6	2	2	2.6	2	2

3 – Strong, 2- Medium, 1- Low

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	3	2	2	2	3	3
CO2	3	2	3	3	3	3	3	3	3	3	3
CO3	3	2	2	3	3	3	3	3	3	3	3
CO4	3	2	3	3	3	3	2	3	3	3	3
CO5	3	2	3	2	3	3	2	3	2	3	3
TOTAL	15	10	14	13	15	15	12	14	13	15	15
AVERAGE	3	2	2.8	2.6	3	3	2.4	2.8	2.6	3	3

3 – Strong, 2- Medium, 1- Low

SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCATC21	**Core Course 3**	**FINANCIAL ACCOUNTING II**	**5**	**4**

Course Objectives

1. To evaluate the Hire purchase accounts and Instalment systems
2. To prepare Branch accounts and Departmental Accounts
3. To understand the accounting treatment for admission and retirement in partnership
4. To know Settlement of accounts at the time of dissolution of a firm.
5. To elaborate the role of IFRS

Course Learning Outcomes

1. Prepare Branch Account.
2. Compute Departmental Profit & Loss A/c.
3. Pass Journal Entries; prepare Ledger Accounts in the books of Hire Purchaser & Hire Vendor.
4. Distinguish between Hire Purchase and Instalment Purchase System.
5. To know Settlement of accounts at the time of dissolution of a firm.
6. To elaborate the role of IFRS

Unit-I	**Hire Purchase and Instalment System**	**15 Hours**

Hire Purchase System – Features- Accounting Treatment in Hire Purchase System – Calculation of Interest - Default and Repossession - Hire Purchase Trading Account - Instalment System - Calculation of Profit.

Unit-II	**Branch and Departmental Accounting**	**15 Hours**

Branch – Dependent Branches: Accounting aspects - Debtors System -Stock and Debtors System – Distinction between Wholesale Profit and Retail Profit – Independent Branches (Foreign Branches excluded) - Departmental Accounts: Basis of Allocation of Expenses – Inter- Departmental Transfer at Cost or Selling Price. (Simple Problems only).

Unit-III	**Partnership Accounts - I**	**15 Hours**

Partnership Accounts: –Admission of a Partner – Treatment of Goodwill - Calculation of Hidden Goodwill –Retirement of a Partner – Death of a Partner.

Unit-IV	**Partnership Accounts - II**	**15 Hours**

Dissolution of Partnership - Methods – Settlement of Accounts Regarding Losses and Assets – Realization account – Treatment of Goodwill – Preparation of Balance Sheet – Application of Garner Vs Murray Theory – Accounting Treatment - Piecemeal Distribution – Surplus Capital Method – Maximum Loss Method.

Unit-V	**Accounting Standards for financial reporting (Theory only)**	**15 Hours**

Objectives and Uses of Financial Statements for Users-Role of Accounting Standards -

Development of Accounting Standards in India -Role of IFRS- IFRS Adoption Vs Convergence Implementation Plan in India- Ind AS- An Introduction - Difference between Ind AS and IFRS.
Theory 20% & Problems 80%
Books for Study: 1. **T.S. Reddy and Murthy,** Financial Accounting, Margham Publications, Chennai. 2**. R.L.Gupta and M. Radhaswamy,** Financial Accounting, Sultan Chand & Sons., New Delhi. 3. **S. Thothadri and S. Nafeesa,** Financial Accounting, McGraw Hill Education, Chennai.
Books for Reference: 1. **M.C.Shukla, T.S.Grewal, S.C. Gupta,** Advanced Accounts – Volume I, S.Chand& Co., - New Delhi. 2. **S.P. Jain and K.L.Narang,** Financial Accounting, Kalyani Publishers, Ludhiana. 3. **V.K.Goyal**, Financial Accounting, Excel Books, New Delhi. 4. **S.M. Shukla**, Financial Accounting, Sahitya Bhawan Publications, Agra. 5. **Mukherji & M. Hanif,** Financial Accounting, Tata McGraw Hill Pub. Co. Ltd., New Delhi.

Web Resources	
1	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	3	3
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	2	3	3	2	2	2	3	2	3
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	3	3	3	3	3	3	3	3	3	3
CO6	3	3	3	3	3	3	3	3	3	3	3
TOTAL	18	14	16	18	16	15	14	14	18	15	16
AVERAGE	3	2.33	2.66	3	2.66	2.5	2.33	2.33	3	2.5	2.66

3 – Strong, 2- Medium, 1- Low

SEMESTER II				
Course Code	**Category**	**Course Title**	**Hr./ WEEKS**	**CREDIT**
UCCATC22	**CORE COURSE 4**	**BUSINESS LAW**	5	4

Course Objectives

1. To know the nature and objectives of Mercantile law and the essentials of valid contract
2. To gain knowledge on performance contracts
3. To be acquainted with the rules of Indemnity and Guarantee
4. To make aware of the essentials of Bailment and pledge
5. To understand the provisions relating to sale of goods.

Course Outcome

CO1: Explain the Objectives and significance of Mercantile law
CO2: Understand the clauses and exceptions of Indian Contract Act.
CO3: Outline the contract of indemnity and guarantee
CO4: Familiar with the provision relating to Bailment and Pledge
CO5: Explain the various provisions of Sale of Goods Act 1930

Unit I	**Elements of Contract**	**15 Hours**

Indian Contract Act 1872 - Definition of Contract, Essentials of Valid Contract, Classification of Contract, Offer and Acceptance – Consideration – Capacity to Contract – Free Consent - Legality of Object – Contingent Contracts – Void Contract

Unit II	**Performance of Contract**	**15 Hours**

Meaning of Performance, Offer to Perform, Devolution of Joint liabilities & Rights, Time and Place of Performance, Reciprocal Promises, Assignment of Contracts - Remedies for Breach of contract - Termination and Discharge of Contract - Quasi Contract

Unit III	**Contract of Indemnity and Guarantee**	**15 Hours**

Contract of Indemnity - Contract of Guarantee - Extent of Surety's Liability - Kinds of Guarantee - Rights of Surety - Discharge of Surety

Unit IV	**Bailment and Pledge**	**15 Hours**

Bailment and Pledge – Bailment – Concept – Essentials - Classification of Bailment - Duties and Rights of Bailor and Bailee – Law of Pledge – Meaning – Essentials of Valid Pledge, Pledge and Lien, Rights of Pawner and Pawnee.

Unit V	**Sale of Goods Act 1930**	**15 Hours**

Definition of Contract of Sale – Formation - Essentials of Contract of Sale - Conditions and Warranties - Transfer of Property – Contracts involving Sea Routes - Sale by Non-owners - Rights and duties of buyer - Rights of an Unpaid Seller

TOTAL	75 Hours

Textbooks

1) N.D. Kapoor , Business Laws- Sultan Chand and Sons, New Delhi.
2) R.S.N. Pillai – Business Law, S.Chand, New Delhi.
3) M C Kuchhal& Vivek Kuchhal, Business law, S Chand Publishing, New Delhi
4) M.V. Dhandapani, Business Laws, Sultan Chand and Sons, New Delhi.
5) Shusma Aurora, Business Law, Taxmann, New Delhi.

Reference Books

1) Preethi Agarwal, Business Law, CA foundation study material, Chennai.
2) Business Law by Saravanavel, Sumathi, Anu, Himalaya Publications, Mumbai.
3) Kavya and Vidhyasagar, Business Law, Nithya Publication, New Delhi.
4) D.Geet, Business Law Nirali Prakashan Publication, Pune.
5) M.R. Sreenivasan , Business Laws, Margham Publications, Chennai.

Web Resources

1) www.cramerz.comwww.digitalbusinesslawgroup.com
2) http://swcu.libguides.com/buslaw
3) http://libguides.slu.edu/businesslaw

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	3	3	3	3	2
CO2	3	2	3	3	2	2	3	3	2	2	2
CO3	3	2	2	3	2	2	3	3	3	2	2
CO4	3	2	3	3	2	2	3	3	2	3	2
CO5	3	2	3	3	2	2	3	3	3	2	2
TOTAL	15	10	13	15	10	10	15	15	13	12	10
AVERAGE	3	2	2.6	3	2	2	3	3	2.6	2	2

3 – Strong, 2- Medium, 1- Low

SEMESTER II				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCAPA21	**Generic Elective 1**	**Allied: PYTHON PROGRAMMING AND LAB**	**4**	**3**

Course Objectives

1. Describe the core syntax and semantics of Python programming language.
2. Discover the need for working with the strings and functions.
3. Illustrate the process of structuring the data using lists, dictionaries, tuples andsets
4. Understand the usage of packages and Dictionaries

COURSE OUTCOMES (CO's):

8. Develop and execute simple Python programs.
9. Write simple Python programs using conditionals and looping for solving problems
10. Decompose a Python program into functions
11. Represent compound data using Python lists, tuples, dictionaries etc.

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

Books for Study:

6. Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem-solving Focus”, Wiley India Edition, 2015.
7. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016
8. Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition.

Books for Reference :

6. Timothy A. Budd, “Exploring Python”, Tata MCGraw Hill Education Private Limited 2011, 1 st Edition.
7. John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, CourseTechnology Cengage Learning Publications, 2013, ISBN 978- 1590282410
8. Michel Dawson, “Python Programming for Absolute Beginers” , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1435455009

MAPPING WITH PROGRAMME OUTCOMESAND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	2	2	3	3	3	2
CO2	3	2	3	3	2	3	2	3	3	3	3
CO3	3	2	3	3	2	2	2	2	3	3	2
CO4	3	2	3	3	3	2	2	3	3	3	2
CO5	3	2	3	3	3	2	2	2	3	3	2
CO6	3	3	2	3	3	2	2	3	3	3	2
CO7	3	3	3	3	2	3	2	2	3	3	3
TOTAL	21	16	20	21	18	16	14	18	21	21	16
AVERAGE	3	2.28	2.85	3	2.57	2.28	2	2.57	3	3	2.28

3 – Strong, 2- Medium, 1- Low

SEMESTER – II				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCATS21	**Generic Elective 2**	**CONSUMER WELFARE**	**2**	**2**

COURSE OBJECTIVES:

1. To Disseminate basic knowledge of Consumer Rights and Welfare.
2. To Enlighten the students above provisions of Consumer Protection Act.
3. To raise awareness on Consumer Dispute and Redressal Agencies
4. To appraise about consumer welfare measures.

Course Outcomes (CO's):

CO1: Appraise various aspects of Consumer Welfare.

CO2: Define important terms under the provisions of Consumer Protection Act, 2019.

CO3: Interpret important provisions of Competition Act 2002, RTI Act-2005.

CO4: Describe the functions of Consumer Dispute Redressal Agencies.

CO5: Illustrate Consumer Welfare measures NGOs, MNC and Supreme Court.

UNIT-I	**INTRODUCTION TO CONSUMER AND MARKETS:**	**6 Hours**

Consumer – Meaning - Classification of Consumers – Customer – Meaning and Definition – Market - Definition of Market - Nature of Market - Consumer Behaviors – Factors affecting Consumer Behavior - Consumer Buying Process - Consumer Needs- Factors affecting Consumer needs- Consumer Welfare -Measures taken by Central & State Government towards consumer welfare.

UNIT-II	**CONSUMER PROTECTION LAW**	**6 Hours**

Consumer Welfare: Meaning and Definition – Needs of Consumer Welfare - Consumer Awareness - Benefits of Consumer Awareness-Consumer Protection Act, 2019 – Definition – Important Terms in Consumer Protection - Salient Features of the Consumer Protection Act 2019.

UNIT-III	**OTHER LAWS RELATED TO CONSUMER PROTECTION IN INDIA**	**6 Hours**

Competition Act 2002 – Meaning, Definitions and Features - Right to Information Act, 2005 - Meaning, Definitions and Features - RBI and Banking Ombudsman - IRDA and Insurance Ombudsman – FSSAI.

UNIT-IV	**CONSUMER DISPUTE REDRESSAL AGENCIES**	**6 Hours**

Consumer Dispute Redressal Agencies - National Commission –State Commission – District Forum – Procedure for Filing Complains with Redressal Agencies - Commodity, Goods and Services –Types of Goods and Services - Goods and Services covered under Consumer Protection Act.

UNIT-V	**CONSUMER WELFARE MEASURES**	**6 Hours**

Consumer Welfare Measures taken by MNC's- Recent trends in consumer activism- Role of Supreme Court and High Courts in Consumer Welfare- Role of NGO's in Consumer Education - Case Laws

Books for Study:

1. Consumer Awareness, Dr. R. Sivanesan, Margham Publications
2. Consumer Protection Act: A Commentary by G. B. Reddy and Baglekar Akash Kumar, EBC Reader
3. Consumer Protection Law by Saharay H K, Elsevier India
4. Competition Law by Neha Vyas, Eastern Book Company

Books for Reference:

1. Consumer Protection (Amendment)Act,2002. S.Chand & Sons.2012
2. Consumer Behaviour, Rajan Nair, Sultan Chand & Sons.2010

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	3	3
CO2	3	2	2	3	2	2	2	2	3	3	3
CO3	3	2	3	3	2	3	2	2	3	3	3
CO4	3	2	3	3	2	2	2	2	3	3	3
CO5	3	2	3	3	2	3	2	2	3	3	3
TOTAL	15	10	14	15	10	13	10	10	15	15	15
AVERAGE	3	2	2.8	3	2	2.6	2	2	3	3	3

3 – Strong, 2- Medium, 1- Low

Course Code	Category	Course Title	Hr./WEEKS	CREDIT
UCCATS22	Skill Enhancement Course 2	DIGITAL MARKETING	2	2

COURSE OBJECTIVES

1. To familiarize with the concepts of digital marketing.
2. To Understand The Product Planning & Segmentation.
3. To analyze different types of Pricing Policies.
4. To acquaint with Electronic Marketing Technology.
5. To Introduce The Recent Developments In Marketing

COURSE OUTCOMES

CO – 1: Define the Basic functions of Digital Marketing.
CO – 2: Develop the strategies for Product planning, packing & segmentation.
CO – 3: Analyze the pricing policies & promotion techniques.
CO – 4: Describe Internet marketing concepts.
CO – 5: Discuss the recent developments in marketing

UNIT- I	INTRODUCTION TO DIGITAL MARKETING	6 Hours

Digital Marketing: Introduction - Definition - Role – Significance - Benefits Of Digital Marketing - Digital Marketing Platforms – Functions Of Marketing - Traditional Vs. Digital Marketing.

UNIT-II	PRODUCT PLANNING AND SEGMENTATION	6 Hours

Product Planning: Meaning and Definition – Concept and New Product - Development - Product Classification- Product Mix Decisions – **Packing:** Meaning, Objectives, Features – **Labeling:** Meaning, Objectives, Features- **Branding:** Meaning, Objectives, Features - Product Life Cycle- **Market Segmentation:** Meaning, Objectives And Bases. Software Used In Product Planning, Segmentation.

UNIT-III	PRICING & PROMOTION	6 Hours

Pricing Decisions and Strategies: Concept –Types Of Pricing- Factors Affecting Pricing Determination, Strategies Related To Pricing, Marketing Strategies Of Leather Industries And Other Local Business - **Promotion:** Significance Of Promotion- Promotion Tools- Advertising, Personal Selling, Public Relations And Sales Promotion- Promotion Mix - Factors Affecting Promotion Mix Decisions – Digital Sales Promotion

Tools		
UNIT-IV	**INTERNET MARKETING**	**6 Hours**
Introduction To Internet Marketing – Theories Of Internet Marketing – Online Marketing Strategies – Idea of Internet Business – Internet and E – Marketing Technology		
UNIT-V	**RECENT DEVELOPMENT IN MARKETING**	**6 Hours**
Recent Developments in Marketing: Introduction – Social Marketing – Online Marketing, Direct Marketing, Service Marketing – Green Marketing – Uses Of Social Media in Marketing.		

Books for Study

1. Fundamentals of Digital Marketing by Puneet Singh Bhatia, Pearson Publications.
2. Marketing by Rajan Nair, Sultan Chand & Sons.2010
3. Modern Marketing by R.S.N. Pillai, S. Chand Ltd., New Delhi.2014
4. Marketing Management in Indian Perspective by Jha and Singh, Himalaya.2013

Books for Reference :

1. The Art of Digital Marketing : The Definitive Guide to Creating Strategic, Targeted and Measurable Online Campaigns by Ian Dodson
2. Fundamentals of Marketing by William J. Stanton, MC Graw – Hill.2011
3. Principles of Marketing by Philip Kotler, Prentice Hall. 2010
4. Marketing Management – Radhasamy & Namakumari, Millennium Publication.
5. Internet Marketing, Dr.Akshaya K, Nayak, Dr.Avinash Chiranjeev, Jnanda Prakashan, New Delhi.

CO – 1: Define the Basic functions of Digital Marketing.
CO – 2: Develop the strategies for Product planning, packing & segmentation.
CO – 3: Analyze the pricing policies & promotion techniques.
CO – 4: Describe Internet marketing concepts.

CO – 5: Discuss the recent developments in marketing

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	3	2	2	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	2	3	3	3	3	3	3
TOTAL	15	15	15	15	12	15	14	14	15	15	15
AVERAGE	3	3	3	3	2.4	3	2.8	2.8	3	3	3

3 – Strong, 2- Medium, 1- Low

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.COM FINANCE& ACCOUNTS**
Programme Code:	**FA01**
Duration:	**UG - 3 years**
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team **PO8: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9: Reflective thinking**: Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify

	appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Programme Specific Outcomes:	**PSO1 – Placement:** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviours, beliefs and apply diverse frames of reference to decisions and actions. **PSO 2 - Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations **PSO3 – Research and Development:** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World:** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5 – Contribution to the Society:** To contribute to the development of the society by collaborating with stakeholders for mutual benefit **PSO 6** Provide more exposure to modern aspects of the HR and Marketing field to develop decision-making skills **PSO 7** Equip with knowledge of legal framework in the context of the business, company, and various industries **PSO 8** Understand the importance of communication, and writing necessary reports in the daily routine of business **PSO 9** Computer applications and computerized accounting like e-filing and different tax return training will enable them to solve accounting problems **PSO 10** Understand the statistical methods and techniques to solve various problems relating to another interdisciplinary arena including research

. **MAPPING OF PROGRAMME-SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES**

Programme Specific Outcomes (PSO)	Program Out Comes (POs)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PSO1	✓	✓	✓	✓		✓	✓	✓		✓
PSO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
PSO3	✓	✓	✓	✓	✓	✓	✓			
PSO4	✓	✓	✓	✓	✓	✓	✓	✓		✓
PSO5	✓	✓	✓	✓	✓	✓	✓		✓	✓
PSO6	✓	✓	✓	✓		✓				✓
PSO7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO8	✓	✓	✓	✓	✓		✓	✓		✓
PSO9	✓	✓	✓	✓		✓		✓	✓	✓
PSO10	✓	✓	✓	✓	✓	✓			✓	✓
Correlated -Very High										**Total =82**

Mapping Bench Mark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-30	31-60	61-70	71-100
Correlation	Poor	Moderate	High	Very High

FIRST YEAR – SEMESTER – I

CORE – I: FINANCIAL ACCOUNTING I

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATC11	5				4	5	25	75	100

Learning Objectives	
LO1	To understand the basic accounting concepts and standards.
LO2	To know the basis for calculating business profits.
LO3	To familiarize with the accounting treatment of depreciation.
LO4	To learn the methods of calculating profit for single entry system.
LO5	To gain knowledge on the accounting treatment of insurance claims.

Prerequisites: Should have studied Accountancy in XII Std

Unit	Contents	No. of Hours
I	**Fundamentals of Financial Accounting** Financial Accounting – Meaning, Definition, Objectives, Basic Accounting Concepts and Conventions - Journal, Ledger Accounts– Subsidiary Books — Trial Balance - Classification of Errors – Rectification of Errors – Preparation of Suspense	**15**

	Account – Bank Reconciliation Statement - Need and Preparation	
II	**Final Accounts** Final Accounts of Sole Trading Concern- Capital and Revenue Expenditure and Receipts – Preparation of Trading, Profit and Loss Account and Balance Sheet with Adjustments.	**15**
III	**Depreciation and Bills of Exchange** Depreciation - Meaning – Objectives – Accounting Treatments - Types - Straight Line Method – Diminishing Balance method – Conversion method. Units of Production Method – Cost Model vs Revaluation **Bills of Exchange** – Definition – Specimens – Discounting of Bills – Endorsement of Bill – Collection – Noting – Renewal – Retirement of Bill under rebate	**15**
IV	**Accounting from Incomplete Records – Single Entry System** Incomplete Records -Meaning and Features - Limitations - Difference between Incomplete Records and Double Entry System - Methods of Calculation of Profit - Statement of Affairs Method – Preparation of final statements by Conversion method.	**15**
V	**Royalty and Insurance Claims** Meaning – Minimum Rent – Short Working – Recoupment of Short Working – Lessor and Lessee – Sublease – Accounting Treatment. **Insurance Claims** –Calculation of Claim Amount-Average clause (Loss of Stock only)	**15**
TOTAL		**75**
THEORY 20% & PROBLEM 80%		

CO	**Course Outcomes**
CO1	Remember the concept of rectification of errors and Bank reconciliation statements
CO2	Apply the knowledge in preparing detailed accounts of sole trading concerns
CO3	Analyse the various methods of providing depreciation
CO4	Evaluate the methods of calculation of profit
CO5	Determine the royalty accounting treatment and claims from insurance companies in case of loss of stock.
Textbooks	
1.	S. P. Jain and K. L. Narang Financial Accounting- I, Kalyani Publishers, New Delhi.
2.	S.N. Maheshwari, Financial Accounting, Vikas Publications, Noida.
3.	ShuklaGrewal and Gupta, “Advanced Accounts”, volume 1, S.Chand and Sons, New Delhi.
4.	Radhaswamy and R.L. Gupta: Advanced Accounting, Sultan Chand, New Delhi.

5.	R.L. Gupta and V.K. Gupta, "Financial Accounting", Sultan Chand, New Delhi.
Reference Books	
6.	Dr.Arulanandan and Raman: Advanced Accountancy, Himalaya Publications, Mumbai.
7.	Tulsian , Advanced Accounting, Tata McGraw Hills, Noida.
8.	Charumathi and Vinayagam, Financial Accounting, S.Chand and Sons, New Delhi.
9.	Goyal and Tiwari, Financial Accounting, Taxmann Publications, New Delhi.
10.	Robert N Anthony, David Hawkins, Kenneth A. Merchant, Accounting: Text and Cases. McGraw-Hill Education, Noida.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1.	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2.	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3.	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	2	3	3	3	2	2	2	3	2	2
TOTAL	15	10	15	15	13	11	10	10	15	10	10
AVERAGE	3	2	3	3	2.6	2.2	2	2	3	2	2

3 – Strong, 2- Medium, 1- Low

CORE – II: PRINCIPLES OF MANAGEMENT

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATC12	5				4	5	25	75	100

Learning Objectives	
LO1	To understand the basic management concepts and functions
LO2	To know the various techniques of planning and decision making
LO3	To familiarize with the concepts of organisation structure
LO4	To gain knowledge about the various components of staffing
LO5	To enable the students in understanding the control techniques of management

Prerequisites: Should have studied Accountancy in XII Std

Unit	Contents	No. of Hours
I	**Introduction to Management** Meaning- Definitions – Nature and Scope - Levels of Management – Importance - Management Vs. Administration – Management: Science or Art –Evolution of Management Thoughts – F. W. Taylor, Henry Fayol, Peter F. Drucker, Elton Mayo - Functions of Management - Trends and Challenges of Management. Managers – Qualification – Duties & Responsibilities.	15
II	**Planning** Planning – Meaning – Definitions – Nature – Scope and Functions – Importance and Elements of Planning – Types – Planning Process - Tools and Techniques of Planning – Management by Objective (MBO). Decision Making: Meaning – Characteristics – Types - Steps in Decision Making – Forecasting.	15
III	**Organizing** Meaning - Definitions - Nature and Scope – Characteristics – Importance – Types - Formal and Informal Organization – Organization Chart – Organization Structure: Meaning and Types - Departmentalization– Authority and Responsibility – Centralization and Decentralization – Span of Management.	15
IV	**Staffing** Introduction - Concept of Staffing- Staffing Process – Recruitment – Sources of Recruitment – Modern Recruitment Methods - Selection Procedure – Test- Interview– Training: Need - Types– Promotion – Management Games – Performance Appraisal - Meaning and Methods – 360 degree Performance Appraisal – Work from Home - Managing Work from Home [WFH].	15
V	**Directing** Motivation –Meaning - Theories – Communication – Types - Barriers to Communications – Measures to Overcome the Barriers. Leadership – Nature - Types and Theories of Leadership – Styles of Leadership - Qualities of a Good Leader – Successful Women Leaders – Challenges faced by women in workforce - Supervision. **Co-ordination and Control** Co-ordination – Meaning - Techniques of Co-ordination.	15

	Control - Characteristics - Importance – Stages in the Control Process - Requisites of Effective Control and Controlling Techniques – Management by Exception [MBE].	
TOTAL		**75**

Course Outcomes

CO1	Demonstrate the importance of principles of management.
CO2	Paraphrase the importance of planning and decision making in an organization.
CO3	Comprehend the concept of various authorizes and responsibilities of an organization.
CO4	Enumerate the various methods of Performance appraisal
CO5	Demonstrate the notion of directing, co-coordination and control in the management.
Textbooks	
1	Gupta.C.B, -Principles of Management-L.M. Prasad, S.Chand& Sons Co. Ltd, New Delhi.
2	DinkarPagare, Principles of Management, Sultan Chand & Sons Publications, New Delhi.
3	P.C.Tripathi& P.N Reddy, Principles of Management. Tata McGraw, Hill, Noida.
4	L.M. Prasad, Principles of Management, S.Chand&Sons Co. Ltd, New Delhi.
5	R.K. Sharma, Shashi K. Gupta, Rahul Sharma, Business Management, Kalyani Publications, New Delhi.
Reference Books	
1	K Sundhar, Principles Of Management, Vijay Nichole Imprints Limited, Chennai
2	Harold Koontz, Heinz Weirich, Essentials of Management, McGraw Hill, Sultan Chand and Sons, New Delhi.
3	Grifffin, Management principles and applications, Cengage learning, India.
4	H.Mintzberg - The Nature of Managerial Work, Harper & Row, New York.
5	Eccles, R. G. &Nohria, N. Beyond the Hype: Rediscovering the Essence of Management. Boston The Harvard Business School Press, India.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	http://www.universityofcalicut.info/sy1/management
2	https://www.managementstudyguide.com/manpower-planning.htm
3	https://www.businessmanagementideas.com/notes/management-notes/coordination/coordination/21392

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO3
CO1	3	2	2	3	3	2	2	2	3	2	3
CO2	3	2	3	3	2	2	2	2	3	2	2
CO3	3	2	2	3	2	2	2	1	3	2	2
CO4	3	2	2	3	2	2	2	2	3	2	2
CO5	3	2	3	3	2	2	2	1	3	2	2
TOTAL	15	10	12	15	11	10	10	8	15	10	11
AVERAGE	3	2	2.4	3	2.2	2	2	1.6	3	2	2.2

3 – Strong, 2- Medium, 1- Low

Elective I – Business Communication

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATA11	**4**				**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To enable the students to know about the principles, objectives and importance of communication in commerce and trade.
LO2	To develop the students to understand about trade enquiries
LO3	To make the students aware about various types of business correspondence.
LO4	To develop the students to write business reports.
LO5	To enable the learners to update with various types of interview

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to Business Communication** Definition – Meaning – Importance of Effective Communication – Modern Communication Methods – Barriers to Communication – E-Communication - Business Letters: Need - Functions – Essentials of Effective Business Letters – Layout	**12**
II	**Trade Enquiries** Trade Enquiries – Orders and their Execution – Credit and Status Enquiries – Complaints and Adjustments – Collection Letters – Sales Letters – Circular Letters	**12**
III	**Banking Correspondence** Banking Correspondence – Types – Structure of Banking Correspondence – Elements of a Good Banking	**12**

	Correspondence – Insurance – Meaning and Types – Insurance Correspondence – Difference between Life and General Insurance – Meaning of Fire Insurance – Kinds – Correspondence Relating to Marine Insurance – Agency Correspondence – Introduction – Kinds – Stages of Agent Correspondence – Terms of Agency Correspondence	
IV	**Secretarial Correspondence** Company Secretarial Correspondence – Introduction – Duties of Secretary – Classification of Secretarial Correspondence – Specimen letters – Agenda and Minutes of Report writing – Introduction – Types of Reports – Preparation of Report Writing	**12**
V	**Application Letters** Application Letters – Preparation of Resume – Interview: Meaning – Objectives and Techniques of Various Types of Interviews – Public Speech – Characteristics of a Good Speech	**12**
	TOTAL	**60**

CO	**Course Outcomes**
CO1	Acquire the basic concept of business communication.
CO2	Exposed to effective business letter
CO3	Paraphrase the concept of various correspondences.
CO4	Prepare Secretarial Correspondence like agenda, mintes and various business reports.
CO5	Acquire the skill of preparing an effective resume

Textbooks

1	Rajendra Pal & J.S. Korlahalli, Essentials of Business Communication- Sultan Chand & Sons- New Delhi.
2	Gupta and Jain, Business Communication, Sahityabahvan publication, New Delhi.
3	K.P.Singha, Business Communication, Taxmann, New Delhi.
4	R. S. N. Pillai and Bhagavathi. S, Commercial Correspondence, Chand Publications, New Delhi.
5	M. S. Ramesh and R. Pattenshetty, Effective Business English and Correspondence, S. Chand & Co, Publishers, New Delhi.

Reference Books

1	V.K.Jain and Om Prakash, Business communication, S.Chand, New Delhi.
2	RithikaMotwani, Business communication, Taxmann, New Delhi.
3	Shirley Taylor, Communication for Business-Pearson Publications-New Delhi.
4	Bovee, Thill, Schatzman, Business Communication Today-Pearson Education, Private Ltd- NewDelhi.

5	Penrose, Rasbery, Myers, Advanced Business Communication, Bangalore.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://accountingseekho.com/
2	https://www.testpreptraining.com/business-communications-practice-exam-questions
3	https://bachelors.online.nmims.edu/degree-programs

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	2	2	2	2	2	2	2
CO2	3	3	2	3	2	2	2	3	2	2	2
CO3	3	3	2	3	2	2	2	2	2	2	2
CO4	3	3	2	3	2	2	2	2	2	2	2
CO5	3	3	2	3	2	2	2	2	2	2	2
TOTAL	15	15	15	15	10	10	10	11	10	10	10
AVERAGE	3	3	3	3	2	2	2	2.2	2	2	2

3-Strong, 2-Medium, 1- Low

Elective 1 – Indian Economic Development

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATA12	4				3	4	25	75	100

Learning Objectives	
LO1	To understand the concepts of Economic growth and development
LO2	To know the features and factors affecting economic development
LO3	To gain understanding about the calculation of national income
LO4	To examine the role of public finance in economic development
LO5	To understand the causes of inflation

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Economic Development and Growth** Concepts of Economic Growth and Development. Measurement of Economic Development: Per Capita Income, Basic Needs, Physical Quality of Life Index, Human Development Index and Gender Empowerment Measure.	**12**
II	**Economic Development** Factors Effecting Economic Development - Characteristics of Developing Countries- Population and Economic Development- Theories of Demographic Transition. Human Resource Development and Economic Development	**12**
III	**National Income** Meaning, Importance, National Product-Concept, types of measurement, Comparison of National Income at Constant and Current Prices. Sectorial Contribution to National Income. National Income and Economic Welfare	**12**
IV	**Public Finance** Meaning, Importance, Role of Public Finance in Economic Development, Public Revenue-Sources, Direct and Indirect taxes, Impact and Incidence of Taxation, Public Expenditure-Classification and Cannons of Public Expenditure, Public Debt-Need, Sources and Importance, Budget-Importance, Types of Deficit -Revenue, Budgetary, Primary and Fiscal, Deficit Financing.	**12**
V	**Money Supply** Theories of Money and Its Supply, Types of Money-Broad, Narrow and High Power, Concepts of M1,M2 and M3. Inflation and Deflation -Types, Causes and Impact, - Price Index- CPI and WPI, Role of Fiscal Policy in Controlling Money supply.	**12**
	TOTAL	**60**

CO	Course Outcomes
CO1	Elaborate the role of State and Market in Economic Development
CO2	Explain the Sectorial contribution to National Income
CO3	Illustrate and Compare National Income at constant and current prices.
CO4	Describe the canons of public expenditure

CO5	Understand the theories of money and supply
Textbooks	
1	Dutt and Sundaram, Indian Economy, S.Chand, New Delhi
2	V.K.Puri, S.K. Mishra, Indian Economy, Himalaya Publishing house, Mumbai
3	Remesh Singh, Indian Economy, Mc.Graw Hill, Noida.
4	NitinSinghania, Indian Economy, Mc.Graw Hill, Noida.
5	Sanjeverma, The Indian Economy, unique publication, Shimla.
Reference Books	
1	GhatakSubrata : Introduction to Development Economics, Routledge Publications, New Delhi.
2	Sukumoychakravarthy : Development Planning- Indian Experience, OUP, New Delhi.
3	Ramesh Singh, Indian Economy, Mc.Graw Hill, Noida.
4	Mier, Gerald, M : Leading issues in Economic Development, OUP, New Delhi.
5	Todaro, Micheal P : Economic Development in the third world, Orient Longman, Hyderabad
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	http://www.jstor.org
2	http://www.indiastat.com
3	http://www.epw.in

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	3	2	2	2	2	2	2	2
CO2	3	2	3	3	2	2	2	2	2	3	2
CO3	3	2	3	3	2	2	2	2	2	2	2
CO4	3	2	3	3	2	2	2	2	2	2	2
CO5	3	2	3	3	2	2	2	2	2	2	2
TOTAL	15	10	14	15	10	10	10	10	10	13	10
AVERAGE	3	2	2.8	3	2	2	2	2	2	2.2	2

3-Strong, 2-Medium, 1- Low

Elective 1 – Business Economics

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATA13	4				3	4	25	75	100

Learning Objectives	
LO1	To understand the approaches to economic analysis
LO2	To know the various determinants of demand
LO3	To gain knowledge on concept and features of consumer behaviour
LO4	To learn the laws of variable proportions
LO5	To enable the students to understand the objectives and importance of pricing policy

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to Economics** Introduction to Economics – Wealth, Welfare and Scarcity Views on Economics – Positive and Normative Economics - Definition – Scope and Importance of Business Economics - Concepts: Production Possibility frontiers – Opportunity Cost – Accounting Profit and Economic Profit – Incremental and Marginal Concepts – Time and Discounting Principles – Concept of Efficiency- Business Cycle: - Inflation, Depression, Recession, Recovery, Reflation and Deflation.	**12**
II	**Demand & Supply Functions** Meaning of Demand - Demand Analysis: Demand Determinants, Law of Demand and its Exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance. Demand Forecasting - Factors Governing Demand Forecasting - Methods of Demand Forecasting, Law of Supply and Determinants.	**12**
III	**Consumer Behaviour** Consumer Behaviour – Meaning, Concepts and Features – Law of Diminishing Marginal Utility – Equi-Marginal Utility – Indifference Curve: Meaning, Definition, Assumptions, Significance and Properties – Consumer's Equilibrium. Price, Income and Substitution Effects. Types of Goods: Normal, Inferior and Giffen Goods - Derivation of Individual Demand Curve and Market Demand Curve with the help of Indifference Curve.	**12**
IV	**Theory of Production** Concept of Production - Production Functions: Linear and Non – Linear Homogeneous Production Functions - Law of Variable Proportion – Laws of Returns to Scale - Difference between Laws of variable proportion and returns to scale – Economies of Scale – Internal and External Economies – Internal and External Diseconomies - Producer's equilibrium	**12**
V	**Product Pricing** Price and Output Determination under Perfect Competition, Short Period and Long Period Price Determination, Objectives of Pricing Policy, its importance, Pricing Methods and Objectives – Price Determination under Monopoly, kinds of Monopoly, Price Discrimination, Determination of Price in	**12**

	Monopoly –Monopolistic Competition – Price Discrimination, Equilibrium of Firm in Monopolistic Competition–Oligopoly – Meaning – features, "Kinked Demand" Curve	
	TOTAL	**60**
CO	**Course Outcomes**	
CO1	Explain the positive and negative approaches in economic analysis	
CO2	Evaluate the factors of demand forecasting	
CO3	Know the assumptions and significance of indifference curve	
CO4	Outline the internal and external economies of scale	
CO5	Relate and apply the various methods of pricing	
Textbooks		
1	H.L. Ahuja, Business Economics–Micro & Macro - Sultan Chand & Sons, New Delhi.	
2	C.M.Chaudhary, Business Economics-RBSA Publishers - Jaipur-03.	
3	Aryamala.T, Business Economics, Vijay Nocole, Chennai.	
4	T.P Jain, Business Ecomnomics, Global Publication Pvt.Ltd, Chennai.	
5	D.M.Mithani, Business Economics, Himalaya Publishing House, Mumbai.	
Reference Books		
1	S.Shankaran, Business Economics-Margham Publications, Chennai.	
2	P.L.Mehta, Managerial Economics–Analysis, Problems & Cases, Sultan Chand & Sons, New Delhi.	
3	Peter Mitchelson and Andrew Mann, Economics for Business-Thomas Nelson Australia	
4	Ram singh and Vinaykumar, Business Economics, Thakur publication Pvt.Ltd, Chennai.	
5	Saluram and Priyanks Tindal, Business Economics, CA Foundation Study material, Chennai.	
NOTE: Latest Edition of Textbooks May be Used		
Web Resources		
1	https://youtube.com/channel/UC69_-P77nf5-rKrjcpVEsqQ	
2	https://www.icsi.edu/	
3	https://www.yourarticlelibrary.com/marketing/pricing/product-pricing-objectives-basis-and-factors/74160	

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	2	2	2	2	2	1	2	2

CO2	3	2	3	3	2	2	2	2	2	2	2
CO3	3	2	3	3	2	2	2	2	2	2	2
CO4	3	2	2	3	2	2	2	2	2	2	2
CO5	3	2	3	3	2	2	2	2	2	2	2
TOTAL	15	10	13	14	11	10	10	10	10	10	10
AVERAGE	3	2	2.6	2.8	2.2	2	2	2	2	2	2

3-Strong, 2-Medium, 1- Low

E-COMMERCE

Subject Code	**L**	**T**	**P**	**S**	**Credits**	**Inst. Hours**	**Marks**		
							CIA	**External**	**Total**
UCFATS11	**2**				**2**	**2**	**25**	**75**	**100**

Learning Objectives	
LO1	To know the usage of Electronic commerce
LO2	To understand the various Business models in emerging E-commerce areas
LO3	To create an a on the internet marketing technologies
LO4	To understand the benefits and implementation of EDI
LO5	To examine the ethical issues of E-commerce

Units	**Contents**	**No. of Hours**
I	**Introduction to E-Commerce** Defining E-Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce - Process of E-Commerce - Types of E-Commerce; Role of Automation & Artificial Intelligence in E-Commerce.	**06**
II	**E-Commerce Business Models &Consumer-OrientedE-Commerce** E-commerce Business Models, Major Business to Consumer (B2C) Business Models, Major Business to Business (B2B) Business Models, Business Models in Emerging E-Commerce Areas - E-tailing: Traditional Retailing and E- retailing, Benefits of E-retailing, Models of E-retailing, Features of E-retailing.	**06**

III	**E-Commerce Marketing Concepts** The Internet Audience and Consumer Behaviour, Basic Marketing Concepts, Internet Marketing Technologies – Marketing Strategy –E-services: Categories of E-services, Web-Enabled Services, Information-Selling on the Web.	**06**
IV	**Electronic Data Interchange & Security** Benefits of EDI, EDI Technology, EDI Standards, EDI Communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System - Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web Server with a Firewall, Firewall and the Security Policy.	**06**
V	**Ethics in E-Commerce** Issues in E-Commerce Understanding Ethical, Social and Political Issues in E-Commerce: A Model for Organizing the Issues, Basic Ethical Concepts, Analysing Ethical Dilemmas, Candidate Ethical Principles Privacy and Information Rights: Information Collected at E-Commerce Websites.	**06**
	TOTAL	**30**

CO	**Course Outcomes**
CO1	Understand the role and features of world wide web
CO2	Understand the Benefits and model of e-tailing
CO3	Use the web enabled services
CO4	Tackle the threats in internet security system
CO5	Know about the Ethical principles Privacy and Information Rights

Textbooks	
1	Kenneth C. Laudon, E-Commerce: Business, Technology, Society, 4 the Edition, Pearson Education Limited, New Delhi
2	S. J. Joseph, E-Commerce: an Indian perspective, PHI Learning Pvt. Ltd., New Delhi
3	David Whitley, E-Commerce-Strategy, Technologies & Applications, TMI, McGraw-Hill, London
4	Kamlesh K. Bajaj, E-Commerce- The cutting edge of business, TMH, McGraw-Hill, Noida
5	W Clarke, E-Commerce through ASP - BPB, Wrox Publisher, Mumbai
Reference Books	

1	Agarwala, K.N. and D. Agarwala, Business on the Net : What's and How's of E-Commerce, McMillan Publisher India Pvt. Ltd., Chennai
2	Ravi Kalkota, Frontiers of E-Commerce, TM, Pearson Education Limited, New Delhi
3	Elias M Awad, Electronic Commerce: From Vision to Fulfilment. PHI Learning Pvt. Ltd., New Delhi
4	Mathew Reynolds, Beginning E-Commerce with Visual Basic, ASP, SQL Server 7.0 & MTS, Wrox Publishers, Mumbai
5	J. Christopher West I and Theodore H. K Clark Global Electronic Commerce- Theory and Case Studies, The MIT Press, Cambridge, London
Web Resources	
1	https://www.investopedia.com/terms/e/ecommerce.asp
2	https://www.webfx.com/industries/retail-ecommerce/ecommerce/basic-ecommerce-marketing-concepts/
3	https://techbullion.com/the-importance-of-ethics-in-ecommerce/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	2	2	2	2	2	2
CO2	3	2	2	2	3	2	2	2	2	2	2
CO3	3	2	2	2	3	2	2	2	2	2	2
CO4	3	2	2	2	3	2	2	2	2	2	2
CO5	3	2	2	2	3	2	2	2	2	2	2
TOTAL	15	10	10	10	15	10	10	10	10	10	10
AVERAGE	3	2	2	2	3	2	2	2	2	2	2

3 – Strong, 2- Medium, 1- Low

FINANCIAL MARKETS

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATS12	2				2	2	25	75	100

Learning Objectives

LO1	To know about the importance of Financial System in India.
LO2	To make the students to understand the method of Financial Markets.
LO3	To familiarize the concept of Secondary market.
LO4	To get a knowledge of online trading.
LO5	To impart the basic knowledge of the SEBI.

Unit-I	**Financial System in India**	**6 Hours**

Financial System- Functions- Financial Concepts- Financial Assets- Financial Intermediaries- An overview of Indian Financial System.

Unit-II	**Financial Market**	**6 Hours**

Financial markets- Meaning- Importance- Capital Market - Money Market – Foreign Exchange Market – Financial Rate of Return – Financial Instruments – Development of Financial System in India and its Weaknesses.

Unit-III	**Primary Market / New Issue Market**	**6 Hours**

Meaning – Stock Exchange – Distinction between New Issue Market and Stock Exchange –– Functions of New Issues Market – General Guidelines – Principle Steps of a Public Issue – Instruments of Issue. Activity: Share Trading Practical

Unit-IV	**Secondary Market**	**6 Hours**

Introduction – Functions and services of Stock Exchange – Recognition of Stock Exchange – Procedure – Organisation – Listing of Securities – Listing Procedure - Registration, Procedure, Code of Conduct and Functions of Brokers – Kinds of Brokers.
Activity: Specimen of share application Form and Opening of Demat Account

Unit-V	**Securities Exchange Board of India**	**6 Hours**

Controller of Capital Issues (CCI) – Securities Contract (Regulations) Act – Malpractices in Securities Market – SEBI Guidelines– Recent Guidelines – OTCEI, NSE, BSE, MCX-SX
Activity: Graphs and Diagram Showing Price movements of shares

Books for Study:

1. E.Gordon K.Natarajan, "Financial Markets and Services" Himalaya Publishing House, Channai. 2019
2. B. Santhanam, "Financial Services" Margham Publication, Chennai. 2016
3. Dr. P. Srirenganayaki, "Financial Services", Charulatha Publications, Channai. 2016
4. Arun Pattanaik, "Financial Markets and Institutions", Ritu Publication, Bihar. 2011
5. Dr. Punithavathy Pandian, **"**Financial Services and Markets" Vikas Publishing House Pvt. Ltd. 2010

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATS12	2				2	2	25	75	100

Learning Objectives	
LO1	To know about the importance of Financial System in India.
LO2	To make the students to understand the method of Financial Markets.
LO3	To familiarize the concept of Secondary market.
LO4	To get a knowledge of online trading.
LO5	To impart the basic knowledge of the SEBI.

Books for Reference:

1. Shashi K.Gupta, Nisha Aggarwal, Neeti Gupta, "Financial Services", Kalayani Publication, Chennai. 2017

2. Dr. Vinay Kandpal, Dr. Pankaj Baag, "Financial Institutions and Market, ABS Books Publisher, 2016

3. Dr. Vasant Desai, ""Financial Markets and Financial Services", Himalaya Publishing House, Channai. 2015

4. P.N. Varshney, Dr. K. Mital, "Indian Financial System", Sultan Chand & Sons, New Delhi. 2015

5. M.Y Khan, "Financial Services" Tata Mcgraw hill, New Delhi. 2014

CO	Course Outcomes
CO1	Describe the various financial systems in India.
CO2	Gain the knowledge of the methods of financial market.
CO3	Understand the idea about new issue.
CO4	Analyze the different types of secondary markets.
CO5	Outline the concepts of about SEBI.

MAPPING WITH PROGRAMME OUTCOMES
AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	2	2	2	2	2
CO2	3	2	2	3	2	2	2	2	2	2	2
CO3	3	2	2	3	2	2	2	2	2	2	2
CO4	3	2	2	3	2	2	2	2	2	2	2
CO5	3	2	2	3	2	2	2	2	2	2	2
TOTAL	15	10	10	15	10	10	10	10	10	10	10
AVERAGE	3	2	2	3	2	2	2	2	2	2	2

3 – Strong, 2- Medium, 1- Low

FIRST YEAR – SEMESTER – II

CORE – III: FINANCIAL ACCOUNTING-II

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATC21	**5**				**4**	**6**	**25**	**75**	**100**

Learning Objectives	
LO1	The students are able to prepare different kinds of accounts such Higher purchase and Instalments System.
LO2	To understand the allocation of expenses under departmental accounts
LO3	To gain an understanding about partnership accounts relating to Admission and retirement
LO4	Provides knowledge to the learners regarding Partnership Accounts relating to dissolution of firm
LO5	To know the requirements of international accounting standards

Prerequisites: Should have studied Accountancy in XII Std

Unit	Contents	No. of Hours
I	**Hire Purchase and Instalment System** Hire Purchase System – Accounting Treatment – Calculation of Interest – Default and Repossession – Hire Purchase Trading Account – Instalment System – Calculation of Profit	**15**

II	**Branch and Departmental Accounts** Branch – Dependent Branches: Accounting Aspects – Debtors system -Stock and Debtors system – Distinction between Wholesale Profit and Retail Profit – Independent Branches (Foreign Branches excluded) – Departmental Accounts: Basis of Allocation of Expenses – Inter- Departmental Transfer at Cost or Selling Price.	**15**
III	**Partnership Accounts – I** Partnership Accounts: –Admission of a Partner – Treatment of Goodwill – Calculation of Hidden Goodwill –Retirement of a Partner – Death of a Partner.	**15**
IV	**Partnership Accounts – II** Dissolution of Partnership – Methods – Settlement of Accounts Regarding Losses and Assets – Realization account – Treatment of Goodwill – Preparation of Balance Sheet – One or more Partners insolvent – All Partners insolvent – Application of Garner Vs Murray Theory – Accounting Treatment – Piecemeal Distribution – Surplus Capital Method – Maximum Loss Method.	**15**
V	**Accounting Standards for financial reporting (Theory only)** Objectives and Uses of Financial Statements for Users-Role of Accounting Standards – Development of Accounting Standards in India Role of IFRS- IFRS Adoption vs Convergence Implementation Plan in India- Ind AS- An Introduction – Difference between Ind AS and IFRS.	**15**
	TOTAL	**75**
THEORY 20% & PROBLEMS 80%		

Course Outcomes	
CO1	To evaluate the Hire purchase accounts and Instalment systems
CO2	To prepare Branch accounts and Departmental Accounts
CO3	To understand the accounting treatment for admission and retirement in partnership
CO4	To know Settlement of accounts at the time of dissolution of a firm.
CO5	To elaborate the role of IFRS
Textbooks	
1	Radhaswamy and R.L. Gupta: Advanced Accounting, Sultan Chand, New Delhi.
2	M.C. Shukla T.S. Grewal& S.C. Gupta, Advance Accounts, S Chand Publishing, New Delhi.
3	R.L. Gupta and V.K. Gupta, "Financial Accounting", Sultan Chand, New Delhi.
4	S P Jain and K. L. Narang: Financial Accounting- I, Kalyani Publishers, New Delhi.

5	T.S. Reddy& A. Murthy, Financial Accounting, Margam Publishers, Chennai.
Reference Books	
1	Dr. S.N. Maheswari: Financial Accounting, Vikas Publications, Noida.
2	Dr.Venkataraman& others (7 lecturers): Financial Accounting, VBH, Chennai.
3	Dr.Arulanandan and Raman: Advanced Accountancy, Himalaya publications, Mumbai.
4	Tulsian , Advanced Accounting, Tata MC. Graw hills, India.
5	Charumathi and Vinayagam, Financial Accounting, S.Chand and sons, New Delhi.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2	https://www.slideshare.net/ramusakha/basics-of-financial-accounting
3	https://www.accountingtools.com/articles/what-is-a-single-entry-system.html

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	2	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	3	3	3	3	3	3	3	3	3	3
TOTAL	16	11	14	15	14	12	11	11	15	11	11
AVERAGE	3.2	2.2	2.8	3	2.8	2.4	2.2	2.2	3	2.2	2.2

3 – Strong, 2- Medium, 1- Low

CORE – IV: BUSINESS LAW

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATC22	5				4	6	25	75	100

Learning Objectives	
LO1	To know the nature and objectives of Mercantile law and the essentials of valid contract
LO2	To gain knowledge on performance contracts
LO3	To be acquainted with the rules of Indemnity and Guarantee
LO4	To make aware of the essentials of Bailment and pledge
LO5	To understand the provisions relating to sale of goods

Prerequisites: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Elements of Contract** **Indian Contract Act 1872:** Definition of Contract, Essentials of Valid Contract, Classification of Contract, Offer and Acceptance – Consideration – Capacity to Contract – Free Consent - Legality of Object – Contingent Contracts – Void Contract	**15**
II	**Performance of Contract** Meaning of Performance, Offer to Perform, Devolution of Joint liabilities & Rights, Time and Place of Performance, Reciprocal Promises, Assignment of Contracts - Remedies for Breach of contract - Termination and Discharge of Contract - Quasi Contract	**15**
III	**Contract of Indemnity and Guarantee** Contract of Indemnity and Contract of Guarantee - Extent of Surety's Liability, Kinds of Guarantee, Rights of Surety, Discharge of Surety –	**15**
IV	**Bailment and Pledge** Bailment and Pledge – Bailment – Concept – Essentials - Classification of Bailments, Duties and Rights of Bailor and Bailee – Law of Pledge – Meaning – Essentials of Valid Pledge, Pledge and Lien, Rights of Pawner and Pawnee.	**15**
V	**Sale of Goods Act 1930:** Definition of Contract of Sale – Formation - Essentials of Contract of Sale - Conditions and Warranties - Transfer of Property – Contracts involving Sea Routes - Sale by Non-owners - Rights and duties of buyer - Rights of an Unpaid Seller	**15**
	TOTAL	**75**

Course Outcome	
CO1	Explain the Objectives and significance of Mercantile law
CO2	Understand the clauses and exceptions of Indian Contract Act.

CO3	Outline the contract of indemnity and guarantee
CO4	Familiar with the provision relating to Bailment and Pledge
CO5	Explain the various provisions of Sale of Goods Act 1930
Textbooks	
1	N.D. Kapoor , Business Laws- Sultan Chand and Sons, New Delhi.
2	R.S.N. Pillai – Business Law, S.Chand, New Delhi.
3	M C Kuchhal&VivekKuchhal, Business law, S Chand Publishing, New Delhi
4	M.V. Dhandapani, Business Laws, Sultan Chand and Sons, New Delhi.
5	Shusma Aurora, Business Law, Taxmann, New Delhi.
Reference Books	
1	PreethiAgarwal, Business Law, CA foundation study material, Chennai.
2	Business Law by Saravanavel, Sumathi, Anu, Himalaya Publications, Mumbai.
3	Kavya and Vidhyasagar, Business Law, Nithya Publication, New Delhi.
4	D.Geet, Business Law NiraliPrakashan Publication, Pune.
5	M.R. Sreenivasan , Business Laws, Margham Publications, Chennai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	www.cramerz.comwww.digitalbusinesslawgroup.com
2	http://swcu.libguides.com/buslaw
3	http://libguides.slu.edu/businesslaw

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	2	2	2	2	2	2
CO2	3	2	3	3	2	2	2	2	2	2	2
CO3	3	2	2	3	2	2	2	2	2	2	2
CO4	3	2	3	3	2	2	2	2	2	2	2
CO5	3	2	3	3	2	2	2	2	2	2	2
TOTAL	15	10	13	15	10	10	10	10	10	10	10
AVERAGE	3	2	2.6	3	2	2	2	2	2	2	2

3 – Strong, 2- Medium, 1- Low

Elective II – HUMAN RESOURCE MANAGEMENT

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATA21	4				3	4	25	75	100

Learning Objectives

C1	To explore to the aspects relating of Human resource management
C2	Toequip with the various processes of Recruitment and Selection
C3	To be acquainted with Training methods and the concept of Performance Appraisal
C4	To learn about Industrial Relations
C5	To assimilate knowledge on employee welfare.

Prerequisite: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction to HRM** Definition of HRM, Objectives – Importance – Nature- Scope, Role and Qualities of a HR Manager - Human Resource Planning - Meaning, Definition, Importance, Factors Affecting HRP, Process Involved in Human Resource Planning. Human Resource Information System (HRIS) - Job Analysis, Need for Job Analysis, Steps in Job Analysis, Job Description and Specification.	**12**
II	**RECRUITMENT AND SELECTION** Definition – Objectives – Factors affecting recruitment – internal and external source of recruitment – Selection Process – Curriculum Vitae –Test- types– Kinds of employment interview – Medical Screening – Appointment Order.	**12**
III	**TRAINING AND DEVELOPMENT** Induction – Training – Methods – Techniques – Identification of the training needs – Training and Development – Performance appraisal – Transfer – Promotion and termination of services – Career Development.	**12**
IV	**INDUSTRIAL RELATIONS** Industrial Disputes and Settlements (Laws Excluded) – Settling Industrial Disputes in India – Arbitration – Adjudication – SettlementLabour Relation – Functions of Trade Unions – Forms of collective bargaining-Workers' participation in management – Types and effectiveness. .	**12**
V	**EMPLOYEE WELFARE** Employee Welfare: Meaning, Objectives, Philosophy, Scope, Limitations, Types of Employee Welfare, Statutory and Non-Statutory Welfare Measures, and Labour Welfare Theories- Social Security, Health, Retirement &Other Benefits- Remuneration – Components of remuneration – Incentives – Benefits	**12**

	TOTAL	60

CO	Course Outcomes
CO1	Examine the role of HRM in the new age organisation and plan man power requirements and implement techniques of job design.
CO2	Formulate action plans for employee Recruitment and Selection.
CO3	Choose appropriate methods of Training
CO4	Estimate, defend and handle legal compliance in HRM involving trade union disputes and employee retention.
CO5	Formulate strategies for employee welfare.
Textbooks	
1	Ashwathappa, Human Resource Management, Tata McGraw-Hill Education, Noida.
2	Mamoria, C.B. and Gaonkar, S.V, Personnel Management, Himalaya Publishing House, Mumbai.
3	Sunil Lalla and NehaShukla, Human Resource Management, NiraliPrakashan Publishers, Pune.
4	P.SubbaRao, Personnel and Human Resource Management, Himalaya Publishing House, Mumbai.
Reference Books	
1	L.M. Prasad, Human Resource Management, Sultan and Chand sons Publications, New Delhi.
2	DeCenzo, D.A. and Robbins, S.P Human Resource Management, Wiley, India.
3	Dr.K.Sundar and Dr.JSrinivasan, Human Resource Development, Margham Publications, Chennai.
4	Jane Weightman, Human Resource Management, VMP Publishers, Mumbai.
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://hr.university/shrm/strategic-human-resource-management/
2	https://www.investopedia.com/terms/c/collective-bargaining.asp
3	https://www.yourarticlelibrary.com/human-resource-management-2/employee-welfare/employee-welfare/99778

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2	3	3	3	2	2
CO2	3	2	2	2	2	2	2	2	3	2	3

CO3	3	3	3	2	3	2	3	3	3	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2
CO5	3	3	3	2	3	2	3	3	3	2	3
TOTAL	15	12	13	10	13	10	13	13	15	10	12
AVERAGE	3	2.2	2.6	2	2.6	2	2.6	2.6	3	2	2.2

3 – Strong, 2- Medium, 1- Low

Elective II – International Trade

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATA22	**4**				**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO1	To enable students familiarise with the basics of International Trade.
LO2	To know the various theories of international trade.
LO3	To impart knowledge about balance of trades and exchange rates.
LO4	To gain knowledge about international institutions.
LO5	To gain insights on World Trade Organisation

Prerequisite: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	Introduction to International Trade – Meaning – Definition - Difference between Internal and International Trade – Importance of International Trade in the Global context	12
II	Theories of International trade: Classical theories - Adam smith's theory of Absolute Advantage – Ricardo's Comparative cost theory - Modern theories of International Trade - Haberler's Opportunity Cost theory – Heckscher –Ohlin's Modern theory – International trade and Factor Mobility Theory – Leontiff's Paradox - International trade and economic growth theory - Immiserizing growth theory.	12
III	Balance of Payments – Components of Balance of Payments - Current account, Capital account & Official settlement accounts - Disequilibrium in BOP -Methods of correcting Disequilibrium - Balance of Payment adjustment Theories - Marshall Lerner mechanism. Balance of Trade – Terms of Trade – Meaning – Definition – Difference between BOP and BOT.	12
IV	International Economic Institutions - International Monetary System - Bretton Woods Conference – IMF - Objectives, Organizational structure – Membership – Quotas – Borrowing and Lending Programme of IMF – SDRs – India and IMF -World Bank and UNCTAD.	12
V	World Trade Organisation (WTO) – Functions and Objectives – Agricultural Agreements – GATS - TRIPS – TRIMS.	12

	TOTAL	**60**
CO	**Course Outcomes**	
CO1	Distinguish between the concept of internal and international trade.	
CO2	Define the various theories of international trade.	
CO3	Examine the balance of trade and exchange rates	
CO4	Appraise the role of IMF and IBRD.	
CO5	Define the workings of WTO and with special reference to India.	
Textbooks		
1	Francis Cherunilam, International Trade and Export Management – Himalaya Publishing House - Mumbai –04.	
2	Paul.R.Krugman and Maurice Obstfeld, International Economics (Theory and Policy) - Pearson Education Asia - Addison Wesley Longman (P) Ltd. - Delhi – 92.	
3	Robert J.Carbaugh, International Economics - Thomson Information Publishing Group - Wadsworth Publishing Company -California.	
4	H.G. Mannur, International Economics – Vikas Publishing House (P) Ltd – New Delhi-14.	
5	BimalJaiswal&Richa Banerjee, Introduction To International Business, Himalaya Publication, Mumbai	
Reference Books		
1	Dr. T. Aryamala,Vijay Nicole, International Trade, Chennai	
2	Avadhani, V.A. International Financial Management, Himalaya Publications, Mumbai	
3	PunamAgarwal And JatinderKaur, International Business, Kalyani Publications, New Delhi	

4	S Sankaran , International Trade, Margham Publication, Chennai
5	C B Gupta, International Business, S Chand Publishing, New Delhi
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	https://opentext.wsu.edu/cpim/chapter/2-1-international-trade/
2	https://www.economicsdiscussion.net/balance-of-payment/balance-of-payments-international-trade-economics/30644
3	https://www.wto.org/english/thewto_e/countries_e/india_e.htm

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	2	2	2	3	2
CO2	3	2	3	2	3	2	2	2	2	3	2
CO3	3	2	3	2	3	2	2	2	2	3	2
CO4	3	2	3	2	2	2	2	2	2	3	2
CO5	3	2	3	2	2	2	2	2	2	3	2
TOTAL	15	10	15	10	12	10	10	10	10	15	10
AVERAGE	3	2	3	2	2.4	2	2	2	2	3	2

3-Strong, 2-Medium, 1- Low

Generic Elective II – Working Capital Management

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATA23	**4**				**3**	**4**	**25**	**75**	**100**

Learning Objectives	
LO 1	To explain working capital and interpret the cash conversion cycle
LO 2	To know whether the company maintain a large size of inventory for efficient and smooth production and sales operations.
LO 3	To prepare a cash budget and comment on it
LO 4	To assess thecomponents of credit policy and its evaluation
LO 5	To explain the inventory management techniques and calculate the Economic Ordering Quantity

Prerequisite: Should have studied Commerce in XII Std

Unit	Contents	No. of Hours
I	**Introduction** Working Capital Meaning – Types of Working Capital - Importance of working capital management - Components of Working Capital - Factors Influencing Working Capital Requirements - Estimating Working capital management- Working Capital. Life Cycle - Role of Finance Manager in Working Capital.	**12**
II	**Financing Current Assets** Different Approaches to Financing Current Assets- Conservative, Aggressive and Matching approach - Sources of Finance Committees on Working Capital Finance – Working Capital Financing Approach.	**12**

III	**Cash Management** Importance - Factors Influencing Cash Balance – Motives of Holding Cash - Determining Optimum Cash Balance – Cash Budgeting - Controlling and Monitoring Collection and Disbursements.- Cash Management Models – Baumol Model and Miller-Orr Model.	**12**
IV	**Receivables Management** Overview of Receivables Management – Significance – Elements of Credit Policy Variables - Credit Standards - Credit period - Cash discount and Collection efforts - Credit Evaluation - Control of Receivables.	**12**
V	**Inventory Management** Components of Inventory - Benefits of Holding Inventory - Importance of Inventory Management -Techniques for Managing Inventory - Economic Order Quantity (EOQ) - Stock levels - Analysis of Investment in Inventory - Selective Inventory Control - ABC, VED and FSN Analysis.	**12**
	TOTAL	**60**
THEORY 20% & PROBLEMS 80%		

CO	**Course Outcomes**
CO1	Construct the factors influencing working capital requirements and estimate it
CO2	Classify the approaches to financing Currents Assets
CO3	Determine the importance of cash management and cash budgeting
CO4	Formulate the receivables management and credit policy evaluation
CO5	Discuss about the Techniques of inventory management, EOQ, ABC, VED, and FSN Analysis
Textbooks	
1	V.K.Bhalla, Working Capital Management, S Chand, New Delhi
2	Dr.Periyaswamy, Working Capital Management, Himalaya Publishing House, Mumbai
3	Dr.R.P.Rustagi, Working Capital Management, Taxmann's, New Delhi
4	Dr. A Murthy, Working Capital Management, Margham Publications, Chennai
Reference Books	
1	James S Sagner, Working Capital Management, Application and Cases, Wiley, New Jersey
2	Dr. S P Gupta, Management of Working Capital, SahityaBhavan Publication , Agra
3	M. K. Rastogi, Working Capital Management, Laxmi Publication, Chennai
4	Hrishikes Bhattacharya, Working Capital Management, PHI Publication, New Delhi
NOTE: Latest Edition of Textbooks May be Used	
Web Resources	
1	http://onlinecourses.nptel.ac.in

2	https://www.iifl.com
3	http://ebooks.lpude.in

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	2	2	2	2	3	2	2
CO2	3	2	3	2	2	2	2	2	3	2	2
CO3	3	2	3	2	3	2	2	2	3	2	2
CO4	3	1	3	2	3	2	2	2	3	2	2
CO5	3	3	3	2	3	2	2	2	3	2	2
TOTAL	15	11	15	10	13	10	10	10	15	10	10
AVERAGE	3	2.2	3	2	2.6	2	2	2	3	2	2

3-Strong, 2-Medium, 1- Low

Skill Enhancement Course II –Financial Technology

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATS21	**2**				**2**	**2**	**25**	**75**	**100**

	Learning Objectives
LO 1	To enable the students to acquire comprehensive knowledge on all aspects relating to financial technology
LO 2	To enlighten the students to gain knowledge on various forms of e-wallets available
LO 3	To make the students understand the usage of technology in finance and business.

Unit-I	**Introduction to Financial Technology**	
Meaning – Concept of financial technology- Historical development – evolution of financial technology- overview of financial technology- Benefit of technology in financial transactions – Role of Technology in finance- Basic examples of Finical Technology application in everyday life – future trends in financial technology		**06**
Unit-II	**Digital Payment and Online transactions**	
Digital payment methods- Digital currencies - Online transfer- Gpay- Paytm- Phonepe- Pay pal – Astro pay- Other e-wallet payment /Mobile wallet- benefits of e-wallet – drawback of e-wallet transactions- precaution during online transactions- challenges faced by online payment transactions industry.		**06**
Unit-III	**Blockchain Technology and Cryptocurrency**	
Introduction to blockchain technology- Blockchain usage in finance- public and private blockchain and their usage- cryptographic concept in blockchain (hashing, digital signature		**06**

etc) cryptocurrency- Mechanism of cryptocurrency- History and evolution of cryptocurrency- advantages of cryptocurrency- challenges and risk- Regulatory framework on cryptocurrency-.		
Unit-IV	**Banking and Insurance Technology**	**06**
Role of technology in banking sector- Historical evolution of banking technology- online banking platform and mobile applications- overview of payment system in banking- cyber security in banking and in the financial industry- common cyber threats and attacks targeting banks. Role of technology in Insurance sector-		
Unit-V	**Financial Regulation and financial data**	**06**
Financial Regulation and regulation technology- Regulations Evolution of RegTech – RegTech Ecosystem: Financial Institutions – RegTech Ecosystem - Suitability and Funds – RegTech Startups: Challenges – Use Case of AI in Smart Regulation and Fraud Detection – Smart Regulation – Redesigning Better Financial Infrastructure- Data- role of data in financial services- - digital identity- KYC to KYD – challenges of data regulation.		

Books for Study:

1. **Ms. Sapna Singh, Mr. Govind Singh**, "Financial Technology", Notion Press, Chennai
2. **Dr Komal Mistry**," Fintech in India", Phoenix International Publication House,2023
3. **Jaspal Singh,** "Financial Technology and digital banking", New century publications, New Delhi.
4. **Pranay Gupta, Mandy Tham**, "Fintech-The new DNA of financial services",
5. **Vinay Divra**, "FinTech: Redefining Finance with Technology"**,** Notion Press, Chennai,2021

Books for Reference:

1. Susanne Chishti and Janos Barberis, "The Fintech Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries**",** John Wiley, 2022

2. **Steven O'Hanlon, Susanne Chishti**, "Fintech for Dummies", Wiley., New York.2021

3. Augustin Rubini, "Fintech in a Flash: Financial Technology Made Easy", Amazon Kindle paperback edition, New York- 2018

4. Jeff Reed, "Fintech",Createspace Independent Publishing Platform,

5. Ross McGill, "Technology Management in Financial Services",Palgrave Macmillan

E-Resources:

1.www. sdk.finance.com
2.www. 101blockchains.com
3.www. creditkarma.com

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments on problems

CO	COURSE OUTCOME
CO1	Understand the concept of financial technology
CO2	Exhibit knowledge of the various forms of E-wallet
CO3	Gain knowledge on the mechanism of cryptocurrency and blockchain
CO4	Explore the usage of technology in the banking sector

CO5	Knowing the regulation of financial technology and data analytics in Finance

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	3	2	2	2	3	2	2
CO2	2	2	2	3	3	2	1	2	3	2	3
CO3	3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	3	3	3	2	2	2	3	2	2
CO5	3	2	3	3	3	2	2	2	3	2	2
TOTAL	14	10	14	15	15	10	09	10	15	10	11
AVERAGE	2.8	2	2.8	3	3	2	1.8	2	3	2	2.2

3-Strong, 2-Medium, 1- Low

PERSONAL FINANCE

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATS22	**2**				**2**	**2**	**25**	**75**	**100**

Instructional Objectives

1. To know the role of personal finance.
2. To recognise the concept of investment planning.
3. To understand the personal tax planning.
4. To analyzeInsurance tax planning.
5. To familiarise the retirementplanning procedure.

Course Outcome:

CO1 UnderstandthemeaningandrelevanceofFinancialPlanning.
CO2 Familiarizewithregard totheconceptof Investment Planningandits methods.
CO3 Examineconcept of Personal TaxPlanning.
CO4 AnalyzeInsurance Planninganditsrelevance
CO5 DevelopinsightsintoRetirementplanninganditsrelevance

Unit-I	**IntroductiontoFinancialPlanning**	**6 Hours**

Financialgoals-timevalueofmoney-stepsoffinancialplanning-personalfinance/loans-education loan- car loan & home loan schemes- introduction of savings- benefits -managementofspending&financialdiscipline-netbankingandUPI-digitalwallets-securitycrime.

Unit-II	**Investmentplanning**	**6 Hours**

Processofinvestment-objectivesofinvestment-conceptofreturn&riskforvariousassetsclass-portfolioriskandreturn-diversification&portfolioformation.

Unit-III	**Personal TaxPlanning**	**6 Hours**

Subject Code	L	T	P	S	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCFATS22	2				2	2	25	75	100

Tax structure in India for personal taxation- steps of personal tax planning- exemptions anddeductionsforindividuals- taxavoidanceversus taxevasion.

Unit-IV **InsurancePlanning** **6 Hours**

Need for protection planning - risk of mortality- health- disability and property- Importance ofinsurance:lifeand non-lifeinsuranceschemes.

Unit-V **RetirementPlanning** **6 Hours**

Retirement planning goals- process of retirement planning- pension plans available in India-reversemortgage- newpension scheme.

Books for Study:

1. Amar Pandit-**The Only Financial Planning Book That you will ever Need-**Network 18 Publications Ltd (CNBC TV 18)- New Delhi- 2018

2. SinhaMadhu- FinancialPlanning: AReadyReckonerJuly2017 Mc GrawHill- New Delhi- 2017

3. Tripathi-Vanita-FundamentalsofInvestment-Taxmann- New Delhi- 2019

4. Prof Y.P Singh- Fundamental of Investment Management-Galgotia Publishing Company- New Delhi- 2019

5. Jeff Madura- Personal Finance - Pearson India- New Delhi- 2018

Books for Reference:

1. Arthur J. Keown "Personal Finance "- Pearson education- 2018

2. Pandit-AmarTheOnlyFinancialPlanningBookthatYouWillEverNeed-Network18PublicationsLtd (CNBCTV18)

3.Jack Kapoor and Les Dlabay and Robert J. Hughes and Melissa Hart- Personal Finance- Mc graw hill Publication- New York- 2018

4. Eric Tyson- Personal finance for Dummies- John Wiley & Sons- New York -2018

5. Joehnk Michael D. Personal finance – A user's perspective- Thomson Press (India) Ltd

Web Sources

1. https://www.investindia.gov.in/
2. https://www.jagoinvestor.com/
3. https://www.moneychai.com/
4. https://myinvestmentideas.com/
5. https://www.indianangelnetwork.com/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	2	2	2	2	3	2	2
CO2	3	2	3	2	2	2	2	2	3	2	2
CO3	3	2	3	2	3	2	2	2	3	2	2
CO4	3	1	3	2	3	2	2	2	3	2	2
CO5	3	3	3	2	3	2	2	2	3	2	2
TOTAL	15	11	15	10	13	10	10	10	15	10	10
AVERAGE	3	2.2	3	2	2.6	2	2	2	3	2	2

3-Strong, 2-Medium, 1- Low

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME

PROGRAMME OUTCOMES

PO1 **Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study.

PO2 **Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO3 **Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO4 **Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

PO5 **Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

PO6 **Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

PO7 **Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

PO8 **Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9 **Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.

PO10 **Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO11 **Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO12 **Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO13 **Moral and ethical awareness/reasoning**: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO14 **Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO15 **Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Programme Outcomes

PO1 **Disciplinary Knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2 **Critical Thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3 **Problem Solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

PO4 **Analytical Reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.

PO5 **Scientific Reasoning:** Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO6 **Self-directed & Lifelong Learning:** Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

Programme Specific Outcomes:

PSO 1 Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO 2 Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

PSO 3 To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, and beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

PROGRAM SPECIFIC OUTCOMES (PSOS) FOR THE MATHEMATICS PROGRAMME
BY THE END OF THE PROGRAM, THE STUDENTS WILL BE ABLE TO
PROGRAM SPECIFIC OUTCOMES (PSOs)

By the end of the program, the students will be able to

PSO1	Develop the mathematical ability to think abstractly.
PSO2	Solve skilled problems.
PSO3	Create talents for various types of employment.
PSO4	Equip themselves to appear in competitive examinations.
PSO5	Learn independently and improve self-performance.
PSO6	Develop in-depth knowledge of mathematics appreciating the connection between theory and its applications.
PSO7	Identify the application of mathematics in other disciplines and society.
PSO8	Demonstrate mathematical modelling ability.

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Programme Specific Outcomes (PSOs)	**Programme Outcomes (POs)**									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PSO1	✓	✓	✓	✓			✓	✓		✓
PSO2	✓	✓	✓	✓			✓	✓	✓	
PSO3	✓		✓	✓	✓		✓	✓		
PSO4	✓	✓		✓	✓			✓	✓	
PSO5	✓		✓	✓		✓	✓	✓	✓	
PSO6		✓	✓	✓	✓		✓	✓	✓	
PSO7		✓	✓	✓				✓	✓	✓
PSO8		✓	✓			✓	✓	✓	✓	✓
Number of Matches = 53, Correlation : High										

Mapping Correlation Benchmark

Mapping	**1-29%**	**30-59%**	**60-69%**	**70-100%**
Matches	**1-24**	**25-50**	**51-56**	**57-80**
Correlation	**Poor**	**Moderate**	**High**	**Very High**
FIRST YEAR – SEMESTER I				

COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
UCMSTC11	CORE COURSE I	ALGEBRA & TRIGONOMETRY	5	4

Pre-requisite	12th Standard Mathematics

Course Objectives
• Basic ideas on the Theory of Equations, Matrices and Number Theory. • Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.

UNIT–I	**Theory of Equations:**	**15 Hours**
Reciprocal Equations-Standard form–Increasing or decreasing the roots of a given equation-Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems. Book 1. Chapter 6. Sections: 16.1, 16.2, 17, 19, 30.		
UNIT–II	**Summation of Series**	**15 Hours**
Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems. Book 1. Chapter 3. Sections: 10,14. Chapter 4.Sections: 1-7, 11.		
UNIT–III	**Matrices:**	**15 Hours**
Characteristic equation –Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems. Book 2. Chapter 2. Sections: 16, 16.1,16.2, 16.3, 16,4.		
UNIT–IV	**Expansions**	**15 Hours**
Expansions of sinnθ, cosnθ in powers of sinθ, cosθ - Expansion of tannθ in terms of tan θ, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta$ $\sin^n\theta$ –Expansions of $\tan(\theta_1+\theta_2+,\ldots,+\theta_n)$-Expansions of sinθ, cosθ and tanθ in terms of θ - related problems. Book 3. Chapter 3. Sections:1-5.		
UNIT–V	**Hyperbolic and Inverse Hyperbolic Functions:**	**15 Hours**
Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems. Book 3. Chapter 4, Chapter 5, Chapter 6,		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Recommended Text:

1. Algebra, Volume I, T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganaparthy, S.Viswanathan (Printers & Publishers) PVT.LTD., 2013.
2. Algebra, Volume II, T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganaparthy, S.Viswanathan (Printers & Publishers) PVT.LTD., 2008.
3. Trigonometry, S.Narayanan, T.K.Manicavachagom Pillay , S.Viswanathan (Printers & Publishers) PVT.LTD., 2013.

Reference Books:

1. W.S. Burnstine and A.W. Panton, Theory of equations
2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007
3. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005
4. C.V. Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003
5. J. Stewart, L. Redlin, and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012.
6. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.

Website and e-Learning Source:

https://nptel.ac.in/courses/111106051
https://www.digimat.in/nptel/courses/video/111106152/L20.html
https://www.nptelvideos.com/mathematics/advanced_mathematics.php

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Classify and Solve reciprocal equations

CLO 2: Find the sum of binomial, exponential and logarithmic series

CLO 3: Find Eigen values, Eigen vectors, verify Clayey – Hamilton theorem and diagonalize a given matrix

CLO 4: Expand the powers and multiples of trigonometric functions in terms of sine and cosine

CLO 5: Determine relationship between circular and hyperbolic functions and the summation of trigonometric series

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						**PSOs**		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

Strong: Medium: Low:

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCMSTC12	**CORE COURSE I**	**DIFFERENTIAL CALCULUS**	**5**	**4**

Pre-requisite	12^{th} Standard Mathematics

Course Objectives
• The basic skills of differentiation, successive differentiation, and their applications. • Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.

UNIT–I	**Successive Differentiation**	**15 Hours**
Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product. Chapter III: Sections 1.1 to 1.6, 2.1-2.2.		
UNIT–II	**Partial Differentiation**	**15 Hours**
Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions. Chapter VIII: Sections 1.1 to 1.5.		
UNIT–III	**Partial Differentiation (Continued)**	**15 Hours**
Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers. Chapter VIII : Sections 1.6 to 1.7; Chapter VIII : Sections 2.4 to 2.5.		
UNIT–IV	**Envelope:**	**15 Hours**
Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter. *Chapter X : Sections 1.1 to 1.4.*		
UNIT–V	**Curvature of Plane Curves**	**15 Hours**
Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutes – Radius of Curvature in Polar Co-ordinates. Chapter X: Sections 2.1 to 2.6.		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

S. Narayanan and T.K. Manicavachagom Pillay (2004) Calculus, Volume I, S. Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

Reference Books:

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010.
3. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
4. R. Courant and F. John, Introduction to Calculus and Analysis(Volumes I & II), Springer- Verlag, New York, Inc., 1989.
5. T. Apostol, Calculus, Volumes I and II.
6. S. Goldberg, Calculus and mathematical analysis

Website and e-Learning Source:

https://www.nptelvideos.com/mathematics/advanced_mathematics.php
https://nptel.ac.in/courses/111105123
https://ocw.mit.edu/courses/18-01sc-single-variable-calculus-fall-2010/
https://ocw.mit.edu/courses/18-013a-calculus-with-applications-spring-2005/

Course Learning Outcome (for Mapping with PLOs and PSOs)

Students will be able to

CLO 1: Find the nth derivative, form equations involving derivatives and apply Leibnitz formula

CLO 2: Find the partial derivative and total derivative coefficient

CLO 3: Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers

CLO 4: Find the envelope of a given family of curves

CLO 5: Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

Prepared by		**Verified by**	
	Dr. S. Soundararajan		

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCMSTA11	**GENERIC ELECTIVE 1**	**Allied - NUMERICAL METHODS WITH APPLICATIONS**	**4**	**3**

Pre-requisite	12^{th} Standard Mathematics

Course Objectives

- To know the methods of solving simultaneous linear equations.
- To acquire knowledge about forward differences and Backward differences and their relationship.
- Knowledge about central difference operators and problems based on various central differences formulae.
- To study Newton's divided difference formula and problems based on Lagrange's interpolation formula.

UNIT–I	Solutions of algebraic and transcendental equations	12 Hours
Bisection method - Regula - falsi method- Newton-Raphson method. Chapter 1 :Section 1.1, 1.3, 1.4.		
UNIT–II	Solutions of Simultaneous Linear Equations	12 Hours
Gauss-Elimination method, Crout's method, Gauss-Jordan method, Gauss-Jacobi method. Chapter 2 :Section 2.2, 2.3, 2.5.		
UNIT–III	Finite Differences	12 Hours
First difference – Express any value of y in terms of y_n and the backward differences of y_n - Differences of a polynomial - Factorial polynomials. Chapter 3 :Section 3.1 to 3.4.		
UNIT–IV	Interpolation (Equal Intervals)	12 Hours
Introduction – Gregory Newton's Forward interpolation formula – Gregory – Newton Backward Interpolation formula Chapter 4 :Section 4.1 to 4.3.		
UNIT–V	Interpolation with Unequal Intervals	12 Hours
Divided Differences – Properties of divided differences -Newton's interpolation formula for unequal intervals -Lagrange's interpolation Formula. Chapter 6 :Section 6.2, 6.3, 6.4, 6.7		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable

	skill.

Recommended Text:
P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

Reference Books:

1. B.D. Gupta.(2001) *Numerical Analysis*.Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.
3. S. Arumugam. (2003) *Numerical Methods*, New Gamma Publishing, Palayamkottai.
4. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co., Delhi

Website and e-Learning Source:
https://ocw.mit.edu/courses/22-15-essential-numerical-methods-fall-2014/pages/syllabus/
https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: After studied unit -1, the student will be able to solve Iteration method- Regula-falsi method- Newton-Raphson method.

CLO2: After studied unit -2, the student will be able to calculate interpolation values by applying Gauss-Elimination method, Gauss-Jordan method.

CLO3: After studied unit -3, the student will be able to calculate Differences of a polynomial-Factorial polynomials- inverse operator Δ^{-1} -Summation Series.

CLO4: After studied unit -4, the student will be able to estimate one or more missing terms of the given set of data.

CLO5: After studied unit -5, the student will be able to estimate the interpolation value for unequal intervals based on Lagrange's formula of inverse interpolation.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	4	-	3	2	1
CLO2	2	1	3	1	4	-	3	2	1
CLO3	3	1	3	1	2	-	3	2	1
CLO4	3	1	3	2	4	-	3	2	1
CLO5	3	1	3	2	4	-	3	2	1

Prepared by		**Verified by**	
	Dr. P.Govindaraju		

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCMSPS11	**SEC 1**	**NUMERICAL METHODS WITH APPLICATIONS LAB**	**2**	**2**

Pre-requisite	12th Standard Mathematics

Course Objective
• Solve Problems using mathematical software.

List of Exercise
1. Computing expressions 2. Operations on Vectors 3. Operations on Sets 4. Permutation and Combinations 5. Polynomial Interpolation. 6. Matrix Manipulation.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

1. Introduction to Scilab, Michael Baudin From Scilab Consortin, 2010
   Chapters 1 to 8.
2. Plotting Using Scilab – Anopen Source Document www.openeering.com

Reference Books:

1. Modeling and Simulation in Scilab, Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukhah.
2. An Introduction to Scilab from a Matlab User's Point of View by Eike Rietsch.
3. Advanced Programming in Scilab, Chetana Jain, Narosa Publishing House, New Delhi.

Website and e-Learning Source:
http://ndl.iitkgp.ac.in http://ocw.mit.edu http:/mathforum.org

Course Learning Outcome (for Mapping with PLOs and PSOs)

Students will be able to

CO1: Solve Mathematical Problems using Mathematical software's.

CO2: Understand the knowledge of application of mathematics.

CO3: Understand the concept of set theory.

CO4: Compute permutation and combinations.

CO5: Analyse polynomial interpolations.

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCMSTF11	**SEC**	**BRIDGE MATHEMATICS**	**2**	**2**

Pre-requisite	12^{th} Standard Mathematics
Course Objectives	
• To bridge the gap and facilitate transition from higher secondary to tertiary education. • To instil confidence among stakeholders and inculcate interest for Mathematics.	

UNIT–I		**6 Hours**
Algebra: Binomial theorem, General term, middle term, problems based on these concepts		
UNIT–II		**6 Hours**
Sequences and series (Progressions). Fundamental principle of counting. Factorial n.		
UNIT–III		**6 Hours**
Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.		
UNIT–IV		**6 Hours**
Trigonometry: Introduction to trigonometric ratios, proof of sin(A+B), cos(A+B), tan(A+B) formulae, multiple and sub multiple angles, sin(2A), cos(2A), tan(2A) etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule		

UNIT–V		6 Hours
Calculus: Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Recommended Text:

1. NCERT class XI and XII text books.
2. Any State Board Mathematics text books of class XI and XII

Website and e-Learning Source:

https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems

CLO2: Find the various sequences and series and solve the problems related to them. Explain the principle of counting.

CLO3: Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations

CLO4: Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.

CLO5: Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs	
	1	2	3	4	5	6	1	2
CLO1	1	1	1	1	1	1	1	1
CLO2	2	1	1	2	2	1	2	1
CLO3	2	1	1	2	2	1	2	1
CLO4	1	1	1	1	1	1	2	1
CLO5	1	1	1	1	1	1	2	1

FIRST YEAR – SEMESTER II

COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
UCMSTC21	CORE COURSE 3	ANALYTICAL GEOMETRY (Two & Three Dimensions)	5	4

Pre-requisite	12th Standard Mathematics

Course Objectives

- Necessary skills to analyze characteristics and properties of twoand three-dimensional geometric shapes.
- To present mathematical arguments about geometric relationships.
- To solve real world problems on geometry and its applications.

UNIT–I	**Conics**	**15 Hours**
Pole, Polar - conjugate points and conjugate lines – diameters– conjugate diameters of an ellipse - semi diameters- conjugate diameters of hyperbola. Chapter 6: Sections: 6.9 - 6.13 and Chapter 7 Section 7.3,7.4.		
UNIT–II	**Conics(continued)**	**15 Hours**
Polar coordinates: General polar equation of straight line –Polar equation of a circle given a diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola. Chapter 9: Sections: 9.1 – 9.8.		
UNIT–III	**Planes**	**15 Hours**
System of Planes-Length of the perpendicular–Orthogonal projection. Chapter 2: Sections: 2.5 – 2.9.		
UNIT–IV	**Planes and Lines**	**15 Hours**
Representation of line–angle between a line and a plane – co – planar lines–shortest distance between two skew lines –length of the perpendicular–intersection of three planes. Chapter 3: Sections: 3.1 - 3.8.		
UNIT–V	**Sphere**	**15 Hours**
Equation of a sphere-general equation-section of a sphere by a plane-equation of the circle-tangent plane- angle of intersection of two spheres- condition for the orthogonality- radical plane. Chapter 6: Sections: 6.1 – 6.8.		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

1. Analytical Geometry 2Dimensional, P.Duraipandian, Laxmi Duraipandian, D.Muhilan, Emeralad Publishers,1983.
2. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr. P.K. Mittal - S. Chand & Co. Pvt. Ltd.

Reference Books:

1. Calculus and Analytical Geometry, G.B.Thomas and R.L.Finny, Pearson Publication, 9th Edition, 2010.
2. Analytic Geometry with Calculus, Robert C. Yates, Prentice Hall, Inc., New York,1961.
3. Algebra and Trigonometry with Analytical Geometry, Earl W. Swokowskiand Jeffery A. Cole, Twelfth Edition, Brooks/Cole, Cengage Learning,CA,USA,2010.
4. Analytical Geometry Part I – Two Dimensions, T.K.Manicavachagom Pillay, T. Natarajan, S. Viswanathan Printers & Publishers Pvt Ltd, 2009.
5. Analytical Geometry Part II – Three Dimensions, T.K.Manicavachagom Pillay , T. Natarajan, S. Viswanathan Printers & Publishers Pvt Ltd, 2009
6. Analytical Geometry 2D And 3D, P.R.Vittal, Pearson Publication, First Edition, 2013.
7. Analytical Geometry of 2D by P. Duraipandian – Muhil Publishers.

Website and e-Learning Source:

https://nptel.ac.in/courses/111104095
https://ocw.mit.edu/courses/res-18-006-calculus-revisited-single-variable-calculus-fall-2010/resources/lecture-1-analytic-geometry/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola.

CLO 2: Find the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola.

CLO 3: Explain in detail the system of Planes.

CLO 4: Explain in detail the system of Straight lines.

CLO 5: Explain in detail the system of Spheres

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	2	2	1	-	-	3	2	1
CLO2	2	2	2	1	-	-	3	2	1
CLO3	3	2	2	1	-	-	3	2	1
CLO4	3	2	3	1	-	-	3	2	1
CLO5	3	2	3	1	-	-	3	2	1

Prepared by		**Verified by**	

	Dr. B. Towfeeq Ahmed		

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCMSTC22	**CORE COURSE 4**	**INTEGRAL CALCULUS**	**5**	**4**

Pre-requisite	12^{th} Standard Mathematics

Course Objectives
• Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals. • Knowledge about Beta and Gamma functions and their applications. • Skills to Determine Fourier series expansions.

UNIT–I	**Integration**	**15 Hours**
Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula. Chapter 1. page 79 to 103 Sections: 13.1 -15.1		
UNIT–II	**Multiple Integration**	**15 Hours**
Multiple Integrals - definition of double integrals - evaluation of double integrals - Change of order of integration – Double Integrals in polar coordinates. Chapter 5. Page 203 to 219 Sections: 1-3		
UNIT–III	**Multiple Integration(continued)**	**15 Hours**
Triple integrals –applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces–change of variables - Jacobian. Chapter 5: Sections 4-7 and Chapter 6: Sections 1.1 -2.1 Chapter 5 : Page 219 to 250 and Chapter 6: Page 251 to 256		
UNIT–IV	**Improper Integrals**	**15 Hours**
Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions – Applications of gamma functions to certain definite integrals. Chapter 7 Pages : 270 to 293, Sections 1.1-5		
UNIT–V	**Applications**	**15 Hours**
Geometric and Physical Applications of Integral calculus. Chapter 2 Pages: 112 to 131. Sections 1.1 -2.2		

Extended Professional Component (is a part of	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be

internal component only, Not to be included in the External Examination question paper)	solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

Calculus (volume II), S. Narayanan and T.K. Manicavachagom Pillay, S.Viewanathan (Printers & publishers) PVT (2016).

Reference Books:

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
3. D. Chatterjee, Integral Calculus and Differential Equations, Tata-McGraw Hill Publishing Company Ltd.
4. P. Dyke, An Introduction to Laplace Transforms and Fourier Series, Springer Undergraduate Mathematics Series, 2001 (second edition).

Website and e-Learning Source:

https://archive.nptel.ac.in/courses/111/105/111105122/
https://archive.nptel.ac.in/courses/111/104/111104144/
https://ocw.mit.edu/courses/18-01sc-single-variable-calculus-fall-2010/pages/unit-4-techniques-of-integration/
https://ocw.mit.edu/courses/18-01-single-variable-calculus-fall-2006/resources/lecture-18-definite-integrals/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae

CLO 2: Evaluate double and triple integrals and problems using change of order of integration

CLO 3: Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution

CLO 4: Explain beta and gamma functions and to use them in solving problems of integration

CLO 5: Explain Geometric and Physical applications of integral calculus

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1

CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1

Prepared by	Dr. S. Soundararajan	**Verified by**	

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCMSPS11	**SEC 3**	**COMPUTATIONAL MATHEMATICS LAB I**	**2**	**2**

Pre-requisite	12^{th} Standard Mathematics

Course Objective
• To solve problems using Mathematical Software.

List of Exercise
1. Finding the roots of polynomial equations 2. Solving system of equations 3. Testing consistency of system of equations 4. Finding sum of infinite series 5. Successive Differentiation of single variable functions. 6. Partial derivatives 7. Finding Extreme Values

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

1. Introduction to Scilab, Michael Baudin From Scilab Consortin, 2010 Chapters 1 to 8 (Book Freely Downloadable in Internet)
2. Plotting Using Scilab – Anopen Source Document www.openeering.com

Reference Books:

1. Modeling and Simulation in Scilab, Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukhah.
2. An Introduction to Scilab from a Matlab User's Point of View by Eike Rietsch.
3. Advanced Programming in Scilab, Chetana Jain, Narosa Publishing House, New Delhi.

Website and e-Learning Source:

http://ndl.iitkgp.ac.in
http://ocw.mit.edu
http:/mathforum.org

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO1: Solve Mathematical Problems using Mathematical software's .
CO2: Understand the knowledge of application of Mathematics
CO3: Perform the successive differentiation.
CO4: Understand the partial derivatives.
CO5: Calculate maxima and minima for the functions of two variables.

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCMSTA21	**GENERIC ELECTIVE 2**	**Allied – CALCULUS OF FINITE DIFFERENCES**	**4**	**3**

Pre-requisite	12th Standard Mathematics

Course Objectives

- To evaluate derivatives using Newton's forward and backward differences formulae.
- To acquire the knowledge about evaluation of numerical integration.
- To evaluate the solution of linear homogeneous difference equations with constant coefficients.
- To obtain numerical solutions to the ordinary differential equations.

UNIT–I	**Numerical Differentiation:**	**12 Hours**
Newton's forward difference formula to get the derivative - Newton's backward difference formulae to compute the derivative - Derivative using Stirling's formula. **Chapter 7** :Section 7.2 to 7.4		
UNIT–II	**Numerical Integration:**	**12 Hours**
Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth rule- Weddle's rule. **Chapter 7** :Section 7.9, 7.13, 7.14, 7.15		
UNIT–III	**Difference equations:**	**12 Hours**

Definition – order and degree of a difference equation - Linear difference equations – To find complementary function of $f(E)y_x = \varphi(x)$ - To find particular integral of $f(E)y_x = \varphi(x)$. **Chapter 8** :Section 8.1to 8.4 &8.6		
UNIT–IV	**Numerical solution of Ordinary Differential Equations**	**12 Hours**
Solution by Taylor's series method- Picard's method of successive approximations- Euler's method- Modified Euler's method. **Chapter 9:** Section 9.5 to 9.7 & 9.9		
UNIT–V	**Numerical solution of Ordinary Differential Equations: (continuous):**	**12 Hours**
Runge - kuttamethod(fourth order only)- Predictor-Corrector methods- Milne's Predictor corrector formulae. **Chapter 9 :** Section 9.10 to 9.13.		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Recommended Text:

P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

Reference Books:

1. B.D. Gupta.(2001) Numerical Analysis.Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) Numerical methods for Science and Engineering National Publishing Company, Chennai.
3. S. Arumugam. (2003) Numerical Methods, New Gamma Publishing, Palayamkottai.
4. H.C. Saxena. (1991) Finite differences and Numerical analysis S.Chand & Co., Delhi

Website and e-Learning Source:

https://ocw.mit.edu/courses/22-15-essential-numerical-methods-fall-2014/pages/syllabus/
https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: After studied unit -1, the student will be able to evaluate derivatives by applying Newton's forward and backward differences formulae.

CLO2: After studied unit -2, the student will be able to evaluate integrations by applying the trapezoidal rule, Simpson‟s rules, and Weddle‟s rule.

CLO3: After studied unit -3, the student will be able to find a complete solution to linear difference equations.

CLO4: After studied unit -4, the student will be able to estimate approximate numerical solutions of ordinary differential equations by Euler, Picard and Taylor.
CLO5: After studied unit -5, the student will be able to estimate approximate numerical solutions of ordinary differential equations by Runge-Kutta methods, Predictor-Corrector method- Milne's method and Adams-Bashforth method.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	4	-	3	2	1
CLO2	2	1	3	1	4	-	3	2	1
CLO3	3	1	3	1	2	-	3	2	1
CLO4	3	1	3	2	4	-	3	2	1
CLO5	3	1	3	2	4	-	3	2	1

Prepared by	Dr. P Govindaraju	**Verified by**	

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCMSPS21	**SEC-2**	**PROBLEM SOLVING TECHNIQUES LAB**	**2**	**2**

Pre-requisite	12^{th} Standard Mathematics

Course Objective
• To solve problems using Mathematical Software.

List of Exercises
1. Integration of single variable functions. 2. Double Integration 3. Triple Integration 4. Finding Radius of curvature. 5. Visualization of functions in 2D. 6. Visualization of three dimensional mathematical objects.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Books for Study:

1. Introduction to Scilab, Michael Baudin From Scilab Consortin, 2010
   Chapters 1 to 8 (Book Freely Downloadable in Internet)
2. Plotting Using Scilab – Anopen Source Document www.openeering.com

Books for Reference:

1. Modeling and Simulation in Scilab, Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukhah.
2. An Introduction to Scilab from a Matlab User's Point of View by Eike Rietsch.
3. Advanced Programming in Scilab, Chetana Jain, Narosa Publishing House, New Delhi.

Source links

http://ndl.iitkgp.ac.in
http://ocw.mit.edu
http:/mathforum.org

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO1: Solve Mathematical Problems using Mathematical software's .

CO2: Understand the knowledge of application of Mathematics

CO3: Understand the concepts of integration.

CO4: Calculate the radius of curvature.

CO5: Visualize the 2D & 3D functions.

Prepared by		**Verified by**	
	B. Towfeeq Ahmed		

For B.Sc Data Science

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCDSTA11	**GE 1**	**STATISTICS – I**	**5**	**3**

Pre-requisite	12th Standard Mathematics

Course Objectives
➢ Understand the significance and computational aspects of statistical analysis. ➢ Understand the patterns of distribution of data. ➢ Understand the concepts of predictive analytics.

UNIT–I	**INTRODUCTION**	**15 Hours**
Introduction – Origin and growth of Statistics – Statistics Defined – Statistics: Science or Art – Functions of Statistics – Scope of Statistics – Limitations of Statistics.		
UNIT–II	**COLLECTION AND TABULATION OF DATA**	**15 Hours**
Introduction – Primary and Secondary Data – Choice between Primary and Secondary Data – Methods of Collecting Primary Data – Direct personal interviews – Indirect oral interviews – Information from correspondents – Introduction – Meaning and Objectives of Classification – Types of Classification (Geographical, Chronological, Qualitative & Quantitative Classification) – Formation of a Discrete Frequency Distribution – Formation of a Continuous Frequency Distribution – Class mid-point or class mark – Tabulation of Data – Parts of a Table – General Rules of Tabulation – Review of the Table – Types of Tables –General and Special Purpose Tables.		
UNIT–III	**DIAGRAMMATIC AND GRAPHICAL PRESENTATION**	**15 Hours**
Types of Diagrams – One-dimensional or bar diagrams – Two-dimensional diagrams - Graphs of Frequency Distributions - Histogram – Frequency Polygon – Smoothed Frequency Curve – Cumulative Frequency Curves or 'Ogives'.		
UNIT–IV	**MEASURES OF CENTRAL VALUE**	**15 Hours**
Types of Averages – Arithmetic Mean – Calculation of Simple Arithmetic Mean - Calculation of Weighted Arithmetic Mean – Median – Mode.		
UNIT–V	**MEASURES OF DISPERSION**	**15 Hours**
Introduction – Dispersion Defined – Significance of Measuring Variation – Properties of a Good Measure of Variation – Methods of Studying Variation – Absolute and Relative Measures of Variation – Range – The Interquartile Range or the Quartile Deviation – The Mean Deviation – The Standard Deviation – Lorenz Curve.		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Recommended Text:

S.P. Gupta, STATISTICAL METHODS, 2016, 44th Revised Edition, S. Chand & co, New Delhi.

Reference Books:

1. B.L. Agarwal, BASIC STATISTICS, 2021, New Age International Private Limited, New Delhi.
2. S.C. Gupta and V.K. Kapoor, FUNDAMENTALS OF MATHEMATICAL STATISTICS, (2020), 12th Edition, S. Chand & co, New Delhi.
3. Z.C. Holcomb, FUNDAMENTALS OF DESCRIPITIVE STATISTICS, 2017, Routledge, New York, US

Website and e-Learning Source:

https://nptel.ac.in/courses/111/104/111104120/
https://www.iiscrpune.ac.in/-bhasbapat/phy221_files/curvefitting.pdf

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understand the merits, demerits and limitations of Statistics.
CLO 2: Analyze the classification of data using Geographical, Chronological, Qualitative & Quantitative
CLO 3: Visualize the data structure.
CLO 4: Understand the data distribution using central tendencies.
CLO 5: Analyze the data using Variations.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	1	3	1	1	3	1	1
CLO2	3	2	1	3	1	1	3	1	1
CLO3	3	2	1	3	1	1	3	1	1
CLO4	3	3	1	3	1	1	3	1	1
CLO5	3	2	1	3	1	1	3	1	1

Prepared by	Dr. A Mohamed Ali	**Verified by**	

For B.Sc Computer Science and BCA

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCCCTA11	**GENERIC ELECTIVE 1**	**ALLIED MATHEMATICS – I**	**5**	**3**

Pre-requisite	12^{th} Standard Mathematics

Course Objectives
To Explore the Fundamental Concept of Mathematics

UNIT–I	**Summation of series**	**15 Hours**
Binomial series -Exponential series - Logarithmic series -Simple Problems. Chapter 2: Sections : 2.1.3, 2.2, 2.2.1, 2.3, 2.3.3.		
UNIT–II	**Matrices**	**15 Hours**
Symmetric – Skew-Symmetric – Hermitian– Skew – Hermitian – Orthogonal and Unitary matrices – Cayley – Hamilton theorem (without proof) – Verification - Computation of inverse of matrix using Cayley - Hamilton theorem. Chapter 4: Sections: 4.1.1 –4.1.6, 4.5.2 and 4.5.3.		
UNIT–III	**Numerical Methods & Finite Differences**	**15 Hours**
Newton's method to find a root approximately – Interpolation: Operators, Δ, ∇,E, E^{-1} difference tables, Interpolation formulae: Newton's forward and backward interpolation formulae for equal intervals, Lagrange's interpolation formula. Chapter 3: Sections 3.4.1. Chapter 5 : Sections : 5.1 and 5.2.		
UNIT–IV	**Trigonometry**	**15 Hours**
Expansions of $\sin^n\theta, \cos^n\theta$, in a series of powers of sinθ and cosθ - Expansions of sin(nθ) and cos(nθ) in a series sines and cosines of multiples of "θ" - Expansions of sinθ, cosθ and tanθ in a series of powers of "θ" – Hyperbolic and inverse hyperbolic functions . Chapter 6: Section 6.1 – 6.3		
UNIT–V	**Differential Calculus**	**15 Hours**
Successive differentiation, n^{th} derivatives, Leibnitz theorem (without proof) and applications, Jacobians, maxima and minima of functions of two variables- Simple problems Chapter 1, Section 1.1 to 1.3.1.		

Extended Professional Component (is a part of internal component only, Not to be included in the	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)

External Examination question paper)	
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Recommended Text:

Allied Mathematics, Volume I and Volume II by P. Duraipandian and S.Udayabaskaran, Muhil Publishers, Volume I: Unit I – IV, Volume II – Unit V

Reference Books:

1. Ancillary Mathematics by S. Narayanan and T.K. Manickavachagom Pillay, S. Viswanathan Pinters, 1986, Chennai
2. Allied Mathematics by A. Singaravelu Allied Mathematics by P.R. Vittal

Website and e-Learning Source:

https://archive.nptel.ac.in/courses/111/106/111106146/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understand the concepts of Summation of Series.

CLO 2: Understand the concepts of Cayley Hamilton Theorem and inverse matrices.

CLO 3: Understand the concepts of finite differences.

CLO 4: Understand the knowledge about expansions, hyperbolic and inverse hyperbolic functions.

CLO 5: Understand the concept of Leibnitz theorem and functions of two variables

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	1	3	1	1	3	1	1
CLO2	3	2	1	3	1	1	3	1	1
CLO3	3	2	1	3	1	1	3	1	1
CLO4	3	3	1	3	1	1	3	1	1
CLO5	3	2	1	3	1	1	3	1	1

Prepared by		**Verified by**	

For B.Sc Computer Science and BCA
For B.Sc Computer Science, BCA and Data Science

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCCCPS11	**SEC 1**	**COMPUTATIONAL MATHEMATICS LAB I**	**3**	**2**

Pre-requisite	12th Standard Mathematics

Course Objective
• To solve problems using Mathematical Software

List of Exercises
1. Finding the roots of polynomial equations 2. Solving system of equations 3. Testing consistency of system of equations 4. Finding sum of infinite series 5. Successive Differentiation of single variable functions. 6. Partial derivatives 7. Finding Extreme Values

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Recommended Text:

1. Introduction to Scilab, Michael Baudin From Scilab Consortin, 2010
   Chapters 1 to 8 (Book Freely Downloadable in Internet)
2. Plotting Using Scilab – Anopen Source Document www.openeering.com

Reference Books:

1. Modeling and Simulation in Scilab, Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukhah.
2. An Introduction to Scilab from a Matlab User's Point of View by Eike Rietsch.
3. Advanced Programming in Scilab, Chetana Jain, Narosa Publishing House, New Delhi.

Website and e-Learning Source: http://ndl.iitkgp.ac.in http://ocw.mit.edu http:/mathforum.org

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO1: Solve Mathematical Problems using Mathematical software's.

CO2: Understand the knowledge of application of Mathematics

CO3: Perform the successive differentiation.

CO4: Understand the partial derivatives.

CO5: Calculate maxima and minima for the functions of two variables.

Prepared by		**Verified by**	
	Dr. A Mohamed Ali		

For B.Sc Data Science

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCDSTA21	**GE 2**	**STATISTICS- II**	**5**	**3**

Pre-requisite	12th Standard Mathematics

Course Objectives
This course aims to provide the correlation and regression analysis of one or more group of datas and also helps to test the Hypothesis of the samples.

UNIT–I	**CORRELATION ANALYSIS**	**15 Hours**
Introduction – Significance of the Study of Correlation - Correlation and Causation - Types of Correlation – Positive and Negative Correlation – Simple, Partial and Multiple Correlation Linear and Non-Linear (Curvilinear) Correlation – Methods of Studying Correlation – Scatter Diagram Method - Graphic Method – Direct Method of Finding out correlation Coefficient of Correlation and Probable Error – Conditions for the Use of Probable Error Coefficient of Determination Properties of the Coefficient of Correlation – Rank Correlation Coefficient\		
UNIT–II	**REGRESSION ANALYSIS**	**15 Hours**
Introduction – Uses of Regression Analysis – Difference between Correlation and Regression Analysis – Regression Lines – Regression Equations – Regression Equation of Y on X – Regression Equation of X on Y		

UNIT–III	ANALYSIS OF VARIANCE	15 Hours
Introduction – Assumptions in Analysis of Variance – Technique of Analysis of Variance – Analysis of Variance in Two-way Classification Model.		
UNIT–IV	**EXPERIMENTAL DESIGN**	**15 Hours**
Introduction – Randomized Block Design – Latin Squares – Randomized Blocks vs. Latin Squares		
UNIT–V	**TEST OF HYPOTHESIS**	**15 Hours**
Introduction – Procedure of Testing Hypothesis – Standard Error and Sampling Distribution – Estimation – Tests of Significance for Attributes – Tests of Significance for Large Samples – Tests of Significance for Small Samples – Student's t- Distribution – Z -Test of the Significance of the Correction Coefficient.		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Recommended Text:

S.P. Gupta, STATISTICAL METHODS, 2016, 44th Revised Edition, S. Chand & co, New Delhi.

Reference Books:

1. B.L. Agarwal, BASIC STATISTICS, 2021, New Age International Private Limited, New Delhi.
2. S.C. Gupta and V.K. Kapoor, FUNDAMENTALS OF MATHEMATICAL STATISTICS, (2020), 12th Edition, S. Chand & co, New Delhi.
3. Z.C. Holcomb, FUNDAMENTALS OF DESCRIPITIVE STATISTICS, 2017, Routledge, New York, US

Website and e-Learning Source:

https://nptel.ac.in/courses/111/104/111104120/
https://www.iiscrpune.ac.in/-bhasbapat/phy221_files/curvefitting.pdf

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understand the correlation between two variables.
CLO2: Analyze the trend between the two variables.
CLO3: Understand the various techniques of Analysis of Variance
CLO4: Understand the concept of RBD and LSD.
CLO5: Analyze the significance of small and large samples.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	2	3	1	1	3	1	1
CLO2	3	3	1	3	1	1	3	1	1
CLO3	3	2	1	3	1	1	3	1	1
CLO4	3	3	1	3	1	1	3	1	1
CLO5	3	3	2	3	1	1	3	1	1

Prepared by	Dr. A Mohamed Ali	**Verified by**	

For B.Sc Computer Science and BCA

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCCCTA21	**GENERIC ELECTIVE 2**	**ALLIED MATHEMATICS – II**	**5**	**3**

Pre-requisite	12^{th} Standard Mathematics

Course Objectives
This course aims to provide the fundamental concepts of integral calculus, differential equations, Fourier Analysis and Vector Calculus.

UNIT–I	**Integral calculus**	
Bernouli's Formula, Reduction Formula $\sin^n\theta, \cos^n\theta, \sin^n\theta\cos^n\theta$– Simple Problems.		
UNIT–II	**Fourier Series**:	
Fourier series for functions (0, 2π), (−π ,π) Chapter 4: Section : 4.1, 4.1.1		
UNIT–III	**Differential Equations**	
Ordinary Differential Equations: second order non- homogeneous differential equations with constant coefficients of the form ay" +by'+ cy = X where X is of the form cos and sin - Related problems only. **Partial Differential Equations**: Formation, complete integrals and general integrals, four standard types and solving Lagrange's linear equation P p +Q q= R. Chapter 5: Section 5.2.1, Chapter 6: Section 6.1 to 6.4		

UNIT–IV	Laplace Transforms	
Laplace Transforms: Laplace transformations of standard functions and simple properties, inverse Laplace transforms. Chapter 7: Section 7.1.1 to 7.1.4 & 7.2 to 7.2.3		
UNIT–V	**Vector Differentiation**	
Vector Differentiation: Introduction, Scalar point functions, Vector point functions, vector differential operator Gradient, Divergence, Curl, Solenoidal, irrotational, identities. Chapter 8, Section 8.1 to 8.4.4		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.

Recommended Text:

Allied Mathematics, Volume II by P. Duraipandian and S.Udayabaskaran, S. Chand Publications Volume I: Unit I – IV, Volume II – Unit V

Reference Books:

1. Ancillary Mathematics by S. Narayanan and T.K. Manickavachagom Pillay, S. Viswanathan Pinters, 1986, Chennai
2. Allied Mathematics by A. Singaravelu Allied Mathematics by P.R. Vittal

Website and e-Learning Source:

https://archive.nptel.ac.in/courses/111/106/111106146/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understand the various concepts of Bernoullis and Reduction formula.
CLO 2: Understand the concepts of Fourier Series.
CLO 3: Understand the concepts of Non homogeneous and Partial differential equations.
CLO 4: Understand the Laplace Transforms.
CLO 5: Understand the concept of vector Differentiation.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	2	3	1	1	3	1	1
CLO2	3	3	1	3	1	1	3	1	1
CLO3	3	2	1	3	1	1	3	1	1
CLO4	3	3	1	3	1	1	3	1	1
CLO5	3	3	2	3	1	1	3	1	1

Prepared by		**Verified by**	

For B.Sc Computer Science, BCA and Data Science

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UCCCPS21	**SEC 2**	**COMPUTATIONAL MATHEMATICS LAB II**	**3**	**2**

Pre-requisite	12th Standard Mathematics

Course Objective
• To solve problems using Mathematical Software

List of Exercises
1. Matrix Manipulation 2. Testing Consistency of System of Equations 3. Integration of single variable functions 4. Applications of Integration to Area and volume 5. Plotting of 2D objects. 6. Visualizaion of functions in three dimensions.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from	Knowledge, problem solving, analytical ability, professional

this course	competency, professional communication and transferable skill.

Books for Study:
1. Introduction to Scilab, Michael Baudin From Scilab Consortin, 2010 Chapters 1 to 8 (Book Freely Downloadable in Internet) 2. Plotting Using Scilab – Anopen Source Document www.openeering.com
Books for Reference:
1. Modeling and Simulation in Scilab, Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikoukhah. 2. An Introduction to Scilab from a Matlab User's Point of View by Eike Rietsch. 3. Advanced Programming in Scilab, Chetana Jain, Narosa Publishing House, New Delhi.
Source links
http://ndl.iitkgp.ac.in http://ocw.mit.edu http:/mathforum.org

Course Learning Outcome (for Mapping with PLOs and PSOs)

Students will be able to

CO1: Solve Mathematical Problems using Mathematical software's .

CO2: Understand the knowledge of application in Mathematics.

CO3: Build their self confidence.

CO4: Evaluate integrals.

CO5: Visualize the 2D and 3D objects.

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TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION

PROGRAMME OUTCOMES

PO1 **Problem Solving Skill**
Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.

PO2 **Decision Making Skill**
Foster analytical and critical thinking abilities for data-based decision-making.

PO3 **Ethical Value**
Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.

PO4 **Communication Skill**
Ability to develop communication, managerial and interpersonal skills.

PO5 **Individual and Team Leadership Skill**
Capability to lead themselves and the team to achieve organizational goals.

PO6 **Employability Skill**
Inculcate contemporary business practices to enhance employability skills in the competitive environment.

PO7 **Entrepreneurial Skill**
Equip with skills and competencies to become an entrepreneur.

PO8 **Contribution to Society**
Succeed in career endeavors and contribute significantly to society.

PO9 **Multicultural competence**
Possess knowledge of the values and beliefs of multiple cultures and a global perspective.

PO10 **Moral and ethical awareness/reasoning**
Ability to embrace moral/ethical values in conducting one's life.

PROGRAM SPECIFIC OUTCOMES (PSOs)

By the end of the program, the students will be able to

PSO1	**Placement** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.
PSO2	**Entrepreneur** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
PSO3	**Research and Development** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.
PSO4	**Contribution to Business World** To produce employable, ethical and innovative professionals to sustain in the dynamic business world.

PSO5	**Contribution to the Society** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

PROGRAM SPECIFIC OUTCOMES (PSOs)

By the end of the program, the students will be able to

PSO1	Understand in-depth knowledge of pure and applied mathematics.
PSO2	Attain the ability to solve challenging problems in Mathematics and prove the abstract theorem.
PSO3	Know the specialized area of mathematics and its applications.
PSO4	Analyse practical problems and propose a solution.
PSO5	Obtain the exact solutions for society-oriented problems by mathematical models.
PSO6	Discuss in groups or individually in multidisciplinary tasks. solution.
PSO7	Crack the NET / SET examination conducted by UGC-CSIR / NTA or State Universities.
PSO8	Apply the mathematical concepts in real-life situations.

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Programme Specific Outcomes (PSOs)	Programme Outcomes (POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PSO1	✓	✓	✓				✓	✓	✓	
PSO2		✓	✓	✓	✓	✓	✓			
PSO3	✓	✓		✓	✓	✓		✓	✓	
PSO4	✓	✓		✓	✓		✓	✓	✓	
PSO5		✓	✓	✓	✓				✓	✓
PSO6	✓	✓		✓	✓	✓		✓	✓	
PSO7		✓	✓		✓	✓	✓	✓		
PSO8		✓	✓			✓	✓	✓	✓	✓
Number of Matches = 52, Correlation : High										

Mapping Correlation Benchmark

Mapping	**1-29%**	**30-59%**	**60-69%**	**70-100%**
Matches	**1-24**	**25-50**	**51-56**	**57-80**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

FIRST YEAR – SEMESTERI				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTC11	**CORE COURSE I**	**ALGEBRAIC STRUCTURES**	**6**	**4**

Pre-requisite	UG level Modern Algebra

Course Objectives
To introduce the concepts and to develop working knowledge on class equation, solvability of groups, finite abelian groups, linear transformations, real quadratic forms.

UNIT–I	**ANOTHER COUNTING PRINCIPLE**	18 hours
Counting Principle - Class equation for finite groups and its applications - Sylow's theorems (For theorem 2.12.1, First proof only). **Chapter 2: Sections 2.11 and 2.12 (Omit Lemma 2.12.5)**		
UNIT–II	**DIRECT PRODUCTS AND MODULES**	18 hours
Solvable groups - Direct products - Finite abelian groups- Modules **Chapter 5: Section 5.7 (Lemma 5.7.1,Lemma 5.7.2, Theorem 5.7.1)** **Chapter 2: Section 2.13 and 2.14 (Theorem 2.14.1 only)** **Chapter 4: Section 4.5**		
UNIT–III	**LINEAR TRANSFORMATIONS**	18 hours
Linear Transformations: Canonical forms –Triangular form - Nilpotent transformations. **Chapter 6: Sections 6.4, 6.5**		
UNIT–IV	**CANONICAL FORMS**	18 hours
Jordan form - rational canonical form. **Chapter 6 : Sections 6.6 and 6.7**		
UNIT–V	**TRACE AND TRANSPOSE**	18 hours
Trace and transpose - Hermitian, unitary, normal transformations, real quadratic form. **Chapter 6 : Sections 6.8, 6.10 and 6.11 (Omit 6.9)**		

PCMSTC11 – ALGEBRAIC STRUCTURES

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)

Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

I.N. Herstein. *Topics in Algebra*, (II Edition), Wiley Eastern Limited, New Delhi, 1975.

Reference Books:

1. M.Artin, *Algebra,* Prentice Hall of India, 1991.
2. P.B.Bhattacharya, S.K.Jain and S.R.Nagpaul, *Basic Abstract Algebra*, (II Edition), Cambridge University Press, 1997. (Indian Edition).
3. I.S.Luther and I.B.S.Passi, *Algebra,* Vol. I –Groups(1996); Vol. II –Rings, Narosa Publishing House , New Delhi, 1999
4. D.S.Malik, J.N. Mordeson and M.K.Sen, *Fundamental of Abstract Algebra*, McGraw Hill (International Edition), New York. 1997.
5. N.Jacobson, *Basic Algebra,* Vol. I & II W.H.Freeman (1980); also published by Hindustan Publishing Company, New Delhi.

Website and e-Learning Source:

http://mathforum.org,
http://ocw.mit.edu/ocwweb/Mathematics,
http://www.opensource.org,www.algebra.com

PCMSTC11 – ALGEBRAIC STRUCTURES

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Recall basic counting principle, define class equations to solve problems, explain Sylow's theorems and apply the theorem to find number of Sylow subgroups.

CLO 2 Define Solvable groups, define direct products, examine the properties of finite abelian groups, define modules.

CLO 3 Define similar Transformations, define invariant subspace, explore the properties of triangular matrix, to find the index of nilpotence to decompose a space into invariant subspaces, to find invariants of linear transformation, to explore the properties of nilpotent transformation relating nilpotence with invariants.

CLO 4 Define Jordan,canonical form, Jordan blocks, define rational canonical form, define companion matrix of polynomial, find the elementary devices of transformation, apply the concepts to find characteristic polynomialof linear transformation.

CLO 5 Define trace, define transpose of a matrix, explain the properties of trace and transpose, to find trace, to find transpose of matrix, to prove Jacobson lemma using the triangular form, define symmetric matrix, skew symmetric matrix, adjoint, to define Hermitian, unitary, normal transformations and to verify whether the transformation in Hermitian, unitary and normal.

CLO 6

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTC12	**CORE COURSE II**	**REAL ANALYSIS I**	**6**	**4**

Pre-requisite	UG level Real Analysis concepts

Course Objectives
To work comfortably with functions of bounded variation, Riemann-Stieltjes Integration, convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.

UNIT–I	**FUNCTIONS OF BOUNDED VARIATION &INFINITE SERIES**	18 hours
Functions of bounded variation - Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on [a, x] as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation. **Chapter6 : Sections 6.1 to 6.8** **Infinite Series :** Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series. **Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18**		
UNIT–II	**THE RIEMANN - STIELTJES INTEGRAL**	18 hours
Introduction - Notation - The definition of the Riemann - Stieltjes integral - Linear Properties - Integration by parts- Change of variable in a Riemann - Stieltjes integral - Reduction to a Riemann Integral – Euler's summation formula - Monotonically increasing integrators, Upper and lower integrals - Additive and linearity properties of upper, lower integrals - Riemann's condition - Comparison theorems. **Chapter 7 : Sections 7.1 to 7.14**		

UNIT–III	**THE RIEMANN - STIELTJES INTEGRAL**	18 hours
Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes integrals-Necessary conditions for the existence of RS integrals- Mean value theorems -integrals as a function of the interval – Second fundamental theorem of integral calculus-Change of variable - Second Mean Value Theorem for Riemann integral- Riemann-Stieltjes integrals depending on a parameter- Differentiation under integral sign-Lebesgue criteriaon for existence of Riemann integrals. **Chapter 7 : Sections 7.15 to 7.26**		
UNIT–IV	**INFINITE SERIES, INFINITE PRODUCTS &POWER SERIES**	18 hours
Infinite Series and infinite Products - Double sequences - Double series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series – Cesarosummability - Infinite products. **Chapter – 8 : Sections 8.20 to 8.26**		

Power series - Multiplication of power series - The Taylor's series generated by a function - Bernstein's theorem - Abel's limit theorem - Tauber's theorem **Chapter 9 : Sections 9.14 9.15, 9.19, 9.20, 9.22, 9.23**		
UNIT–V	**SEQUENCES OF FUNCTIONS**	18 hours
Pointwise convergence of sequences of functions - Examples of sequences of real - valued functions - Uniform convergence and continuity - Cauchy condition for uniform convergence - Uniform convergence of infinite series of functions - Riemann - Stieltjes integration – Non-uniform Convergence and Term-by-term Integration - Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series - Mean convergence. **Chapter 9 : Sections 9.1 to 9.6, 9.8,9.9,9.10,9.11, 9.13**		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

PCMSTC12 – REAL ANALYSIS I

Recommended Text:

Tom M.Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1974.

Reference Books:

1. Bartle, R.G. *Real Analysis*, John Wiley and Sons Inc., 1976.
2. Rudin,W. *Principles of Mathematical Analysis*, 3rd Edition. McGraw Hill Company, New York, 1976.
3. Malik,S.C. and Savita Arora. *Mathematical Anslysis*, Wiley Eastern Limited.New Delhi, 1991.
4. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, New Delhi, 1991.
5. Gelbaum, B.R. and J. Olmsted, *Counter Examples in Analysis*, Holden day, San Francisco, 1964.
6. A.L.Gupta and N.R.Gupta, *Principles of Real Analysis*, Pearson Education, (Indian print) 2003.

Website and e-Learning Source:

http://mathforum.org,
http://ocw.mit.edu/ocwweb/Mathematics,
http://www.opensource.org,
www.mathpages.com

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Analyze and evaluate functions of bounded variation and Rectifiable Curves.
CLO 2 Describe the concept of Riemann-Stieltjes integral and its properties.
CLO 3 Demonstrate the concept of step function, upper function, Lebesgue function and their integrals.
CLO 4 Construct various mathematical proofs using the properties of Lebesgue integrals and establish the Levi monotone convergence theorem.
CLO 5 Formulate the concept and properties of inner products, norms and measurable functions.

PCMSTC12 – REAL ANALYSIS I

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Strong: Medium: Low:

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTC13	**CORE COURSE III**	**ORDINARY DIFFERENTIAL EQUATIONS**	**5**	**4**

Pre-requisite	UG level Calculus and Differential Equations

Course Objectives
To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points, to study existence and uniqueness of the solutions of first order differential equations

UNIT–I	**LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS**	15 hours
Second order homogeneous equations-Initial value problems-Linear dependence and independence-Wronskian and a formula for Wronskian-Non-homogeneous equation of order two. **Chapter 2: Sections 1 to 6**		
UNIT–II	**LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS**	15 hours
Homogeneous and non-homogeneous equation of order n –Initial value problems– Annihilator method to solve non-homogeneous equation–Algebra of constant coefficient operators. **Chapter 2 : Sections 7 to 12**.		
UNIT–III	**LINEAR EQUATION WITH VARIABLE COEFFICIENTS**	15 hours
Initial value problems –Existence and uniqueness theorems – Solutions to solve a non-homogeneous equation – Wronskian and linear dependence – reduction of the order of a homogeneous equation – homogeneous equation with analytic coefficients–The Legendre equation. **Chapter : 3 Sections 1 to 8**		

PCMSTC13 – ORDINARY DIFFERENTIAL EQUATIONS

UNIT–IV	LINEAR EQUATION WITH REGULAR SINGULAR POINTS	15 hours
Euler equation – Second order equations with regular singular points –Exceptional cases – Bessel Function. **Chapter 4 : Sections 1 to 4 and 6 to 8**		
UNIT–V	**EXISTENCE AND UNIQUENESS OF SOLUTIONS TO FIRST ORDER EQUATIONS**	15 hours
Existence and uniqueness of solutions to first order equations: Equation with variable separated – Exact equation – method of successive approximations – The Lipschitz condition – convergence of the successive approximations and the existence theorem. **Chapter 5 : Sections 1 to 6**		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

E.A.Coddington, *An introduction to ordinary differential equations* (3rd Printing) Prentice-Hall of India Ltd.,New Delhi, 1987.

Reference Books:

1. Williams E. Boyce and Richard C. DI Prima, *Elementary differential equations and boundary value problems*,John Wiley and sons, New York, 1967.
2. George F Simmons, *Differential equations with applications and historical notes,* Tata McGraw Hill, New Delhi, 1974.
3. N.N. Lebedev, *Special functions and their applications*, Prentice Hall of India, New Delhi, 1965.
4. W.T. Reid. *Ordinary Differential Equations*, John Wiley and Sons, New York, 1971.
5. M.D.Raisinghania, *Advanced Differential Equations*, S.Chand& Company Ltd., New Delhi 2001.
6. B.Rai, D.P.Choudary and H.I. Freedman, *A Course in Ordinary Differential Equations,* Narosa Publishing House, New Delhi, 2002.

PCMSTC13 – ORDINARY DIFFERENTIAL EQUATIONS

Website and e-Learning Source:

http://mathforum.org,
http://ocw.mit.edu/ocwweb/Mathematics,
http://www.opensource.org,
www.mathpages.com

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Establish the qualitative behavior of solutions of systems of differential equations.
CLO 2 Recognize the physical phenomena modeled by differential equations and dynamical systems.
CLO 3 Analyze solutions using appropriate methods and give examples.
CLO 4 Formulate Green's function for boundary value problems.
CLO 5 Understand and use various theoretical ideas and results that underlie the mathematics in this course.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Strong: Medium: Low:

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTC14	**CORE COURSE III**	**CLASSICAL DYNAMICS**	**5**	**4**

Pre-requisite	UG level Mechanics

Course Objectives
To study mechanical systems under generalized co–ordinate systems.Virtual work, energy and momentum. To study mechanics developed by Newton,Langrange, Hamilton Jacobi and theory of relativity due to Einstein.

UNIT–I	**MECHANICAL SYSTEMS**	15 hours
The mechanical systems – Generalized co-ordinates –Constraints – Virtual work – Energy and Momentum. **Chapter 1:** Sections 1.1 to 1.5		
UNIT–II	**LAGRANGE'S EQUATIONS**	15 hours
Derivation of Lagrange's equation – Examples – Integrals of motion. **Chapter 2:** Sections 2.1 to 2.3		
UNIT–III	**HAMILTON EQUATIONS**	15 hours
Hamilton's Principle – Hamilton's equation – Other Variational Principle. **Chapter 4:** Sections 4.1 to 4.3		
UNIT–IV	**HAMILTON – JACOBI THEORY**	15 hours
Hamilton's Principle Function –Hamliton–Jacobi Equation –Separability. **Chapter 5:** Sections 5.1 to 5.3		
UNIT–V	**CANONICAL TRANSFORMATION**	15 hours

Differential forms and Generating functions –Special Transformations – Lagrange and Poisson brackets. **Chapter 6:** Sections 6.1 to 6.3

PCMSTC14 – CLASSICAL DYNAMICS

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

D. T. Greenwood, CLASSICAL DYNAMICS (2016), Prentice Hall of India, New Delhi.

Reference Books:

1. H. Goldstein, CLASSICAL MECHANICS(Second edition), Narosa PublishingHouse, New Delhi.
2. N.C. Rane and P.S.C. Joag, CLASSICAL MECHANICS(1991), Tata Mc Graw Hill.
3. J.L. Synge and B.A. Griffith, PRINCIPLES OF MECHANICS, McGraw HillBook Co, New York, (1970).

Website and e-Learning Source:

https://archive.nptel.ac.in/courses/115/106/115106123/#
https://ocw.mit.edu/courses/8-01sc-classical-mechanics-fall-2016/
https://ocw.mit.edu/courses/8-223-classical-mechanics-ii-january-iap-2017/
https://ocw.mit.edu/courses/8-09-classical-mechanics-iii-fall-2014/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Understand the concepts of mechanical systems.
CLO 2 Establish the idea of Lagrange's equations.
CLO 3 Analyze the Hamilton's principle.
CLO 4 Identify the Jacobi equations and related problems.
CLO 5 Prove the Lagrange and Poisson brackets.

PCMSTC14 – CLASSICAL DYNAMICS

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER I

COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
PCMSTE11	**DCE I**	**NUMBER THEORY AND CRYPTOGRAPHY**	**4**	**2**

Pre-requisite	UG level Theory of Equations & Matrices

Course Objectives
This course aims to give elementary ideas from number theory which will have applications in cryptography.

UNIT–I	**SOME TOPICS IN ELEMENTARY NUMBER THEORY**	12 hours
Time Estimates for doing arithmetic – Divisibility and Euclidean Algorithm – Congruence's – Some applications to factoring. **Chapter I : Sections 1 – 4**		
UNIT–II	**CRYPTOGRAPHY**	12 hours
Some simple cryptosystems – Enciphering matrices. **Chapter III : Sections 1 – 2**		
UNIT–III	**QUADRATIC RESIDUES**	12 hours
Quadratics Residues and reciprocity. **Chapter II : Sections 2**		
UNIT–IV	**PUBLIC KEY**	12 hours
The idea of Public key Cryptography – RSA – Discrete law. **Chapter IV : Sections 1 – 3**		
UNIT–V	**PRIMALITY AND FACTORING**	12 hours
Pseudo-primes – The rho method – Fermat factorization and factor. **Chapter V : Sections 1 – 3**		

PCMSTE11 – NUMBER THEORY AND CRYPTOGRAPHY

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

Neal Koblitz, (1987), A COURSE IN NUMBER THEORY AND CRYPTOGRAPHY, Springer–Verlag, New York.

Reference Books:

1. *Niven and Zuckerman,*(1976), AN INTRODUCTION TO THEORY OF NUMBERS,
2. Third Edition,Wiley Eastern Ltd,New Delhi.
3. *David M.Burton,* (1989), ELEMENTARY NUMBER THEORY, Wm.C.BrownPublishers, Dubuque, Iowa.
4. *K.Ireland and M.Rosen,* (1972), A CLASSICAL INTRODUCTION TO MODERN NUMBER THEORY,Springer–Verlag.
5. *James S. Kraft and Lawrence C. Washington*, (2013), AN INTRODUCTION TO NUMBER THEORY WITH CRYPTOGRAPHY, Chapman and Hall/CRC Publisher.
6. *M. Welleda Baldoni, Ciro Ciliberto and G.M. Piacentini Cattaneo*, (2008), ELEMENTARY NUMBER THEORY, CRYPTOGRAPHY AND CODES, Springer, New York.

Website and e-Learning Source:

https://archive.nptel.ac.in/content/syllabus_pdf/106103015.pdf
https://nptel.ac.in/courses/106103015
https://math.mit.edu/research/highschool/primes/circle/documents/2022/Daniela%20&%20Ayelet.pdf
https://math.mit.edu/research/highschool/primes/circle/documents/2022/Daniela%20&%20Ayelet.pdf

PCMSTE11 – NUMBER THEORY AND CRYPTOGRAPHY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Understand fundamental algorithms such as the Euclidean algorithm and Chinese remainder theorem.

CLO 2 Evaluate the basic problems involved with cryptography and Enciphering matrices.

CLO 3 Derive quadratic residues and reciprocity.

CLO 4 Demonstrate understanding of the RSA cryptosystem and apply public key cryptography.

CLO 5 Solve problems on continued fraction.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTE12	**DCE I**	**ADVANCED GRAPH THEORY**	**4**	**2**

Pre-requisite	UG level Graph Theory

Course Objectives
To understand the concept of graphs, sub graphs, trees, connectivity, Euler tour, Hamiltoncycle, matching, colouring of graphs, independent set, cliques, vertex colouring and planargraphs.

UNIT–I	**GRAPHS AND SUB GRAPHS**	12 hours
Graphs and simple graphs – Graph isomorphism – The Incidence and Adjacency matrices –Sub graphs – Vertex degrees – Paths and connection – Cycles – The shortest path problem. **Chapter 1 : Sections: 1.1 to1.8**		
UNIT–II	**TREES AND CONNECTIVITY**	12 hours
Trees – Cut edges and Bonds – Cut vertices – Cayley's formula – The connector problem – Connectivity – Blocks. **Chapter 2 :Sections: 2.1 to 2.5** **Chapter 3 : Sections: 3.1 to 3.2**		
UNIT–III	**EULER TOURS AND HAMILTON CYCLES**	12 hours
Euler tour – Hamilton cycles – The Chinese postman problem – The traveling salesmanproblem. **Chapter 4 : Sections: 4.1 to 4.4**		
UNIT–IV	**MATCHING, INDEPENDENT SETS AND CLIQUES**	12 hours
Matchings – Matchings and coverings in bipartite graphs – Perfect matchings – Thepersonal assignment problem – The optimal assignment problem – Independent sets. **Chapter 5 : Sections: 5.1 to 5.5** **Chapter 7 : Section: 7.1**		

UNIT–V	**VERTEX COLOURING AND PLANAR GRAPHS**	12 hours
Chromatic number – Brook's theorem – Chromatic polynomials – Plane and planar graphs –Dual graphs – Euler's formula – The five colour theorem and the four colour conjecture. **Chapter 8 : Sections: 8.1, 8.2, 8.4** **Chapter 9 :Sections: 9.1 to 9.3, 9.6**		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this	Knowledge, Problem Solving, Analytical ability, Professional

course	Competency, Professional Communication and Transferrable Skill

Recommended Text:

J.A. Bondy and U.S.R. Murty, GRAPH THEORY WITH APPLICATION, Macmillan press, 2011.

Reference Books:

1. K. R. Parthasarthy, Basic graph theory, Tata McGraw Hill Company, New Delhi,1994.
2. P. Harray, Graph theory, Narosa Publishing House, New Delhi,1998.
3. S. Arumugam and S. Ramachandran, Invitation to graph theory, SciTech publishingcompany,2000.

Website and e-Learning Source:

https://math.mit.edu/research/highschool/primes/circle/documents/2022/Daniela%20&%20Ayelet.pdf
https://nptel.ac.in/courses/111106102
https://ocw.mit.edu/courses/18-217-graph-theory-and-additive-combinatorics-fall-2019/

PCMSTE12 – ADVANCED GRAPH THEORY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Understand basic concepts in Graph theory.
CLO 2 Apply the understanding and use it to model real life situations.
CLO 3 Analyze the concepts of connectivity, Euler and Hamilton cycles in the real life situations.
CLO 4 Find the applications of planarity and colourability.
CLO 5 Create graph models in network and computing and define the matching, Independent sets and cliques.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Strong: Medium: Low:

Prepared by		**Verified by**	
	Dr. ZAHIRUDDEEN		

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTE13	**GE II**	**MATHEMATICAL PROGRAMMING**	**4**	**2**

Pre-requisite	UG level Operation Research

Course Objectives
This course introduces advanced topics in linear and non – linear programming.

UNIT–I	**INTEGER LINEAR PROGRAMMING**	12 hours
Introduction – Types of Integer Programming Problems – Enumeration and Cutting Plane Solution Concepts – Gomory's All Integer Cutting Plane Method. **Chapter 7: Sections 7.1 – 7.4**		
UNIT–II	**INTEGER LINEAR PROGRAMMING (Contd…)**	12 hours
Gomory's Mixed-Integer Cutting Plane Method – Branch and Bound Method. **Chapter 7: Sections 7.5 – 7.6**		
UNIT–III	**CLASSICAL OPTIMIZATION METHODS**	12 hours
Introduction – Unconstrained Optimization – Constrained Multivariable Optimization with Equality Constraints. **Chapter 23: Sections 23.1 -23.3**		
UNIT–IV	**THEORY OF SIMPLEX METHOD**	12 hours
Introduction –Canonical and Standard form of LP Problems – Slack and Surplus Variables – Reduction of Feasible solution to a Basic Feasible solution – Improving a Basic Feasible Solution. **Chapter 25: Sections 25.1 – 25.5**		
UNIT–V	**REVISED SIMPLEX METHOD**	12 hours
Introduction –Standard forms for Revised simplex method –Computational procedure for Standard form I. **Chapter 26: Sections 26.1 – 26.3**		

PCMSTE13 – MATHEMATICAL PROGRAMMING

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

J.K. Sharma, OPERATIONS RESEARCH : THEORY AND APPLICATIONS,(2016) (Sixth Edition),

Trinity Press, New Delhi.

Reference Books:

1. Hamdy A.Taha, OPERATIONS RESEARCH(1997), Prentice Hall of India private Limited, New Delhi.
2. F.S.Hiller and J.Lieberman, INTRODUCTION TO OPERATIONS RESEARCH(2001), Tata –McGraw Hill, New Delhi.
3. Beightler C. D. Philips and B. Wilde, FOUNDATIONS OF OPTIMIZATION (Second edition) (1979), Prentice Hall, New York.
4. S.S.Rao, OPTIMIZATION THEORY AND APPLICATIONS(1990), Wiley Eastern,New Delhi.

Website and e-Learning Source:

https://nptel.ac.in/courses/110106062
https://orc.mit.edu/academics/master%E2%80%99s-operations-research

PCMSTE13 – MATHEMATICAL PROGRAMMING

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Understand the concepts of Integer Linear Programming Problems

CLO 2 Examine and evaluate classical linear programming problems.

CLO 3 Compile the primal linear programming problem into standard form and use the simplex method to solve it.

CLO 4 Analyze the revised simplex method.

CLO 5 Evaluate classical optimization method.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTE14	**GE II**	**DISCRETE MATHEMATICS**	**4**	**2**

Pre-requisite	UG level Algebraic concepts

Course Objectives
This course aims to explore the topics like lattices and their applications in switching circuits, finite fields, polynomials and coding theory.

UNIT–I	**LATTICES**	12 hours
Properties and examples of Lattices – Distributive lattices – Boolean algebras – Boolean polynomials. **Sections: 1 to 4**		
UNIT–II	**APPLICATIONS OF LATTICES**	12 hours
Switching Circuits - Applications of Switching Circuits **Sections: 7 and 8**		
UNIT–III	**FINITE FIELDS**	12 hours
Finite fields **Sections: 13**		
UNIT–IV	**POLYNOMIALS OVER FINITE FIELDS**	12 hours
Irreducible Polynomials over Finite fields - Factorization of Polynomials over Finite fields. **Sections: 14 and 15**		
UNIT–V	**CODING THEORY**	12 hours
Introduction to Coding - Linear Codes. **Sections: 16 and 17**		

PCMSTE14 – DISCRETE MATHEMATICS

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

Rudolf Lidl & Gunter Pilz, (2009), APPLIED ABSTRACT ALGEBRA, Second Edition,

Springer Verlag, New York.

Reference Books:

1. A. Gill, *APPLIED ALGEBRA FOR COMPUTER SCIENCE*, Prentice Hall Inc., New Jersey.
2. J.L. Gersting, *MATHEMATICAL STRUCTURES FOR COMPUTER SCIENCE* (3rd Edn.), Computer Science Press, New York.
3. S.Wiitala, *DISCRETE MATHEMATICS- A UNIFIED APPROACH*, McGraw Hill Book Co.
4. V.K. Balakrishnan, (2000), INTRODUCTORY DISCRETE MATHEMATICS, Dover Publications Inc. Publisher.
5. Kenneth Rosen, (2011), DISCRETE MATHEMATICS AND ITS APPLICATIONS, Seventh Edition, McGraw Hill Publisher.

Website and e-Learning Source:

https://nptel.ac.in/courses/106106183
https://ocw.mit.edu/courses/18-310-principles-of-discrete-applied-mathematics-fall-2013/

PCMSTE14 – DISCRETE MATHEMATICS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Acquire the knowledge of Lattices and Boolean algebras
CLO 2 Apply the lattices in circuits
CLO 3 Understand the finite field structure
CLO 4 Compute the factorization of polynomials over finite fields
CLO 5 Understand the coding theory and analyze the coding theory

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTC21	**CORE COURSE IV**	**ADVANCED ALGEBRA**	**6**	**5**

Pre-requisite	UG level Algebraic Structures

Course Objectives
To study field extension, roots of polynomials, Galois Theory, finite fields, division rings, solvability by radicals and to develop computational skill in abstract algebra.

UNIT–I	**EXTENSION FIELDS**	18 hours
Extension fields – Transcendence of e. **Chapter 5: Section 5.1 and 5.2**		
UNIT–II	**ROOTS OF POLYNOMIALS**	18 hours
Roots or Polynomials.- More about roots **Chapter 5: Sections 5.3 and 5.5**		
UNIT–III	**ELEMENTS OF GALOIS THEORY**	18 hours
Elements of Galois theory. **Chapter 5 : Section 5.6**		
UNIT–IV	**FINITE FIELDS**	18 hours
Finite fields - Wedderburn's theorem on finite division rings. **Chapter 7: Sections 7.1 and 7.2 (Theorem 7.2.1 only)**		
UNIT–V	**SOLVABILITY BY RADICALS**	18 hours
Solvability by radicals - A theorem of Frobenius - Integral Quaternions and the Four - Square theorem. **Chapter 5: Section 5.7 (omit Lemma 5.7.1, Lemma 5.7.2 and Theorem 5.7.1)** **Chapter 7 : Sections 7.3 and 7.4**		

PCMSTC21 – ADVANCED ALGEBRA

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

I.N. Herstein. *Topics in Algebra* (II Edition) Wiley EasternLimited, New Delhi, 1975.

Reference Books:

1. M.Artin, *Algebra*, Prentice Hall of India, 1991.
2. P.B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, *Basic Abstract Algebra* (II Edition) Cambridge University Press, 1997. (Indian Edition)
3. I.S.Luther and I.B.S.Passi, *Algebra*, Vol. I –Groups(1996); Vol. II –*Rings*,Narosa Publishing House , New Delhi, 1999
4. D.S.Malik, J.N. Mordeson and M.K.Sen, *Fundamental of Abstract Algebra*, McGraw Hill (International Edition), New York. 1997.
5. N.Jacobson, *Basic Algebra*, Vol. I & II Hindustan Publishing Company, New Delhi.

Website and e-Learning Source:

http://mathforum.org,
http://ocw.mit.edu/ocwweb/Mathematics,
http://www.opensource.org,
www.algebra.com

PCMSTC21 – ADVANCED ALGEBRA

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Prove theorems applying algebraic ways of thinking.

CLO 2 Connect groups with graphs and understanding about Hamiltonian graphs.

CLO 3 Compose clear and accurate proofs using the concepts of Galois Theory.

CLO 4 Bring out insight into Abstract Algebra with focus on axiomatic theories.

CLO 5 Demonstrate knowledge and understanding of fundamental concepts including extension fields, Algebraic extensions, Finite fields, Class equations and Sylow's theorem.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTC22	**CORE COURSE V**	**REAL ANALYSIS II**	**6**	**5**

Pre-requisite	Elements of Real Analysis

Course Objectives
To introduce measure on the real line, Lebesgue measurability and integrability, Fourier Series and Integrals, in-depth study in multivariable calculus.

UNIT–I	**MEASURE ON THE REAL LINE**	18 hours
Lebesgue Outer Measure - Measurable sets - Regularity - Measurable Functions - Borel and Lebesgue Measurability **Chapter - 2 Sec 2.1 to 2.5 (de Barra)**		
UNIT–II	**INTEGRATION OF FUNCTIONS OF A REAL VARIABLE**	18 hours
Integration of Non- negative functions - The General Integral - Riemann and Lebesgue Integrals **Chapter - 3 Sec 3.1,3.2 and 3.4 (de Barra)**		
UNIT–III	**FOURIER SERIES AND FOURIER INTEGRALS**	18 hours
Introduction - Orthogonal system of functions - The theorem on best approximation - The Fourier series of a function relative to an orthonormal system - Properties of Fourier Coefficients - The Riesz-Fischer Thorem - The convergence and representation problems in for trigonometric series - The Riemann - Lebesgue Lemma - The Dirichlet Integrals - An integral representation for the partial sums of Fourier series - Riemann's localization theorem - Sufficient conditions for convergence of a Fourier series at a particular point –Cesarosummability of Fourier series- Consequences of Fejes's theorem - The Weierstrass approximation theorem **Chapter 11 : Sections 11.1 to 11.15 (Apostol)**		

UNIT–IV	**MULTIVARIABLE DIFFERENTIAL CALCULUS**	18 hours
Introduction - The Directional derivative - Directional derivative and continuity - The total derivative - The total derivative expressed in terms of partial derivatives - The matrix of linear function - The Jacobian matrix - The chain rule - Matrix form of chain rule - The mean - value theorem for differentiable functions - A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives - Taylor's theorem for functions of R^n to R^1 **Chapter 12 : Section 12.1 to 12.14 (Apostol)**		
UNIT–V	**IMPLICIT FUNCTIONS AND EXTREMUM PROBLEMS**	18 hours
Functions with non-zero Jacobian determinants – The inverse function theorem-The Implicit function theorem-Extrema of real valued functions of severable variables-Extremum problems with side conditions. **Chapter 13 : Sections 13.1 to 13.7 (Apostol)**		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

1. G. de Barra, *Measure Theory and Integration*, Wiley Eastern Ltd., New Delhi, 1981. (for Units I and II)
2. Tom M.Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1974. (for Units III, IV and V)

PCMSTC22 – REAL ANALYSIS II

Reference Books:

1. Burkill,J.C., *The Lebesgue Integral*, Cambridge University Press, 1951.
2. Munroe,M.E., *Measure and Integration*. Addison-Wesley, Mass.1971.
3. Roydon,H.L., *Real Analysis*, Macmillan Pub. Company, New York, 1988.
4. Rudin, W. *Principles of Mathematical Analysis*, McGraw Hill Company, New York,1979.
5. Malik,S.C. and Savita Arora,*Mathematical Analysis,* Wiley Eastern Limited, New Delhi, 1991.
6. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, NewDelhi, 1991.

Website and e-Learning Source:

http://mathforum.org,http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Understand and describe the basic concepts of Fourier series and Fourier integrals with respect to orthogonal system.

CLO 2 Analyze the representation and convergence problems of Fourier series.

CLO 3 Analyze and evaluate the difference between transforms of various functions.

CLO 4 Formulate and evaluate complex contour integrals directly and by the fundamental theorem.

CLO 5 Apply the Cauchy integral theorem in its various versions to compute contour integration.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTC23	**CORE COURSE VI**	**PARTIAL DIFFERENTIAL EQUATIONS**	**6**	**4**

Pre-requisite	UG level partial differential equations

Course Objectives
To classify the second order partial differential equations and to study Cauchy problem, method of separation of variables, boundary value problems.

UNIT–I	**MATHEMATICAL MODELS AND CLASSIFICATION OF SECOND ORDER EQUATIONS**	18 hours
Classical equations-Vibrating string – Vibrating membrane – waves in elastic medium – Conduction of heat in solids – Gravitational potential – Second order equations in two independent variables – canonical forms – equations with constant coefficients – general solution **Chapter 2 : Sections 2.1 to 2.6** **Chapter 3 : Sections 3.1 to 3.4**		
UNIT–II	**CAUCHY PROBLEM**	18 hours
The Cauchy problem – Cauchy-Kowalewsky theorem – Homogeneous wave equation – Initial Boundary value problem- Non-homogeneous boundary conditions – Finite string with fixed ends – Non-homogeneous wave equation – Riemann method – Goursat problem – spherical wave equation – cylindrical wave equation. **Chapter 4 : Sections 4.1 to 4.11**		
UNIT–III	**METHOD OF SEPARATION OF VARIABLES**	18 hours
Separation of variable- Vibrating string problem – Existence and uniqueness of solution of vibrating string problem- Heat conduction problem – Existence and uniqueness of solution of heat conduction problem – Laplace and beam equations **Chapter 6 : Sections 6.1 to 6.6**		

UNIT–IV	**BOUNDARY VALUE PROBLEMS**	18 hours
Boundary value problems – Maximum and minimum principles – Uniqueness and continuity theorem – Dirichlet Problem for a circle, a circular annulus, a rectangle – Dirichlet problem involving Poisson equation – Neumann problem for a circle and a rectangle. **Chapter 8 : Sections 8.1 to 8.9**		
UNIT–V	**GREEN'S FUNCTION**	18 hours
The Delta function – Green's function – Method of Green's function – Dirichlet Problem for the Laplace and Helmholtz operators – Method of images and eigen functions – Higher dimensional problem – Neumann Problem. **Chapter 10 : Section 10.1 to 10.9**		

Extended Professional Component (is a part of	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others

internal component only, Not to be included in the External Examination question paper)	to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

TynMyint-U and Lokenath Debnath, *Partial Differential Equations for Scientists and Engineers* (Third Edition), North Hollan, New York, 1987.

Reference Books:

1. M.M.Smirnov, *Second Order partial Differential Equations*, Leningrad, 1964.
2. I.N.Sneddon, *Elements of Partial Differential Equations,* McGraw Hill, New Delhi, 1983.
3. R. Dennemeyer, *Introduction to Partial Differential Equations and Boundary Value Problems,* McGraw Hill, New York, 1968.
4. M.D.Raisinghania, *Advanced Differential Equations,*S.Chand& Company Ltd., New Delhi, 2001.
5. S. Sankar Rao, *Partial Differential Equations*, 2nd Edition, PrenticeHall of India, New Delhi. 2004.

PCMSTC23 – PARTIAL DIFFERENTIAL EQUATIONS

Website and e-Learning Source:

http://mathforum.org,
http://ocw.mit.edu/ocwweb/Mathematics,
http://www.opensource.org,
www.mathpages.com

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 To understand and classify second order equations and find general solutions.

CLO 2 To analyse and solve wave equations in different polar coordinates.

CLO 3 To solve Vibrating string problem, Heat conduction problem, to identify and solve Laplace and beam equations.

CLO 4 To apply maximum and minimum principle's and solve Dirichlet, Neumann problems for various boundary conditions.

CLO 5 To apply Green's function and solve Dirichlet, Laplace problems, to apply Helmholtz operation and to solve Higher dimensional problem.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Strong: Medium: Low:

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTE21	**DCE III**	**MATHEMATICAL STATISTICS**	**4**	**3**

Pre-requisite	UG level Statistics

Course Objectives
This course introduces sampling theory, significance tests, estimation,testing of hypothesis, ANOVA and sequential analysis with rigorous mathematical treatment.

UNIT–I	**SAMPLE MOMENTS AND THEIR FUNCTIONS**	12 hours
Notion of a sample and a statistic – Distribution of the arithmetic mean of independent normally distributed random variables – the χ^2distribution – the distribution of the statistic ($\bar{X}$; S) – student t–distribution – Fisher's Z – distribution – Distribution of $\bar{X}$ from non–normal populations. **Chapter 9: Section 9.1 to 9.8**		
UNIT–II	**SIGNIFICANCE TEST**	12 hours
The theorems of Kolmogorov and Smirnov. **SIGNIFICANCE TEST:** Concept of a statistical test – Parameteric tests for small samples and large samples χ^2test – The test of Kolmogorov and smirnov type – the Wald Wolfovitz and Wilcoxon–Mann–Whitney tests – Independence tests by contingency tables. **Chapter 10: Section 10.11** **Chapter 12: Section 12.1 to 12 .7**		
UNIT–III	**ESTIMATION**	12 hours
Preliminary notion – Consistent estimates – Unbiased estimates – Sufficiency – Efficiency – Asymptotically most efficient estimates – Methods of finding estimates – Confidence interval **Chapter 13: Sections 13.1 to 13.8**		

PCMSTE21 – MATHEMATICAL STATISTICS

UNIT–IV	**ANALYSIS OF VARIANCE**	12 hours
One way classification and two way classification **HYPOTHESIS TESTING:** Power functions and the OC function – Most powerful test – Uniformly most powerful test – unbiased test . **Chapter 15: Sections 15.1 and 15.2** **Chapter 16: Sections 16.1 to 16.5**		
UNIT–V	**SEQUENTIAL ANALYSIS**	12 hours
SPRT – Auxiliary theorem – Wald's fundamental identity – OC function and SPRT – E(n) and determination of A and B – Testing a hypothesis concerning p on zero – one distribution – Testing a hypothesis concerning the expected value m of a Normal population. **Chapter 17: Sections 17.1 to 17.9**		

Extended Professional Component (is a part of internal component only,	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved

Not to be included in the External Examination question paper)	(To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

M. Fisz, (1963), PROBABILITY THEORY AND MATHEMATICAL STATISTICS, John Wiley and sons, New York.

Reference Books:

1. *E.J. Dudewicz and S.N.Mishra,*(1963),MODERN MATHEMATICAL STATISTICS, John Wiley, New York.
2. *V.K.Rohatgi,* (1988), AN INTRODUCTION TO PROBABILITY THEORY ANDMATHEMATICAL STATISTICS, Wiley Eastern.
3. *G.G. Roussas, (1973),* A FIRST COURSE IN MATHEMATICAL STATISTICS, Addison Wesley Publishing Company.
4. *B.L. Vander, (1968),* MATHEMATICAL STATISTICS, G. Allen & Unwin Ltd., London.
5. *S.G. Gupta and V.K. Kapoor*, (2017), FUNDAMENTALS OF MATHEMATICAL STATISTICS, Eleventh Edition, Sultan Chand & sons, New Delhi.

PCMSTE21 – MATHEMATICAL STATISTICS

Website and e-Learning Source:

https://nptel.ac.in/courses/111105090

https://ocw.mit.edu/courses/18-655-mathematical-statistics-spring-2016/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Understand various types of distributions.

CLO 2 Apply the appropriate significance test to the situation.

CLO 3 Find sufficiency, efficiency and asymptotically most efficient estimation.

CLO 4 Classify one-way and two-way ANOVA.

CLO 5 Analyse the hypothesis types of Normal population.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTE22	**DCE III**	**ALGEBRAIC NUMBER THEORY**	**4**	**3**

Pre-requisite	UG level Algebraic Structures and Number Theory

Course Objectives
This course aims to provide a study on modules over rings, finite fields, algebraic extensions, number fields and cyclotomic fields, Noetherian rings modules and Dedekind rings.

UNIT–I	**EXTENSION FIELD**	12 hours
Rings and Fields – Factorization of Polynomials –Field Extensions – Symmetric Polynomials – Modules– Free Abelian Groups. **Chapter 1: Sections 1.1 to 1.6**		
UNIT–II	**ALGEBRAIC NUMBERS**	12 hours
Conjugates and Discriminants – Algebraic Integers –Integral Bases – Norms and Trace – Rings of Integers. **Chapter 2: Sections 2.1 to 2.6**		
UNIT–III	**QUADRATIC AND CYCLOTOMIC FIELDS, FACTROIZATION INTO IRREDUCIBLES**	12 hours
Quadratic fields and cyclotomatic fields – Trivial factorization – Factroization into irreducibles – Examples of non unique factorization into irreducibles. **Chapter 3: Sections 3.1 to 3.2** **Chapter 4: Sections 4.2 to 4.4**		
UNIT–IV	**FACTROIZATION INTO IRREDUCIBLES (Contd…)**	12 hours
Prime Factorization – Euclidean Domains – Euclidean Quadratic fields –Consequences of unique factorization– The Ramanujan–Nagell Theorem. **Chapter 4: Sections 4.5 to 4.9**		

UNIT–V	**IDEALS**	12 hours
Prime Factorization of ideals – The norms of an ideal – Non unique Factorization in Cyclotomic Fields. **Chapter 5: Sections 5.2 to 5.4**		

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

Steward and D. Tall, ALGEBRAIC NUMBER THEORY AND FERMAT'S THEOREM (2002), (Third Edition), A.K Peters Ltd, Natrick, Mass.

Reference Books:

1. Z.I. Bosevic and I.R. Safarevic, NUMBER THEORY(1966), Academic Press, New York.
2. J.W.S Cassels and A. Frohlich, ALGEBRAIC NUMBER THEORY(1967), Academic Press, New York.
3. P. Ribenbiom, ALGEBRAIC NUMBER(1972), Wiley, New York.
4. P.Samuel, ALGEBRAIC THEORY OF NUMBERS(1970), Houghton Mifflin Company, Boston.
5. A. Well, BASIC NUMBER THEORY(1967), Springer, New York.

Website and e-Learning Source:

https://nptel.ac.in/courses/111104138
https://www.math.iitb.ac.in/~srg/Lecnotes/kiel.pdf
https://ocw.mit.edu/courses/18-786-topics-in-algebraic-number-theory-spring-2006/

PCMSTE22 – ALGEBRAIC NUMBER THEORY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Analyse the distinction between various concepts of Rings, Fields, Polynomials and free abelian groups.

CLO 2 Discuss various algebraic integers ypes.

CLO 3 Examine the fields.

CLO 4 Find the prime factorization and its consequences.

CLO 5 Calculate the prime factorization of ideals.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSPE23	**GE IV**	**MODELLING AND SIMULATION WITH EXCEL - LAB**	**4**	**3**

Pre-requisite	Basic commands and Shortcut Keys in Excel

Course Objectives

This course aims to provides a concrete knowledge in Modelling and Simulation using Excel.

UNIT–I	MODEL DESIGN	12 hours
Introduction – How do we Classify models? – An example of deterministic modeling – Understanding the important elements of a model. **Chapter 7 : Sections 7.1 – 7.4**		
UNIT–II	**MODEL BUILDING WITH EXCEL**	12 hours
Basic model – Sensitivity analysis – Controls from the forms control tools – Option buttons – Scroll Bars. **Chapter 7 : Section 7.5**		
UNIT–III	**MONTE CARLO SIMULATION**	12 hours
Introduction – Types of Simulation and Uncertainy – The Monte Carlo Sampling methodology. **Chapter 8 : Sections 8.1 – 8.3**		
UNIT–IV	**FINANCIAL SIMULATION**	12 hours
A Financial Example – Income Statement – Status of Autohaus Model – Building the Brain Worksheet – Building the Calculation Worksheet. **Chapter 8 : Section 8.4, 8.5.1, 8.5.2, 8.5.3**		
UNIT–V	**AN OPERATIONS EXAMPLE**	
Variation in approaches to Poisson Arrivals – Sufficient Sample Size – Building the Data collection worksheet. **Chapter 8 : Section 8.5.4, 8.5.5, 8.5.6**		

PCMSTE23 – MODELLING AND SIMULATION WITH EXCEL

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

Hector Guerrero, EXCEL DATA ANALYSIS: MODELING AND SIMULATION (2019), (Second Edition), Springer, New York.

Reference Books:

1. **Manohar and Hansa Lysander, DATA ANALYSIS AND BUSINESS MODELLING USING MICROSOFT EXCEL (2016), PHI Learning Publisher.**
2. **Cynthia Fraser, BUSINESS STATISTICS FOR COMPETITIVE ADVANTAGE WITH EXCEL 2019 AND JMP: BASICS, MODEL BUILDING, SIMULATION AND CASES(2019), Springer**
3. **Nathan George, EXCEL 2019 BASICS: A QUICK AND EASY GUIDE TO BOOSTING YOUR PRODUCTIVITY WITH EXCEL (2019), Nathan George Publisher.**
4. M L Humphrey, EXCEL FOR BEGINNERS (2019), M L Humphrey Publisher

Website and e-Learning Source:

https://onlinecourses.nptel.ac.in/noc22_mg35/preview
https://ocw.mit.edu/courses/3-021j-introduction-to-modeling-and-simulation-spring-2012/

PCMSTE23 – MODELLING AND SIMULATION WITH EXCEL

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Analyse the elements of modeling.
CLO 2 Discuss the various tools in excel to handle modeling.
CLO 3 Find the Monte Carlo simulation and its methodology.
CLO 4 Calculate the income statement using excel.
CLO 5 Build the various worksheet for real life situation.

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSTE24	**GE IV**	**ADVANCED NUMERICAL ANALYSIS**	**4**	**3**

Pre-requisite	UG level Numerical methods

Course Objectives
To introduce the derivation of numerical methods with error analysis and give better understanding of the subject.

UNIT–I	**TRANSCENDENTAL AND POLYNOMIAL EQUATIONS**	12 hours
Iteration Methods Based on Second Degree Equation (Muller Method, Chebyshev Method, Multipoint Method) – Rate of Convergence (Definition, Secant Method, Regula-Falsi Method, Chebyshev Method, Problems) – Polynomial equations (Iterative methods : Birge-Vieta Method, Bairstow Method – Direct Method : Graeffe's Root Squaring Method). **Chapter 2:Sections2.4, 2.5, 2.9**		
UNIT–II	**SYSTEM OF LINEAR ALGEBRAIC EQUATIONS**	12 hours
DirectMethods (Triangularization Method, Cholesky Method, Partition Method) – Iteration Methods (Jacobi Iteration Method, Gauss-Seidel Iteration Method, Successive Over Relaxation (SOR) Method). **Chapter 3:Sections 3.2, 3.4**		
UNIT–III	**INTERPOLATION AND APPROXIMATION**	12 hours
Hermite Interpolation – Piecewise andSpline Interpolation – Bivariate Interpolation – Approximation – Least SquareApproximation. **Chapter 4:Sections4.5, 4.6, 4.7, 4.8, 4.9**		

PCMSTE24 – ADVANCED NUMERICAL ANALYSIS

UNIT–IV	**DIFFERENTIATION AND INTEGRATION**	12 hours
Numerical Differentiation – PartialDifferentiation – Numerical Integration – Methods Based on Undetermined Coefficients (Gauss Quadrature Methods, Gauss-Legendre Integration Methods, Gauss-Chebyshev Integration Methods, Gauss-Laguerre Integration Methods, Gauss-Hermite Integration Methods Lobatto Integration Methods, Radau Integration Methods) – Double integration. **Chapter 5:Sections5.2, 5.5, 5.6, 5.8, 5.11**		
UNIT–V	**ORDINARY DIFFERENTIAL EQUATIONS**	12 hours

Numerical methods – Singlestep methods (Local Truncation Error or Discretization Error, Order of a Method, Taylor Series Method, Runge-Kutta Methods, Explicit Runge-Kutta Methods : Second Order Methods, Minimization of Local Truncation Error, Third Order Methods, Fourth Order Methods, Systems of Equations : Taylor Series Method, Runge-Kutta Method of Second Order, Runge-Kuta (classical) Method of Fourth Order, Implicit Runge-Kutta Methods). **Chapter 6:Sections 6.3, 6.4**

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

M.K. Jain, S.R.K. Iyengar and R.K. Jain, NUMERICAL METHODS FOR SCIENTIFIC AND ENGINEERING COMPUTATION (2012 – Reprint 2018), Sixth Edition, New Age International Publishers.

PCMSTE24 – ADVANCED NUMERICAL ANALYSIS

Reference Books:

1. S. D. Corte and de Boor, ELEMENTARY NUMERICAL ANALYSIS – An Algorithmic approach, 3rd Edition, McGraw Hill International Book Company,1980.
2. James B. Scarboraugh, NUMERICAL MATHEMATICAL ANALYSIS,Oxford& IBH Publishing Company, New Delhi.
3. F.B. Hildebrand, INTRODUCTION TO NUMERICAL ANALYSIS,McGrawHill, New York, 1956.
4. *E. Isaacson, (2000),* ANALYSIS OF NUMERICAL METHODS, DOVER Publications Inc.
5. *Peter Linz, (2019),* THEORETICAL NUMERICAL ANALYSIS: AN INTRODUCTION TO ADVANCED TECHNIQUES, DOVER Publications Inc.

Website and e-Learning Source:

https://archive.nptel.ac.in/courses/103/101/103101111/
https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2012/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Understand the various methods and compute the solution of the transcendental and polynomial equation.

CLO 2 Apply the different methods to solve the system of linear algebraic equations.

CLO 3 Acquire the knowledge of interpolation and approximation and predict the value of the given from the data.

CLO 4 Understand the numerical differentiation and integration.

CLO 5 Compute the solution of the ordinary differential equations.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1

CLO5	3	1	2	3	3	3	3	2	1

FIRST YEAR – SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PCMSPS21	**SEC I (NME I)**	**MATHEMATICAL DOCUMENTATION USING LATEX - LAB**	**4**	**2**

Pre-requisite	Basic System Knowledge

Course Objectives
To practice the students in Mathematics document preparation

CREATING A DOCUMENT USING LATEX

- Title creation
- Page Layout
- Fonts
- List Structures
- Tables
- Including Figures
- Colouring
- Header and Footer
- Mathematical Equations
- Bibliography Management
- Index.
- Slides using Beamer Class

CMSTSE2 – LATEX LAB

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Reference Books:

1. LATEX MANUAL.
2. https://en.wikibooks.org/wiki/LaTeX
3. http://home.iitk.ac.in/~dasgupta/teaching/LSSC/TechInScholComm/A%20Brief%20Introduction%20to%20LaTeX-2017-8.pdf

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 Prepare documents with list, tables and images.
CLO 2 Manage Bibliography and References along with citation.
CLO 3 Print mathematical equations clearly.
CLO 4 Manage the concept of Index.
CLO 5 Prepare slides using beamer.

SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCPYTC11	**CORE 1**	**PROPERTIES OF MATTER AND ACOUSTICS**	**6**	**4**

Instructional Objectives

Study of the properties of matter leads to information which is of practical value to both the physicist and the engineers.
It gives us information about the internal forces which act between the constituent parts of the substance.
Students who undergo this course are successfully bound to get a better insight and understanding of the subject.

Unit-I	**ELASTICITY**	**12 Hours**

Hooke's law – stress-strain diagram – elastic constants –Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion– torsional pendulum (with and without masses)

Unit-II	**BENDING OF BEAMS**	**12 Hours**

Cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope

Unit-III	**FLUID DYNAMICS**	**12 Hours**

Surface tension: definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaeger's method–variation of surface tension with temperature
Viscosity : definition – streamline and turbulent flow – Reynold's Number -rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature-Applications- Hydraulic Brakes- Blood circulation

Unit-IV	**WAVES AND OSCILLATIONS**	**12 Hours**

Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations –resonance and Sharpness of resonance.
Laws of transverse vibration in strings –sonometer – determination of AC frequency using sonometer–determination of frequency using Melde's string apparatus

Unit-V	**ACOUSTICS OF BUILDINGS AND ULTRASONICS**	**12 Hours**

Intensity of sound – decibel – loudness of sound –reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings.

Ultrasonic waves: production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – applications of ultrasonic waves-NDT-Welding-Cleanings- lithotripsy.
Books for Study 1. Properties of Matter by Murugeshan R, S Chand & Co. Pvt. Ltd., New Delhi,2012 2. Elements of Properties of Matter by Mathur D S, Shyamlal Charitable Trust, New Delhi, 2010 3. Text book of Sound by BrijLal& Subramaniam N. Vikas Publishing House, New Delhi, 2018 4. The Physics of Waves and Oscillations,N.K.Bajaj,McGraw Hill Education,Noida,2019
Books for Reference: 1. Fundamentals of General Properties of Matter by Gulati H R, R Chand & Co. New Delhi, 2012 2. Waves & Oscillations by Subrahmanyam N &BrijLal, Vikas Publishing House Pvt. Ltd., New Delhi, 2018 3. A Textbook of Sound by Khanna D R &Bedi R S ,Atma Ram & Sons, New Delhi 2014 4. Fundamentals of Physics, 6th Edition by D Halliday, R Resnick and J Walker, Wiley 2018.

Methodology of Teaching

Chalk and Talk, ICT Presentation, Video Lectures, Assignments and Problem Solving involving students.

COURSE OUTCOME

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Relate elastic behavior in terms of three moduli of elasticity and working of torsion pendulum.	K1,K2
CO2	Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials.	K1,K2
CO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineering problems.	K1,K2
CO4	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency of ac mains	K1,K2
CO5	Understand the concept of acoustics, importance of constructing buildings with good acoustics and to apply their knowledge of ultrasonics in real life.	K1,K2,K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	-	✓
CO2	✓	✓	✓	✓	✓	✓	-	✓

CO3	-	✓	✓	✓	✓	✓	-	✓
CO4	-	-	✓	✓	✓	✓	✓	-
CO5	✓	✓	✓	✓	-	-	-	✓
Number of matches = 30 , Correlations: Very High								

SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCPYTF11	**SEC 1**	**PHYSICS FOR EVERYDAY LIFE**	**2**	**2**
Instructional Objectives				
To know where all physics principles have been put to use in daily life and appreciate the concepts with a better understanding also to know about Indian scientists who have made significant contributions to Physics				
Unit-I	**MECHANICAL OBJECTS**			**5 Hours**
spring scales – bouncing balls –roller coasters – bicycles –rockets and space travel.				
Unit-II	**OPTICAL INSTRUMENTS AND LASER**			**5 Hours**
vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – colour photography – holography and laser.				
Unit-III	**PHYSICS OF HOME APPLIANCES**			**5 Hours**
bulb – fan – Electric Iron box- television – air conditioners – microwave ovens – vacuum cleaners				
Unit-IV	**SOLAR ENERGY**			**5 Hours**
Solar constant – General applications of solar energy – Solar water heaters – Solar Photo – voltaic cells – General applications of solar cells.				
Unit-V	**INDIAN PHYSICIST AND THEIR CONTRIBUTIONS**			**5 Hours**
C.V.Raman, HomiJehangirBhabha, S.C.Bose, Vikram Sarabhai, Subrahmanyan Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.				
Books for Reference: 1. The Physics in our Daily Lives, UmmeAmmara, Gugucool Publishing, Hyderabad, 2019. 2. For the love of physics, Walter Lawin, Free Press, New York, 2011.				

Methodology of Teaching

Chalk and Talk, ICT Presentation, Video Lectures, Assignments and Problem Solving involving students.

COURSE OUTCOME

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	understand the principle of working ofmechanicalobjects	K1,K2
CO2	realize the concept optical instruments and laser	K1,K2

CO3	understand the working of home appliances	K1,K2
CO4	appreciate the use of solar energy applications.	K1,K2
CO5	know the contribution of indian scientist in the filed of physics	K1,K2,K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	–	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	–
CO3	–	✓	✓	✓	✓	✓	–	✓
CO4	✓	–	✓	✓	✓	✓	✓	–
CO5	✓	✓	✓	–	–	✓	✓	✓
Number of matches = 31, Correlations: Very High								

SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCPYPC12	**CORE 2**	**PHYSICS PRACTICAL- I**	**3**	**3**

Instructional Objectives

1. To develop the skills among students while performing experiments.
2. To demonstrate the use of the apparatus correlating the physics concepts.
3. To train students handling simple measuring instruments and also measure certain mechanical properties of matter.
4. To develop the team work among students through experiential learning.

List of Experiments

Minimum of Eight Experiments from the list:

1. Determination of rigidity modulus without mass using Torsional pendulum.
2. Determination of rigidity modulus with masses using Torsional pendulum.
3. Determination of moment of inertia and g using Bifilar pendulum.
4. Determination of Young's modulus by non-uniform bending – scale and telescope.
5. Determination of Young's modulus by cantilever – load depression graph.
6. Determination of Young's modulus by Koenig's method – (or unknown load)
7. Determination of rigidity modulus by static torsion.
8. Determination of surface tension and interfacial surface tension by drop weight method.
9. Determination of viscosity by Poiseullie's flow method.
10. Determination of g using compound pendulum.

Books for Study:

1. Practical Physics by C. C. Ouseph, U.J. Rao, V. Vijayendiran, Viswanathan.S Printers and Publishers Private Ltd., Chennai, 2015

2. A Textbook of practical Physics by M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, Sultan Chand & Sons, New Delhi,2017.

Books for Reference:

1. B.Sc. Practical Physics by C.L.Arora,S.Chand& Co , New Delhi,2010.
2. Practical Physics by P. R. Sasi Kumar, PHI ,New Delhi,2014.
3. Advanced Practical Physics by S. P. Singh, PragathiPrakashan,Meerut,2017.

Methodology of Teaching

Demonstration of experimental techniques and measurements of physical parameters.

COURSE OUTCOME

On the completion of this course the student will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	develop the skills of determining the strength of the material through various modulus	K1,K2,K3
CO2	Determine viscosity and surface tension of a liquid.	K1,K2,K3
CO3	handle simple measuring instruments and also measure certain mechanical properties of matter.	K1,K2,K3
CO4	measure acceleration due to gravity at a place	K1,K2,K3
CO5	find moment of inertia of a body.	K1,K2,K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	–
CO3	✓	–	✓	✓	✓	✓	–	–
CO4	✓	✓	✓	✓	✓	✓	–	–
CO5	✓	✓	✓	✓	✓	✓	–	✓
Number of matches = 32, Correlations: Very High								

SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCPYTC21	**CORE 3**	**HEAT, THERMODYNAMICS and STATISTICAL PHYSICS**	**6**	**5**

Instructional Objectives

The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales.
Practical exhibition and explanation of transmission of heat in good and bad conductor.
Relate the laws of thermodynamics, entropy in everyday life and explore the knowledge of statistical mechanics and its relation

Unit-I	**CALORIMETRY and LOWTEMPERATURE PHYSICS**	**12 Hours**

Specific heat capacity – specific heat capacity of gases C_P and C_V– Meyer's relation – Joly's method for determination of C_V – Regnault's method for determination of C_P.
Callender and Barne's method.
Joule-Kelvin effect – porous plug experiment – Joule-Thomson effect –Boyle temperature – temperature of inversion – liquefaction of gas by Linde's Process – adiabatic demagnetisation.

Unit-II	**THERMODYNAMICS-I**	**12 Hours**

Zeroth law and first law of thermodynamics – P-V diagram – heat engine –efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines.

Unit-III	**THERMODYNAMICS-II:**	**12 Hours**

Second law of thermodynamics –entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram –thermodynamical scale of temperature – Maxwell's thermodynamical relations –Clasius-Clapeyron's equation (first latent heat equation) – third law of thermodynamics – unattainability of absolute zero – heat death.

Unit-IV	**HEATTRANSFER:**	**12 Hours**

Modes of heat transfer: conduction, convection and radiation.
Conduction: thermal conductivity – determination of thermal conductivity of a good conductor by Forbe's method – determination ofthermal conductivity of a bad conductor by Lee's disc method. Radiation: black body radiation (Ferry's method) – distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law –Planck's law of radiation – Stefan's law – deduction of Newton's law of cooling from Stefan's law.

Unit-V	**STATISTICALMECHANICS:**	**12 Hours**

Definition of phase-space – micro and macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics –expression for distribution function – comparison of three statistics.

Books for Study

1.Thermal Physics by A. B. Gupta and H. P. Roy, Books & Allied Ltd,2010.
2. Heat ,Thermodynamics and Statistical Physics by BrijLal, Subramaniam and P.S.Hemne S Chand &Co, New Delhi,2016
3. Elementary Statistics by Gupta and Kumar, PragatiPrakashan, Meerut,2017.

Books for Reference:

1. Thermodynamics by C. P. Arora, McGraw Hill Education,New Delhi,2017
2. Thermodynamics and statistical Physics by Sharma &Sarkar, Himalaya Publishing House,

Mumbai, 2018
3. Statistical Mechanics by SathyaPrakash&C.Agarwal, KNRN Publisher,Meerut,2021.
4. Fundamentals of Physics, 6th Edition, by D.Halliday, R.Resnick and J.Walker, Wiley, New Delhi, 2018.

Methodology of Teaching

Chalk and Talk, ICT Presentation, Video Lectures, Assignments and Problem Solving involving students.

COURSE OUTCOME

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquires knowledge on how to distinguish between temperature and heat.	K1,K2
CO2	Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines	K1,K2
CO3	Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy	K1,K2
CO4	Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyse them	K1,K2
CO5	Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac . Apply to quantum particles such as photon and electron	K1,K2
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	–	✓	–	✓
CO2	✓	–	✓	✓	–	–	–	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	–	✓	✓	–
CO5	✓	✓	✓	✓	–	✓	✓	–
Number of matches = 30, Correlations: Very High								

SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCPYPC22	**CORE 4**	**PHYSICS PRACTICAL- II**	**3**	**3**

1. To develop the skills among students while performing experiments.
2. To demonstrate the use of the apparatus correlating the physics concepts.
3.To train students handling simple measuring instruments and also measure certain optical, mechanical and thermal properties of matter.
4.To develop the team work among students through experiential learning.

List of Experiments

Minimum of Eight Experiments from the list:

1. Determination of specific heat by Newton's Law of cooling.
2. Determination of thermal conductivity of bad conductor by Lee's disc method.
3. Determination of specific heat capacity of solid by Method of Mixtures.
4. Determination of specific heat of liquid by Joule's electrical heating method (applying radiation correction by Barton's correction/graphical method),
5. Determination of Stefan's constant for Black body radiation.
6. Velocity of sound through a wire using Sonometer.
7. To verify the laws of transverse vibration using sonometer.
8. To verify the laws of transverse vibration using Melde's apparatus.
9. To compare the mass per unit length of two strings using Melde's apparatus.
10. Frequency of AC by using sonometer.

Books for Study:

1. Practical Physics by C. C. Ouseph, U.J. Rao, V. Vijayendiran, Viswanathan.S Printers and Publishers Private Ltd., Chennai, 2015
2. A Textbook of practical Physics by M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, Sultan Chand & Sons, New Delhi,2017.

Books for Reference:

1. B.Sc. Practical Physics by C.L.Arora,S.Chand& Co , New Delhi,2010.
2. Practical Physics by P. R. Sasi Kumar, PHI ,New Delhi,2014.
3.Advanced Practical Physics by S. P. Singh, PragathiPrakashan,Meerut,2017.

Methodology of Teaching

Demonstration of experimental techniques and measurements of physical parameters.

COURSE OUTCOME

On the completion of this course the student will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	develop the skills of measuring specific heat of a substance	K1,K2,K3
CO2	To demonstrate the use of the apparatus correlating the physics concepts.	K1,K2,K3
CO3	Handle simple measuring instruments and also to measure	K1,K2,K3

	certain thermal properties of matter	
CO4	Understand the concept of conductors.	K1,K2,K3
CO5	Determine frequencies using sonometer and Melde's apparatus.	K1,K2,K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	–
CO3	✓	–	✓	✓	✓	✓	–	–
CO4	✓	✓	✓	✓	✓	✓	–	–
CO5	✓	✓	✓	✓	✓	✓	–	✓
Number of matches = 32, Correlations: Very High								

SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCPYTS21	**SEC2**	**PHYSICS OF MEDICAL INSTRUMENTS**	**2**	**2**

Instructional Objectives

The students will be exposed to instruments like ECG, EEG, EMG, medical imaging, diagnostic specialties, operation theater and its safety which will kindle interest to specialize in instrument servicing.

Unit-I	**BIO-POTENTIALS AND ELECTRODES**	**5Hours**

transport of ions through cell membrane- resting and action potential - Characteristics of resting potential – bio-electric potential – design of medical instruments – components of bio-medical instrumentation – electrodes – electrode potential – metal microelectrode – depth and needle electrodes – types of surface electrode – the pH electrode.

Unit-II	**BIO-POTENTIAL BASED INSTRUMENTATION**	**5 Hours**

Electrocardiography (ECG) – origin of cardiac action potential - ECG lead configuration –block diagram of ECG recording set up (qualitative) – Electroencephalography (EEG) – origin of EEG – action and evoked potentials - brain waves – block diagram of modern EEG set up – electromyography (EMG) – block diagram of EMG recording setup.

Unit-III	**OPERATION THEATRE AND RADIATION SAFETY**	**5 Hours**

diathermy – block diagram of the electrosurgical diathermy– shortwave, microwave, ultrasonic diathermy – ventilators – servo controlled systems -units of radiation - pocket dosimeter – pocket type radiation alarm – thermo-luminescence dosimeter.

Unit-IV	**MEDICAL IMAGING**	**5 Hours**

nuclear imaging technique –computer tomography (CT) – principle – mathematical basis of image construction –block diagram of CT scanner – ultrasonic imaging systems – construction of transducer – display modes – MRI principle and instrumentation.

Unit-V	**DIAGNOSTICS AND LASER IN MEDICINE**	**5 Hours**

X-rays in radiography – fluoroscopy – comparison– image intensifiers – angiography – applications of X-ray examination (*problems*).laser interactions with biomolecules – advantages of laser surgery – endoscopy – types of endoscopes with their operation (qualitative).
Books for Study 1. Biomedical Instrumentation and measurement, Leslie Cromwell, PHI, 2015 2. Medical Instrumentation, M. Arumugam, Anuradha agencies, 1992 3. Medical Electronics, M.J.Kumar Doss, Prathibha Publishers, 1987
Books for Reference: 1. Medical Physics, John R. Cameron and James G. Skofronick, Thrift books, Atlanta, 1985. 2. Electronic Instruments and Instrumentation Technology, M. M.M.Anand, PHI, 2015

Methodology of Teaching

Chalk and Talk, ICT Presentation, Video Lectures, Assignments and Problem Solving involving students.

COURSE OUTCOME

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	realize the concepts of bio-potentials and electrodes	K1,K2,K3
CO2	Understand the working mechanism of bio-potential based instrumentation	K1,K2,K3
CO3	know the importance of operation theatre and radiation safety	K1,K2,K3
CO4	familiarize techniques of medical imaging	K1,K2,K3
CO5	diagnostics and laser in medicine	K1,K2,K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓	–	✓
CO2	✓	✓	✓	✓	✓	✓	✓	–
CO3	✓	–	✓	✓	✓	✓	–	–
CO4	✓	✓	✓	✓	✓	✓	–	–
CO5	✓	✓	✓	✓	✓	✓	–	✓
Number of matches = 32, Correlations: Very High								

SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCHTA11	**GE1**	**ALLIED PHYSICS-I**	**4**	**4**

Instructional Objectives

To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.

Unit-I	**WAVES, OSCILLATIONS AND ULTRASONICS**	**12 Hours**

Simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) –piezoelectric method – application of ultrasonics: medical field –ultrasonography – ultrasonoimaging- ultrasonics in dentistry – physiotheraphy.

Unit-II	**PROPERTIES OF MATTER**	**12 Hours**

Elasticity: elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum

Viscosity: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula

Surface tension: definition – molecular theory – droplets formation–shape, size and lifetime – drop weight method – interfacial surface tension.

Unit-III	**HEAT AND THERMODYNAMICS**	**12 Hours**

Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde's process of liquefaction of air– liquid Oxygen for medical purpose– importance of cryocoolers– thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy – change of entropy in reversible and irreversible process.

Unit-IV	**ELECTRICITY AND MAGNETISM**	**12 Hours**

potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – Faraday's Law of electromagnetic induction- ac current and voltage- peak, average and RMS values– power factor and current values in an AC circuit – types of switches in household and factories– Smart wifi switches.

Unit-V	**DIGITAL ELECTRONICS AND DIGITAL INDIA:**	**12 Hours**

logic gates, OR, AND, NOT, NAND, NOR , EX-OR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification – Sign representation of Numbers-Half-Adder & Full -Adder- Half-Subtractor& Full -Subtractor-Introduction to ICs.

Books for Study:

1. Properties of Matter by Murugeshan R, S Chand & Co. Pvt. Ltd., New Delhi,2012
2. Heat, Thermodynamics and Statistical Physics by BrijLal, Subramaniam N and P.S.Hemne S Chand &Co,New Delhi,2016
3. Electricity and Magnetismby R. Murugesan S. Chand &Co,New Delhi,2019
4. The Physics of Waves and Oscillations, N.K.Bajaj,McGraw HillEducation,Noida,2019
5. A text book of Optics by BrijLal, Subramaniam and M.N. Avadhanulu,2012.

Books for Reference:

1. Modern Physics by R. Murugesan and KiruthigaSivaprasath,S. Chand &Co,New Delhi,2021.
2. Elements of Properties of Matter by Mathur D S, Shyamlal Charitable Trust, New Delhi, 2010
3. Fundamentals of General Properties of Matter by Gulati H R, R Chand & Co. New Delhi, 2012
4. Fundamentals of Physics, 6th Edition by D Halliday, R Resnick and J Walker, Wiley 2018.

Methodology of Teaching

Chalk and Talk, ICT Presentation, Video Lectures, Assignments and Problem Solving involving students.

COURSE OUTCOME

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically.	K1,K2
CO2	Explain their knowledge of understanding about materials and their bahaviors and Apply Itto various situation sin laboratoryan dreal life.	K1,K2
CO3	Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the back ground of growth of this technology.	K1,K2
CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field .	K1,K2
CO5	Interpret the real life solutions using AND, OR, NOT basiclogicgatesandintendtheirideastouniversalbuildingblocks.	K1,K2,K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	–	✓	–	✓
CO2	✓	✓	✓	✓	–	–	–	✓
CO3	✓	✓	✓	✓	✓	–	✓	–
CO4	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 33, Correlations: Very High								

SEMESTER I				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCHPS11	**GE1**	**ALLIED PHYSICS PRACTICAL– I**	**3**	**2**

Instructional Objectives

1. To develop the skills among students while performing experiments.
2. To demonstrate the use of the apparatus correlating the physics concepts.
3. To train students handling simple measuring instruments and also measure certain optical, mechanical and thermal properties of matter.
4. To develop the team work among students through experiential learning.

List of Experiments

Minimum of Eight Experiments from the list:

1. Young's modulus by non-uniform bending using pin and microscope.
2. Young's modulus by non-uniform bending using single optic lever, scale and telescope.
3. Rigidity modulus by static torsion method.
4. Rigidity modulus by Torsional oscillations without mass.
2. Surface tension and interfacial Surface tension – drop weight method.
3. Comparison of viscosities of two liquids – burette method.
4. Specific heat capacity of a liquid – half time correction.
5. Verification of laws of transverse vibrations using sonometer.
6. Calibration of low range voltmeter using potentiometer.
7. Determination of thermo emf using potentiometer.
8. Verification of truth tables of basic logic gates using ICs.
9. Verification of De Morgan's theorems using logic gate ICs.
10. Use of NAND as universal building block.

Note : Use of digital balance permitted

Books for Study:

1. Practical Physics by C. C. Ouseph, U.J. Rao, V. Vijayendiran, Viswanathan.S Printers and Publishers Private Ltd., Chennai, 2015
2. A Textbook of practical Physics by M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, Sultan Chand & Sons, New Delhi,2017.

Books for Reference:

1. B.Sc. Practical Physics by C.L.Arora,S.Chand& Co , New Delhi,2010.
2. Practical Physics by P. R. Sasi Kumar, PHI ,New Delhi,2014.
3. Advanced Practical Physics by S. P. Singh, PragathiPrakashan,Meerut,2017.

Methodology of Teaching

Demonstration of experimental techniques and measurements of physical parameters.

COURSE OUTCOME

On the completion of this course the student will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Determine Young's modulus ,Rigidity modulus of the given material	K1,K2,K3
CO2	Measure the Viscosity and surface Tension of the given material	K1, K2,K3
CO3	Find the specific heat capacity of the given liquid	K1,K2,K3

CO4	Calibrate the low range voltmeter using potentiometer	K1,K2,K3
CO5	Construct electronic circuits for logics and verify them	K1, K2,K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓	–	–
CO2	✓	✓	✓	✓	✓	✓	–	–
CO3	✓	✓	✓	✓	✓	✓	–	–
CO4	✓	✓	✓	✓	✓	✓	–	–
CO5	✓	✓	✓	✓	✓	✓	–	–
Number of matches = 30, Correlations: Very High								

SEMESTER II				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCHTA21	**GE2**	**ALLIED PHYSICS-II**	**4**	**3**

Instructional Objectives

To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.

Unit-I	**OPTICS**	**12Hours**

interference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity –Specific Rotation Laurent's half shade polarimeter.

Unit-II	**ATOMIC PHYSICS**	**12 Hours**

atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – periodic table– Bohr magneton – Stark effect –Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect: solar cells, solar panels.

Unit-III	**NUCLEAR PHYSICS**	**12 Hours**

nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses – controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – nuclear fusion – differences between fission and fusion- chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor– importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods – introduction to DAE, IAEA

Unit-IV	**INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES**	**12 Hours**

frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – Variation of mass with velocity-twin paradox – mass-energy equivalence –introduction on gravitational waves, gravitational mass and potential- LIGO		
Unit-V	**SEMICONDUCTOR PHYSICS**	**12 Hours**
p-n junction diode – forward and reverse biasing – characteristic of diode – full wave bridge rectifier – construction and working –advantages - Zener diode – characteristic of Zener diode – voltage regulator –USB cell phone charger –introduction to e-vehicles and EV charging stations		

Books for Study:

1. Modern Physics by R. Murugesan and KiruthigaSivaprasath,S. Chand &Co,New Delhi,2021.
2. Electricity and Magnetism by R. Murugesan S. Chand &Co,New Delhi,2019
3. Introduction to Fiber optics by K. Thyagarajan and Ajay Ghatak, Cambridge, University Press ,2017.
4. Electronic Principles and applications – A. B. Bhattacharya, New Central Book Agency, Kolkata,2011.

Books for Reference:

1. Fundamentals of Physics, 6th Edition by D Halliday, R Resnick and J Walker, Wiley 2018.
2. Electricity and Magnetism by Brijlal and Subramaniam, S. Chand & Co, New Delhi,2016.
3. An Introduction to Lasers Theory and Applications by Dr. M. N. Avadhanulu and Dr.P.S.Hemne, S. Chand & Co, New Delhi,2012.
4. Electronics Fundamentals and Applications by D.Chattopadhyay and P.C.Rakshit,New Age International Pvt. Ltd.,Bengaluru,2020.

Methodology of Teaching

Chalk and Talk, ICT Presentation, Video Lectures, Assignments and Problem Solving involving students.

COURSE OUTCOME

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Explaintheconceptsof interferencediffractionusingprinciplesof superpositionofwaves and rephrase the concept of polarization based on wave patterns	K1,K2
CO2	Outline the basic foundation of different atom models and variousexperiments establishing quantum concepts. Relate the importance solar energy related applications.	K1,K2
CO3	Summarizethepropertiesofnuclei, nuclearforcesstructureofatomicnucleusandnuclear models. Solveproblems on delayratehalf-lifeand mean-life.	K1,K2
CO4	Todescribethebasicconceptsofrelativitylikeequivalenceprinciple, inertialframes and Lorentz transformation. Extend their knowledge on concepts ofrelativityandviceversa	K1,K2
CO5	Summarize the working of semiconductor devices like junction diode, Zenerdiode, transistors and practical devices we daily use like USB chargers and EV charging stations.	K1, K2, K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Methodology of Teaching
Demonstration of experimental techniques and measurements of physical parameters.

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	–	✓	–	–
CO2	✓	✓	✓	✓	–	–	–	✓
CO3	✓	✓	✓	✓	✓	–	✓	–
CO4	✓	✓	✓	✓	–	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 31, Correlations: Very High								

SEMESTER I

COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
UCCHPS21	**GE2**	**ALLIED PHYSICS PRACTICAL– II**	**3**	**2**

Instructional Objectives

1. To develop the skills among students while performing experiments.
2. To demonstrate the use of the apparatus correlating the physics concepts.
3. To train students handling simple measuring instruments and also measure certain optical, mechanical and thermal properties of matter.
4. To develop the team work among students through experiential learning.

List of Experiments

Minimum of Eight Experiments from the list:

1. Radius of curvature of lens by forming Newton's rings
2. Thickness of a wire using air wedge
3. Wavelength of mercury lines using spectrometer and grating-Normal Incidence method
4. Refractive index of material of the Prism by minimum deviation method.
5. Refractive index of liquid using liquid prism
6. Determination of AC frequency using sonometer
7. Determination of figure of merit table galvanometer
8. Characterisation of Zener diode
9. Construction of Zener/IC regulated power supply
10. NOR gate as a universal building block.

Books for Study:

1. Practical Physics by C. C. Ouseph, U.J. Rao, V. Vijayendiran, Viswanathan.S Printers and Publishers Private Ltd., Chennai, 2015
2. A Textbook of practical Physics by M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, Sultan Chand & Sons, New Delhi,2017.

Books for Reference:

1. B.Sc. Practical Physics by C.L.Arora,S.Chand& Co , New Delhi,2010.
2. Practical Physics by P. R. Sasi Kumar, PHI ,New Delhi,2014.
3. Advanced Practical Physics by S. P. Singh, PragathiPrakashan,Meerut,2017.

COURSE OUTCOME

On the completion of this course the student will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Determine the radius of curvature.	K1,K2,K3
CO2	Measure the frequency of AC main	K1, K2,K3
CO3	Find the figure of merit of galvanometer	K1,K2,K3
CO4	Determine the refractive index of a material and wavelength length of prominent colour	K1,K2,K3
CO5	Construct electronic circuits and logic gates.	K1, K2,K3
K1-Remembering/Knowledge, K2-Understand,K3-Apply		

Mapping of COs with PSOs

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO 8**
CO1	✓	✓	✓	✓	✓	✓	–	–
CO2	✓	✓	✓	✓	✓	✓	–	–
CO3	✓	✓	✓	✓	✓	✓	–	–
CO4	✓	✓	✓	✓	✓	✓	–	–
CO5	✓	✓	✓	✓	✓	✓	–	–
Number of matches = 30, Correlations: Very High								

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	**M. Sc., Physics**
Programme Code	
Duration	**PG – 2YEARS**
Programme Outcomes (POs)	**PO1: Problem Solving Skill** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. **PO2: Decision Making Skill** Foster analytical and critical thinking abilities for data-based decision-making. **PO3: Ethical Value** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities. **PO4: Communication Skill** Ability to develop communication, managerial and interpersonal skills. **PO5: Individual and Team Leadership Skill** Capability to lead themselves and the team to achieve organizational goals. **PO6: Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment. **PO7: Entrepreneurial Skill** Equip with skills and competencies to become an entrepreneur. **PO8: Contribution to Society** Succeed in career endeavors and contribute significantly to society. **PO 9 Multicultural competence** Possess knowledge of the values and beliefs of multiple cultures and a global perspective. **PO 10: Moral and ethical awareness/reasoning** Ability to embrace moral/ethical values in conducting one's life.

The curriculum for the P.G. Physics for universities and colleges is revised as per Learning Outcomes- based Curriculum Framework (LOCF). The learner centric courses are designed to enable the students to progressively develop a good understanding of the concepts of various domains in physics. Significant modification is the inclusion of the courses to equip students to face challenges in industries and make them employable. Skill development in different spheres and confidence building are given a special focus.

PROGRAM SPECIFIC OUTCOMES (PSOs):
By the end of the program, the students will be able to

Programme Specific Outcomes (PSOs)	**PSO1:** Understand principles of physics for the scientific phenomena in the classical domain. **PSO2:** Understand the mathematical techniques for describing in-depth knowledge of physical concepts.

	PSO3: Understand and apply statistical methods for describing the classical and quantum particles in various physical systems and processes. **PSO4:** Understand and apply interdisciplinary concepts for understanding and describing natural phenomena. **PSO5:** Understand the principles of Quantum mechanics for knowing the physical systems in the quantum arena. **PSO6:** Provide exposure to various specializations of Physics (Solid StatePhysics/Nuclear Physics/Particle Physics). **PSO7:** Provide exposure to modern experimental/theoretical methods for measurement, observation and fundamental understanding of physical phenomena/systems. **PSO8:** Engage in research and life-long learning to adapt to changing environment

MAPPING OF PROGRAMME-SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Programme Specific Outcomes (PSOs)	Programme Outcomes (POs)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PSO1	✓	✓		✓		✓	✓		✓	✓
PSO2	✓	✓	✓	✓		✓	✓		✓	✓
PSO3	✓	✓	✓	✓			✓	✓	✓	✓
PSO4	✓	✓		✓	✓		✓	✓	✓	✓
PSO5	✓	✓		✓		✓		✓	✓	✓
PSO6	✓	✓	✓	✓	✓	✓		✓	✓	✓
PSO7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Mapping Correlation Benchmark

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High
Matching: 67	Correlation: Very High			

Paper-1 - **MATHEMATICAL PHYSICS**	**I YEAR - FIRST SEMESTER**

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTC11	**MATHEMATICAL PHYSICS**	Core				4	6	75

Pre-Requisites
Knowledge of Matrices, vectors, differentiation, integration, differential equations
Learning Objectives
➢ To equip students with the mathematical techniques needed for understanding theoretical treatment in different courses taught in their program ➢ To extend their manipulative skills to apply mathematical techniques in their fields ➢ To help students apply Mathematics in solving problems of Physics

UNITS	Course Details
UNITI: **LINEAR VECTOR SPACE**	Basic concepts – Definitions- examples of vector space – Linear independence - Scalar product- Orthogonality – Gram-Schmidt orthogonalization procedure –linear operators – Dual space – orthogonal basis – change of basis – Isomorphism of vector space – projection operator –Eigen values and Eigen functions – Direct sum and invariant subspace – orthogonal transformations and rotation
UNITII: **COMPLEX ANALYSIS**	Review of Complex Numbers -de Moivre's theorem-Functions of a Complex Variable- Differentiability -Analytic functions- Harmonic Functions- Complex Integration- Contour Integration, Cauchy – Riemann conditions – Singular points – Cauchy's Integral Theorem and integral Formula -Taylor's Series - Laurent's Expansion- Zeros and poles – Residue theorem.
UNITIII: **MATRICES**	Types of Matrices and their properties, Rank of a Matrix -Conjugate of a matrix - Adjoint of a matrix - Inverse of a matrix - Hermitian and Unitary Matrices -Trace of a matrix- Transformation of matrices - Characteristic equation - Eigen values and Eigen vectors - Cayley–Hamilton theorem – Diagonalization
UNITIV: **FOURIER TRANSFORMS & LAPLACE TRANSFORMS**	Definitions -Fourier transform and its inverse - Transform of Gaussian function and Dirac delta function -Fourier transform of derivatives - Cosine and sine transforms - Convolution theorem. Application: Diffusion equation: Flow of heat in an infinite and in a semi - infinite medium - Wave equation: Vibration of an infinite string and of a semi - infinite string. Laplace transform and its inverse - Transforms of derivatives and integrals – Differentiation and integration of transforms - Dirac delta functions - Application - Laplace equation: Potential problem in a semi - infinite strip

UNITV: **DIFFERENTIAL EQUATIONS**	Second order differential equation- Sturm-Liouville's theory - Series solution with simple examples - Hermite polynomials - Generating function - Orthogonality properties - Recurrence relations – Legendre polynomials - Generating function - Rodrigue formula – Orthogonality properties - Dirac delta function- One dimensional Green's function and Reciprocity theorem - Sturm-Liouville's type equation in one dimension & their Green's function.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. George Arfken and Hans J Weber, 2012, Mathematical Methods for Physicists – A Comprehensive Guide (7th edition), Academic press. 2. P.K. Chattopadhyay, 2013, *Mathematical Physics* (2nd edition), New Age, New Delhi 3. A W Joshi, 2017, Matrices and Tensors in Physics, 4th Edition (Paperback), New Age International Pvt.Ltd., India 4. B. D. Gupta, 2009, *Mathematical Physics* (4th edition), VikasPublishing House, New Delhi. 5. H. K. Dass and Dr. Rama Verma, 2014, Mathematical Physics, Seventh Revised Edition, S. Chand & Company Pvt. Ltd., New Delhi.
REFERENCEBOOKS	1. E. Kreyszig, 1983, Advanced Engineering Mathematics, Wiley Eastern, New Delhi, 2. D. G. Zill and M. R. Cullen, 2006, Advanced Engineering Mathematics, 3rd Ed. Narosa, New Delhi. 3. S. Lipschutz, 1987, Linear Algebra, Schaum's Series, McGraw - Hill, New York 3. E. Butkov, 1968, Mathematical Physics Addison - Wesley, Reading, Massachusetts. 4. P. R. Halmos, 1965, Finite Dimensional Vector Spaces, 2nd Edition, Affiliated EastWest, New Delhi. 5. C. R. Wylie and L. C. Barrett, 1995, Advanced Engineering Mathematics, 6 th Edition, International Edition, McGraw-Hill, New York
WEB SOURCES	1. www.khanacademy.org 2. https://youtu.be/LZnRlOA1_2I 3. http://hyperphysics.phy-astr.gsu.edu/hbase/hmat.html#hmath 4. https://www.youtube.com/watch?v=_2jymuM7OUU&list=PLhkiT_RYTEU27vS_SlED56gNjVJGO2qaZ 5. https://archive.nptel.ac.in/courses/115/106/115106086/

COURSEOUTCOMES:

At the endofthe course thestudentwillbeableto:

CO1	Understand use of bra-ket vector notation and explain the meaning of complete orthonormal set of basis vectors, and transformations and be able to apply them	K1, K2
CO2	Able to understand analytic functions, do complex integration, by applying Cauchy Integral Formula. Able to compute many real integrals and infinite sums via complex integration.	**K2, K3**

CO3	Analyze characteristics of matrices and its different types, and the process of diagonalization.	**K4**
CO4	Solve equations using Laplace transform and analyze the Fourier transformations of different function, grasp how these transformations can speed up analysis and correlate their importance in technology	**K4, K5**
CO5	To find the solutions for physical problems using linear differential equations and to solve boundary value problems using Green's function. Apply special functions in computation of solutions to real world problems	**K2, K5**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓				
CO3	✓	✓	✓	✓				
CO4	✓	✓	✓	✓				
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 28, Correlations: High								

Paper-2 - **CLASSICAL MECHANICS AND RELATIVITY**	**I YEAR - FIRST SEMESTER**

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTC12	CLASSICAL MECHANICS AND RELATIVITY	Core				4	5	75

Pre-Requisites
Knowledge offundamentals of mechanics, Foundation in mathematical methods.
Learning Objectives
➢ To understand fundamentals of classical mechanics. ➢ To understand Lagrangian formulation of mechanics and apply it to solve equation of motion. ➢ To understand Hamiltonian formulation of mechanics and apply it to solve equation of motion. ➢ To discuss the theory of small oscillations of a system. ➢ To learn the relativistic formulation of mechanics of a system.

UNITS	Course Details
UNIT I: PRINCIPLES OF CLASSICAL MECHANICS	Mechanics of a single particle – mechanics of a system of particles – conservation laws for a system of particles – constraints – holonomic & non-holonomic constraints – generalized coordinates – configuration space – transformation equations – principle of virtual work.
UNIT II: LAGRANGIAN FORMULATION	D'Alembert's principle – Lagrangian equations of motion for conservative systems – applications: (i) simple pendulum (ii) Atwood's machine (iii) projectile motion-Non conservative systems.
UNIT III: HAMILTONIAN FORMULATION	Phase space – cyclic coordinates – conjugate momentum – Hamiltonian function – Hamilton's canonical equations of motion – **Hamilton -Jacobi equation-Action angle variables**-applications: (i) simple pendulum (ii) one dimensional simple harmonic oscillator (iii) motion of particle in a central force field.
UNIT IV: SMALL OSCILLATIONS	Formulation of the problem – transformation to normal coordinates-**two coupled pendulum**– frequencies of normal modes – linear triatomic molecule
UNIT V: RELATIVITY	Inertial and non-inertial frames – Lorentz transformation equations – length contraction and time dilation – relativistic addition of velocities – Einstein's mass-energy relation – Minkowski's space – four vectors – position, velocity, momentum, acceleration and force in four vector notation and their transformations
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS	1. H. Goldstein, 2002, *Classical Mechanics*, 3rd Edition, Pearson Edu. 2. J. C. Upadhyaya, *Classical Mechanics*, HimalayaPublshing. Co.New Delhi. 3. R. Resnick, 1968, *Introduction to Special Theory of Relativity,* Wiley Eastern, New Delhi. 4. R. G. Takwala and P.S. Puranik, Introduction to Classical Mechanics –Tata – McGraw Hill, New Delhi, 1980. 5. N. C. Rana and P.S. Joag, Classical Mechanics - Tata McGraw Hill, 2001
REFERENCE BOOKS	1. K. R. Symon,1971, *Mechanics,* Addison Wesley, London. 2. S. N. Biswas, 1999, *Classical Mechanics*, Books & Allied, Kolkata. 3. Gupta and Kumar, *Classical Mechanics*, KedarNath. 4. T.W.B. Kibble, *Classical Mechanics*, ELBS. 5. Greenwood, *Classical Dynamics*, PHI, New Delhi.
WEB SOURCES	1. http://poincare.matf.bg.ac.rs/~zarkom/Book_Mechanics_Goldstein_Classical_Mechanics_optimized.pdf 2. https://pdfcoffee.com/classical-mechanics-j-c-upadhyay-2014-

	editionpdf-pdf-free.html 3. https://nptel.ac.in/courses/122/106/122106027/ 4. https://ocw.mit.edu/courses/physics/8-09-classical-mechanics-iii-fall-2014/lecture-notes/ 5. https://www.britannica.com/science/relativistic-mechanics

COURSE OUTCOMES:

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

CO1	Understand the fundamentals of classical mechanics.	K2
CO2	Apply the principles of Lagrangian and Hamiltonian mechanics to solve the equations of motion of physical systems.	**K3**
CO3	Apply the principles of Lagrangian and Hamiltonian mechanics to solve the equations of motion of physical systems.	**K3, K5**
CO4	Analyze the small oscillations in systems and determine their normal modes of oscillations.	**K4, K5**
CO5	Understand and apply the principles of relativistic kinematics to the mechanical systems.	**K2, K3**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓			✓	
CO2	✓	✓	✓	✓			✓	
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓			✓	
CO5	✓	✓	✓	✓			✓	
Number of matches = 27, Correlations: High								

Paper- 3 - **LINEAR AND DIGITAL ICs & APPLICATIONS**	**I YEAR - FIRST SEMESTER**

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYPC13	**LINEAR AND DIGITAL ICs AND APPLICATIONS**	**Core**				**4**	**5**	**75**

Pre-Requisites
Knowledge of semiconductor devices, basic concepts of digital and analog electronics
Learning Objectives
➢ To introduce the basic building blocks of linear integrated circuits. ➢ To teach the linear and non-linear applications of operational amplifiers. ➢ To introduce the theory and applications of PLL. ➢ To introduce the concepts of waveform generation and introduce one special function ICs. ➢ Exposure to digital IC‘s

UNITS	Course Details
UNIT I: INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER	Introduction, Classification of IC‘s, basic information of Op-Amp 741 and its features, the ideal Operational amplifier-Inverting and Non-Inverting Op-Amp-**Characteristics:Dual input-single output-CMRR-Slew rate-Fan in & Fan out-PSSR**. Log and Antilog amplifier, multiplier and divider-V to I and I to V converters.
UNIT II: APPLICATIONS OF OP-AMP	LINEAR APPLICATIONS OF OP-AMP: Solution to simultaneous equations and differential equations, Instrumentation amplifiers. NON-LINEAR APPLICATIONS OF OP-AMP: **Comparators and its types-Zero signal crossing detector, squarer**and Schmitt trigger,Triangular and Square waveform generators.
UNIT III: ACTIVE FILTERS & TIMER AND PHASE LOCKED LOOPS	ACTIVE FILTERS: Introduction, Butterworth filters – 1st order, 2nd order low pass and high pass filters, band pass, band reject and all pass filters. TIMER AND PHASE LOCKED LOOPS: Introduction to IC 555 timer, description of functional diagram, monostable and astable operations and applications, Schmitt trigger, PLL - introduction, basic principle, phase detector/comparator, voltage-controlled oscillator (IC 566), low pass filter, monolithic PLL and applications of PLL
UNIT IV: Voltage Regulator& D to A AND A to D CONVERTERS	Voltage Regulator-Series,IC 723 general purpose and switching. D to A AND A to D Converters: Introduction, basic DAC techniques - weighted resistor, R-2R ladder, A to D converters: parallel comparator type, counter type, successive approximation and dual slope.
UNIT V: CMOS LOGIC, COMBINATIONAL CIRCUITS USING TTL	CMOS LOGIC: CMOS logic levels, MOS transistors, Basic CMOS Inverter, NAND and NOR gates, CMOS AND-OR-INVERT and OR-AND-INVERT gates, implementation of any function using CMOS logic. COMBINATIONAL CIRCUITS USING TTL 74XX ICs: Study of logic gates using 74XX ICs, Four-bit

74XX ICs	parallel adder (IC 7483), Comparator (IC 7485), Decoder (IC 74138, IC 74154), BCD to 7-segment decoder (IC7447), Encoder (IC74147), Multiplexer (IC74151), Demultiplexer (IC 74154).
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. D. Roy Choudhury, Shail B. Jain (2012), Linear Integrated Circuit, 4th edition, New Age International Pvt.Ltd., NewDelhi,India 2. Ramakant A. Gayakwad, (2012), OP-AMP and Linear Integrated Circuits, 4th edition, Prentice Hall / Pearson Education, NewDelhi. 3. B.L. Theraja and A.K. Theraja, 2004, A Textbook of Electrical technology, S. Chand & Co. 4. V.K. Mehta and Rohit Mehta, 2008, Principles of Electronics, S. Chand & Co, 12th Edition. 5. V. Vijayendran, 2008, Introduction to Integrated electronics (Digital & Analog), S.Viswanathan Printers & Publishers Private Ltd, Reprint. V.
REFERENCE BOOKS	1. Sergio Franco (1997), Design with operational amplifiers and analog integrated circuits, McGraw Hill, New Delhi. 2. Gray, Meyer (1995), Analysis and Design of Analog Integrated Circuits, Wiley International, New Delhi. 3. Malvino and Leach (2005), Digital Principles and Applications 5th Edition, Tata McGraw Hill, New Delhi 4. Floyd, Jain (2009), Digital Fundamentals, 8th edition, Pearson Education, New Delhi. 5. Integrated Electronics, Millman &Halkias, Tata McGraw Hill, 17th Reprint (2000)
WEB SOURCES	1. https://nptel.ac.in/course.html/digital circuits/ 2. https://nptel.ac.in/course.html/electronics/operational amplifier/ 3. https://www.allaboutcircuits.com/textbook/semiconductors/chpt-7/field-effect-controlled-thyristors/ 4. https://www.electrical4u.com/applications-of-op-amp/ 5. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

COURSE OUTCOMES:

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

CO1	Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve problems	K1, K5
CO2	Develop skills to design linear and non-linear applications circuits using Op-Amp and design the active filters circuits.	**K3**
CO3	Gain knowledge about PLL, and develop the skills to design the simple circuits using IC 555 timer and can solve problems related to it.	**K1, K3**
CO4	Learn about various techniques to develop A/D and D/A converters.	**K2**

CO5	Acquire the knowledge about the CMOS logic, combinational and sequential circuits	**K1, K4**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓		
CO2		✓		✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓				
CO4	✓	✓			✓		✓	✓
CO5		✓		✓	✓		✓	✓
Number of matches = 26, Correlations: High								

Paper 4 - PRACTICAL I	**I YEAR - FIRST SEMESTER**

Subject Code	**Subject Name**	**Category**	**L**	**T**	**P**	**Credits**	**Inst. Hours**	**Marks**
PCPYPC14	**General Physics PRACTICAL I**	**Core**				**4**	**6**	**75**

Pre-Requisites
Knowledge and hands on experience of basic general and electronics experiments of Physics
Learning Objectives
➢ To understand the concept of mechanical behavior of materials and calculation of same using appropriate equations. ➢ To calculate the thermodynamic quantities and physical properties of materials. ➢ To analyze the optical and electrical properties of materials.

Course Details
(Minimum of 12 Experiments from the list) 1. Determination of Young's modulus and Poisson's ratio by Hyperbolic fringes - Cornu's Method 2. Determination of Viscosity of the given liquid – Meyer's disc 3. Measurement of Coefficient of linear expansion- Air wedge Method 4. Determination of Thickness of the enamel coating on a wire by diffraction 5. Determination of Rydberg's Constant - Hydrogen Spectrum 6. Thickness of air film - FP Etalon

7. Measurement of Band gap energy- Thermistor
8. Determination of Specific charge of an electron – Thomson's method.
9. Determination of Wavelength, Separation of wavelengths - Michelson Interferometer
10. GM counter – Characteristics and inverse square law.
11. Measurement of Conductivity - Four probe method.
12. Molecular spectra – AlO band.
13. Measurement of wavelength of Diode Laser / He – Ne Laser using Diffraction grating.
14. Construction of relaxation oscillator using UJT
15. FET CS amplifier- Frequency response, input impedance, output impedance
16. Study of summing, difference, inverting, non-inverting, Differentiator and Integrator using IC741.
17. Study of R-S, clocked R-S and D-Flip flop using NAND gates

TEXT BOOKS	1. Practical Physics, Gupta and Kumar, PragatiPrakasan. 2. Kit Developed for doing experiments in Physics- Instruction manual, R.Srinivasan K.R Priolkar, Indian Academy of Sciences. 3. Electronic Laboratory Primer a design approach, S. Poornachandra, B.Sasikala, Wheeler Publishing, New Delhi. 4. Electronic lab manual Vol I, K ANavas, Rajath Publishing. 5. Electronic lab manual Vol II, K ANavas, PHI eastern Economy Edition
REFERENCE BOOKS	1. Advanced Practical Physics, S.P Singh, PragatiPrakasan. 2. An advanced course in Practical Physics, D.Chattopadhayay, C.R Rakshit, New Central Book Agency Pvt. Ltd 3. Op-Amp and linear integrated circuit, Ramakanth A Gaykwad, Eastern Economy Edition. 4. A course on experiment with He-Ne Laser, R.S. Sirohi, John Wiley & Sons (Asia) Pvt. Ltd. 5. Electronic lab manual Vol II, Kuriachan T.D, Syam Mohan, Ayodhya Publishing.

COURSE OUTCOMES:

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

CO1	Understand the strength of material using Young's modulus.	K2
CO2	Acquire knowledge of thermal behavior of the matetials.	**K1**
CO3	Understand theoretical principles of magnetism through the experiments.	**K2**
CO4	Acquire knowledge about arc spectrum and applications of laser	**K1, K3**
CO5	Improve the analytical and observation ability in Physics Experiments	**K3, K5**
CO6	Conduct experiments on applications of FET and UJT	**K4**
CO7	Analyze various parameters related to operational amplifiers.	**K4**
CO8	Understand the concepts involved in arithmatic and logical circuits using IC's	**K2**
CO9	Acquire knowledge about Combinational Logic Circuits and Sequential Logic Circuits	**K1**
CO10	Analyze the applications of counters and registers	**K4**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓		✓	✓	✓
CO2	✓	✓	✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓
CO4	✓	✓		✓	✓	✓	✓	✓
CO5	✓	✓	✓		✓	✓	✓	✓
CO6	✓	✓					✓	✓
CO7	✓	✓		✓		✓	✓	✓
CO8	✓	✓		✓		✓	✓	✓
CO9	✓	✓		✓		✓	✓	✓
CO10	✓	✓		✓		✓	✓	✓
Number of matches = 63, Correlations: High								

Elective - List 1 – 1. PHYSICS OF NANOSCIENCE AND TECHNOLOGY	**I YEAR – FIRST SEMESTER**

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTE11	PHYSICS OF NANOSCIENCE AND TECHNOLOGY	ELECTIVE				3	4	75

Pre-Requisites
Basic knowledge in Solid State Physics
Learning Objectives
➢ Physics of Nanoscience and Technology is concerned with the study, creation, manipulation and applications at nanometer scale. ➢ To provide the basic knowledge about nanoscience and technology. ➢ To learn the structures and properties of nanomaterials. ➢ To acquire the knowledge about synthesis methods and characterization techniques and its applications.

UNITS	Course Details
UNIT I: FUNDAMENTALS OF NANOSCIENCE AND TECHNOLOGY	Fundamentals of NANO – Historical Perspective on Nanomaterial and Nanotechnology -– Classification of Nanomaterials – Metal and Semiconductor Nanomaterials - 2D, 1D, 0D nanostructured materials - Quantum dots – Quantum wires – Quantum wells - Surface effects of nanomaterials.
UNIT II: PROPERTIES OF	Physical properties of Nanomaterials: Melting points, specific heat

NANOMATERIALS	capacity, and lattice constant - Mechanical behavior: Elastic properties – strength - ductility - superplastic behavior - Optical properties: - Surface Plasmon Resonance – Quantum size effects - Electrical properties - Conductivity, Ferroelectrics and dielectrics - Magnetic properties – super para magnetism – Diluted magnetic semiconductor (DMS).
UNIT III: SYNTHESIS AND FABRICATION	Physical vapour deposition - Chemical vapour deposition - sol-gel – Wet deposition techniques - electrochemical deposition method – Plasma arching - Electrospinning method - ball milling technique - pulsed laser deposition - Nanolithography: photolithography – Nanomanipulator.
UNIT IV: CHARACTERIZATION TECHNIQUES	Powder X-ray diffraction – X-ray photoelectron spectroscopy (XPS) - UV-visible spectroscopy – Photoluminescence - Scanning electron microscopy (SEM) - Transmission electron microscopy (TEM) - Scanning probe microscopy (SPM) - Scanning tunneling microscopy (STM) – Vibrating sample Magnetometer.
UNIT V: APPLICATIONS OF NANOMATERIALS	Sensors: Nanosensors based on optical and physical properties - Electrochemical sensors – Nano-biosensors. Nano Electronics: Nanobots - display screens - GMR read/write heads - Carbon Nanotube Emitters – Photocatalytic application: Air purification, water purification -Medicine: Imaging of cancer cells – biological tags - drug delivery - photodynamic therapy - Energy: fuel cells - rechargeable batteries - supercapacitors - photovoltaics.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. A textbook of Nanoscience and Nanotechnology, Pradeep T., Tata McGraw-Hill Publishing Co. (2012). 2. Principles of Nanoscience and Nanotechnology, M.A. Shah, Tokeer Ahmad, Narosa Publishing House Pvt Ltd., (2010). 3. Introduction to Nanoscience and Nanotechnology, K. K. Chattopadhyay and A.N. Banerjee, PHI Learning Pvt. Ltd., New Delhi, (2012). 4. Nanostructured Materials and Nanotechnology, Hari Singh Nalwa, Academic Press, (2002). 5. Nanotechnology and Nanoelectronics, D.P. Kothari, V. Velmurugan and Rajit Ram Singh, Narosa Publishing House Pvt.Ltd, New Delhi. (2018)
REFERENCE BOOKS	1. Nanostructures and Nanomaterials – HuozhongGao – Imperial College Press (2004). 2. Richard Booker and Earl Boysen, (2005) Nanotechnology, Wiley Publishing Inc. USA 3. Nano particles and Nano structured films; Preparation, Characterization and Applications, J.H.Fendler John Wiley and Sons. (2007) 4. Textbook of Nanoscience and Nanotechnology, B.S.Murty, et al.,

	Universities Press. (2012) 5. The Nanoscope (Encyclopedia of Nanoscience and Nanotechnology), Dr. Parag Diwan and Ashish Bharadwaj (2005) Vol. IV - Nanoelectronics Pentagon Press, New Delhi.
WEB SOURCES	1. www.its.caltec.edu/feyman/plenty.html 2. http://www.library.ualberta.ca/subject/nanoscience/guide/index.cfm 3. http://www.understandingnano.com 4. http://www.nano.gov 5. http://www.nanotechnology.com

COURSE OUTCOMES:

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

CO1	Understand the basic of nanoscience and explore the different types of nanomaterials and should comprehend the surface effects of the nanomaterials.	K1, K2
CO2	Explore various physical, mechanical, optical, electrical and magnetic properties nanomaterials.	**K1**
CO3	Understand the process and mechanism of synthesis and fabrication of nanomaterials.	**K2, K3**
CO4	Analyze the various characterization of Nano-products through diffraction, spectroscopic, microscopic and other techniques.	**K4**
CO5	Apply the concepts of nanoscience and technology in the field of sensors, robotics, purification of air and water and in the energy devices.	**K3**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓			
CO2	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 36,					Correlations: High			

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTE12	ASTROPHYSICS	ELECTIVE				3	4	75

Pre-Requisites

Fundamental knowledge about electromagnetic spectrum, wave nature of light and about the universe and the galaxy where we live in.

Learning Objectives

- To impart knowledge on the physical universe and its evolution.
- To make the student to understand fundamental principles and techniques of astronomy and astrophysics.
- To make the student to study electromagnetic radiation from stars, atomic spectra and classification of stars.
- To provide information about the properties and the evolution of stars.

To render information about astronomical instrumentation.

UNITS	Course Details
UNIT I: OBSERVATIONAL ASTRONOMY	The electromagnetic spectrum; geometrical optics (ray diagrams, focal length, magnification etc); diffraction (resolving power, Airy disc, diffraction limit etc); telescopes (reflecting, refracting, multiwavelength)
UNIT II: PROPERTIES OF STARS	Brightness (luminosities, fluxes and magnitudes); colours (black body radiation, the Planck, Stefan-Boltzmann and Wien's laws, effective temperature, interstellar reddening); spectral types; spectral lines (Bohr model, Lyman & Balmer series etc, Doppler effect); Hertzprung-Russell diagram; the main sequence (stellar masses ,binary systems, Kepler's laws, mass-luminosity relations); distances to stars (parallax, standard candles, P-L relationships, ms-fitting etc); positions of stars (celestial sphere, coordinate systems, proper motions, sidereal and universal time).
UNIT III: THE LIFE AND DEATH OF STARS	Energy source (nuclear fusion, p-pchain, triple-alpha, CNO cycle, lifetime of the Sun); solar neutrinos; basic stellar structure hydro static equilibrium, equation of state);evolution beyond the main sequence; formation of the heavy elements; supernovae; stellar remnants(white dwarfs, neutron stars, black holes, degeneracy pressure, Swarszchild radius, escape velocities).
UNIT IV: GALAXIES	Constituents of galaxies; stellar populations; the interstellar medium; HII regions; 21cm line; spirals and ellipticals; galactic dynamics; galaxy rotation curves and dark matter; active galaxies and quasars.

UNIT V: COSMOLOGY	Galaxies and the expanding Universe; Hubble's Law; the age of the Universe; the Big Bang; cosmic microwave background (black body radiation);big bang nucleosynthesis (cosmic abundances, binding energies, matter & radiation); introductory cosmology (the cosmological principle, homogeneity and isotropy, Olber's paradox); cosmological models (critical density, geometry of space, the fate of the Universe); dark energy and the accelerating Universe.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1.Zeilik& Gregory, Introductory Astronomy & Astrophysics,4th edition (Saunders College Publishing) 2.Morison, I., IntroductiontoAstronomyand Cosmology, (Wiley) 3.Kutner, M.L., Astronomy: A Physical Perspective (Cambridge University Press) 4. Green,S.F& Jones,M.H.,An Introduction to the Sunand Stars (Cambridge University Press)
REFERENCE BOOKS	5.Jones, M.H.&Lambourne,R.J.A.,An Introduction to Galaxies & Cosmology (Cambridge UniversityPress) 6.Carroll, B.W.&Ostlie,D.A.,An Introduction to ModernAstrophysics (Pearson) 7.Shu, F.H.,The Physical Universe, An Introduction to Astronomy, (University Science Books) 8.Motz, L.&Duveen, A.,The Essentials of Astronomy, (ColombiaUniversityPress)
WEB SOURCES	1. https://www.coursera.org/courses?query=astrophysics 2. https://www.space.com 3. https://www.britanica.com 4. https://science.nasa.gov 5. https://merriam-webster.com

COURSE OUTCOMES:

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

CO1	Recall and understand the electromagnetic ration from celestial objects. Analyze the wave nature of light in the form of ray diagram. Apply the knowledge of phenomenon of diffraction and asses, how diffraction limits the resolution of any system having a lens or mirror. Distinguish between reflecting and refracting telescopes and their usage.	**K1** **K2** **K3** **K4** K5
CO2	Correlate luminosity, flux and magnitude, related to the brightness of a star. Analyze the evolution of stars using HR diagram. Apply and examine the various laws related to temperature of a star. Assess the distance of stars, measured using trigonometric parallax method. Understand the position of star in the celestial sphere. Distinguish between sideral and universal time.	**K1** **K2** **K3** **K4** **K5**

CO3	Define nuclear fusion, which is the fundamental energy source of stars. Analyze, how neutrinos are born during the process of nuclear fusion in the sun. Recall and explain the CNO cycle – the main source of energy of hotter stars.Comprehend stellar evolution, including red giants,supernovas, neutron stars, pulsars, white dwarfs and blackholes, using evidence and presently accepted theories	**K1 K2 K3 K4**
CO4	Remember and illustrate the structure of our Milky waygalaxy. Classify the types of galaxies. Understand the presence of dark matter in the universe. Explain, howquasars and active galaxies are powered by supermassiveblack holes which produce copious luminosity.	**K1 K2 K3 K4**
CO5	Explain cosmology, a branch of astronomy that involvesthe origin and evolution of the universe, from the Big Bangto today and on into the future. Define Hubble's law ofcosmic expansion.Analyze and assess the big bangnucleonsynthesis universe that explains the relative	**K1 K2 K3 K4 K5**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓		✓		✓	
CO2	✓	✓	✓		✓	✓	✓	
CO3	✓			✓	✓			
CO4		✓	✓	✓	✓			✓
CO5		✓	✓				✓	✓
Number of matches = 23, Correlations: Moderate								

Elective - List 1 – 1. MATERIALS SCIENCE	I YEAR - FIRST SEMESTER

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTE13	MATERIALS SCIENCE	ELECTIVE				3	4	75

Pre-Requisites	Basic knowledge on different types of materials
Learning Objectives	➢ To gain knowledge on optoelectronic materials ➢ To learn about ceramic processing and advanced ceramics ➢ To understand the processing and applications of polymeric materials ➢ To gain knowledge on the fabrication of composite materials To learn about shape memory alloys, metallic glasses and nanomaterials
UNITS	**Course details**
UNIT I: OPTOELECTRONIC MATERIALS	Importance of optical materials – properties: Band gap and lattice matching – optical absorption and emission – charge injection, quasi-Fermi levels and recombination – optical absorption, loss and gain. Optical processes in quantum structures: Inter-band and intra-band transitions Organic semiconductors. Light propagation in materials – Electro-optic effect and modulation, electro-absorption modulation – exciton quenching.
UNIT II CERAMIC MATERIALS	Ceramic processing: powder processing, milling and sintering – structural ceramics: zirconia, alumina, silicon carbide, tungsten carbide – electronic ceramics – refractories – glass and glass ceramics
UNIT III POLYMERIC MATERIALS	Polymers and copolymers – molecular weight measurement – synthesis: chain growth polymerization – polymerization techniques – glass transition temperature and its measurement – viscoelasticity – polymer processing techniques – applications: conducting polymers, biopolymers and high temperature polymers.
UNIT IV COMPOSITE MATERIALS	Particle reinforced composites – fiber reinforced composites – mechanical behavior – fabrication methods of polymer matrix composites and metal matrix composites – carbon/carbon composites: fabrication and applications.
UNIT V: NEW MATERIALS	Shape memory alloys: mechanisms of one-way and two-way shape memory effect, reverse transformation, thermo-elasticity and pseudo-elasticity, examples and applications -bulk metallic glass: criteria for glass formation and stability, examples and mechanical behavior - nanomaterials: classification, size effect on structural and functional properties, processing and properties of Nano crystalline materials,

	single walled and multi walled carbon nanotubes
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	Jasprit Singh, Electronic and optoelectronic properties of semiconductor structures, Cambridge University Press, 2007 P. K. Mallick. Fiber-Reinforced Composites. CRC Press, 2008. V. Raghavan, 2003, Materials Scienceand Engineering, 4th Edition, Prentice- Hall India, New Delhi(For units 2,3,4 and 5) G.K. Narula, K.S. Narula and V.K. Gupta, 1988, Materials Science, Tata McGraw-Hill M. Arumugam, 2002, Materials Science, 3rd revised Edition, Anuratha Agencies
REFERENCE BOOKS	B. S. Murty, P. Shankar, B. Raj, B. B. Rath and J. Murday. Textbook of Nanoscience and Nanotechnology. Springer- Verlag, 2012. K. Yamauchi, I. Ohkata, K. Tsuchiya and S. Miyazaki (Eds). Shape Memory and Super Elastic Alloys: Technologies and Applications. Wood head Publishing Limited, 2011. Lawrence H. VanVlack, 1998. Elements of Materials Science and Engineering, 6th Edition, Second ISE reprint, Addison-Wesley. H. Iabch and H. Luth, 2002, Solid State Physics – An Introduction to Principles of Materials Science, 2nd Edition, Springer. D. Hull & T. W. Clyne, An introduction to composite materials, Cambridge University Press, 2008.
WEB SOURCES	1. https://onlinecourses.nptel.ac.in/noc20_mm02/preview 2. https://nptel.ac.in/courses/112104229 3. https://archive.nptel.ac.in/courses/113/105/113105081 4. https://nptel.ac.in/courses/113/105/113105025/ https://eng.libretexts.org/Bookshelves/Materials_Science/Supplemental_Modules_(Materials_Science)/Electronic_Properties/Lattice_Vibrations

COURSE OUTCOMES:

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

CO1	Acquire knowledge on optoelectronic materials	K1
CO2	Be able to prepare ceramic materials	**K3**
CO3	Be able to understand the processing and applications of polymeric materials	**K2, K3**
CO4	Be aware of the fabrication of composite materials	**K5**
CO5	Be knowledgeable of shape memory alloys, metallic glasses and nanomaterials	**K1**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓		✓		✓	✓	✓
CO2	✓	✓	✓			✓	✓	

CO3	✓	✓	✓	✓		✓		
CO4	✓	✓	✓	✓		✓	✓	
CO5	✓	✓		✓		✓		
Number of matches = 26 Correlation =HIGH								

Elective List 2 – 2. NONLINEAR DYNAMICS	**I YEAR – FIRST SEMESTER**

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTE14	NONLINEAR DYNAMICS	ELECTIVE				3	4	75

Pre-Requisites

Basics of Numerical methods and Differential equations, Fundamentals of linear and nonlinear waves, and Basics of communication systems

Learning Objectives

- To school the students about the analytical and numerical techniques of nonlinear dynamics.
- To make the students understand the concepts of various coherent structures.
- To train the students on bifurcations and onset of chaos.
- To educate the students about the theory of chaos and its characterization.
- To make the students aware of the applications of solitons, chaos and fractals.

UNITS	Course Details
UNIT I: GENERAL	Linear waves-ordinary differential equations(ODEs)-Partial differential equations(PDEs)- Methods to solve ODEs and PDEs. - Numerical methods – Linear and Nonlinear Oscillators-Nonlinear Waves-Qualitative features
UNIT II: COHERENT STRUCTURES	Linear and Nonlinear dispersive waves - Solitons – KdB equation – Basic theory of KdB equation –Ubiquitous soliton equations – AKNS Method, Backlund transformation, Hirotabilinearization method, Painleve analysis - Perturbation methods- Solitons in Optical fibres - Applications.
UNIT III: BIFURCATIONS AND ONSET OF CHAOS	One dimensional flow – Two dimensional flows – Phase plane – Limit cycles – Simple bifurcations – Discrete Dinamical system – Strange attractors – Routes to chaos.
UNIT IV: SOLUTION OF NLD SYSTEM	Stability of solutions from nonlinear dynamics systems – phase portrait – trajectories – driven pendulum – Vender Pol and Duffing oscillator – period doubling route to chaos Poincare Map – Logistic Map – strange attractors – Lorentz attractor.
UNIT V APPLICATIONS	Soliton based communication systems – Solition based computation – Synchronization of chaos – Chaos based communication – Cryptography – Image processing – Stochastic – Resonance – Chaos based

	computation – Time Series analysis.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS	1. M.Lakshmanan and S.Rajasekar, Nonlinear Dynamics: Integrability, Chaos and Patterns.Springer, 2003. 2. A.Hasegawa and Y.Kodama, Solitons in Optical Communications. Oxford Press, 1995. 3. Drazin, P. G. Nonlinear Systems. Cambridge University Press, 2012. ISBN: 9781139172455. 4. Wiggins, S. Introduction to Applied Nonlinear Dynamical Systems and Chaos. Springer, 2003. ISBN: 9780387001777. 5. Strogatz, Steven H. Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry, and Engineering. Westview Press, 2014. ISBN: 9780813349107.
REFERENCE BOOKS	1. G.Drazin and R.S.Johnson. Solitons: An Introduction. Cambridge University Press, 1989. 2. M.Lakshmanan and K.Murali. Chaos in Nonlinear Oscillators. World Scientific, 1989. 3. S.Strogatz**.** Nonlinear Dynamics and Chaos. Addison Wesley, 1995. 4. Hao Bai-Lin, Chaos (World Scientidic, Singapore, 1984). 5. Kahn, P. B., Mathematical Methods for Scientists & Engineers (Wiley, NY, 1990)
WEB SOURCES	1. https://www.digimat.in/nptel/courses/video/108106135/L06.html 2. http://digimat.in/nptel/courses/video/115105124/L01.html 3. https://www.digimat.in/nptel/courses/video/108106135/L01.html 4. http://complex.gmu.edu/neural/index.html 5. https://cnls.lanl.gov/External/Kac.php

COURSE OUTCOMES:

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

CO1	Gain knowledge about the available analytical and numerical methods to solve various nonlinear systems.	K1, K4
CO2	Understand the concepts of different types of coherent structures and their importance in science and technology.	**K2**
CO3	Learn about simple and complex bifurcations and the routes to chaos	**K1, K2**
CO4	Acquire knowledge about various oscillators, characterization of chaos and fractals.	**K1**
CO5	To analyze and evaluate the applications of solutions in telecommunication, applications of chaos in cryptography, computations and that of fractals.	**K3, K5**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓		✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	
CO3	✓	✓		✓		✓	✓	✓
CO4	✓	✓	✓	✓	✓			✓
CO5	✓	✓	✓	✓	✓		✓	
Number of matches =31					Correlation = Very High			

Paper 5 - STATISTICAL MECHANICS	I YEAR - SECOND SEMESTER

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTC21	STATISTICAL MECHANICS	Core				5	6	75

Pre-Requisites
Knowledge of Laws of thermodynamics, phase transition, entropy, ensembles, partition function, classical and quantum statistics, thermal equilibrium, Brownian motion
Learning Objectives
➢ To acquire the knowledge of thermodynamic potentials and to understand phase transition in thermodynamics ➢ To identify the relationship between statistic and thermodynamic quantities ➢ To comprehend the concept of partition function, canonical and grand canonical ensembles ➢ To grasp the fundamental knowledge about the three types of statistics ➢ To get in depth knowledge about phase transitions and fluctuation of thermodynamic properties that vary with time

UNITS	Course Details
UNIT I: PHASE TRANSITIONS	Thermodynamic potentials - Phase Equilibrium - Gibb's phase rule - Phase transitions and Ehrenfest's classifications –Third law of Thermodynamics. Order parameters – Landau's theory of phase transition - Critical indices - Scale transformations and dimensional analysis.
UNIT II: STATISTICAL MECHANICS AND	Foundations of statistical mechanics - Specification of states of a system - Micro canonical ensemble - Phase space – Entropy - Connection between statistics and thermodynamics – Entropy of an ideal gas using the micro canonical

THERMODYNAMICS	ensemble - Entropy of mixing and Gibb's paradox.
UNIT III: CANONICAL AND GRAND CANONICAL ENSEMBLES	Trajectories and density of states - Liouville's theorem - Canonical and grand canonical ensembles - Partition function - Calculation of statistical quantities - Energy and density fluctuations.
UNIT IV: CLASSICAL AND QUANTUM STATISTICS	Density matrix - Statistics of ensembles - Statistics of indistinguishable particles - Maxwell-Boltzmann statistics - Fermi-Dirac statistics – Ideal Fermi gas – Degeneracy - Bose-Einstein statistics - Plank radiation formula - Ideal Bose gas - Bose-Einstein condensation.
UNIT V: REAL GAS, ISING MODEL AND FLUCTUATIONS	Cluster expansion for a classical gas - Virial equation of state – Calculation of the first Virial coefficient in the cluster expansion - Ising model - Mean-field theories of the Ising model in three, two and one dimensions - Exact solutions in onedimension. Correlation of space-time dependent fluctuations - Fluctuations and transport phenomena - Brownian motion - Langevin's theory - Fluctuation-dissipation theorem - The Fokker-Planck equation
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. S. K. Sinha, 1990, Statistical *Mechanics*, Tata McGraw Hill, New Delhi. 2. B. K. Agarwal and M. Eisner, 1998, *Statistical Mechanics,* Second Edition New Age International, New Delhi. 3. J. K. Bhattacharjee, 1996, *Statistical Mechanics*: An Introductory Text, Allied Publication, New Delhi. 4. F. Reif, 1965, *Fundamentals of Statistical and Thermal Physics,* McGraw - Hill, New York. 5. M. K. Zemansky, 1968, *Heat and Thermodynamics,* 5th edition, McGraw-Hill New York.
REFERENCE BOOKS	1. R. K. Pathria, 1996, *Statistical Mechanics,* 2nd edition, Butter WorthHeinemann, New Delhi. 2. L. D. Landau and E. M. Lifshitz, 1969, *Statistical Physics,* Pergamon Press, Oxford. 3. K. Huang, 2002, *Statistical Mechanics,* Taylor and Francis, London 4. W. Greiner, L. Neiseand H.Stoecker, *Thermodynamics and Statistical Mechanics,* Springer Verlang, New York. 5. A. B. Gupta, H. Roy, 2002, *Thermal Physics*, Books and Allied, Kolkata.
WEB SOURCES	1. https://byjus.com/chemistry/third-law-of-thermodynamics/ 2. https://web.stanford.edu/~peastman/statmech/thermodynamics.html 3. https://en.wikiversity.org/wiki/Statistical_mechanics_and_thermodynamics 4. https://en.wikipedia.org/wiki/Grand_canonical_ensemble 5. https://en.wikipedia.org/wiki/Ising_model

COURSE OUTCOMES:

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

CO1	To examine and elaborate the effect of changes in thermodynamic quantities on the states of matter during phase transition	K5

CO2	To analyze the macroscopic properties such as pressure, volume, temperature, specific heat, elastic moduli etc. using microscopic properties like intermolecular forces, chemical bonding, atomicity etc. Describe the peculiar behaviour of the entropy by mixing two gases Justify the connection between statistics and thermodynamic quantities	**K4**
CO3	Differentiate between canonical and grand canonical ensembles and to interpret the relation between thermodynamical quantities and partition function	**K1**
CO4	To recall and apply the different statistical concepts to analyze the behaviour of ideal Fermi gas and ideal Bose gas and also to compare and distinguish between the three types of statistics.	**K4, K5**
CO5	To discuss and examine the thermodynamical behaviour of gases under fluctuation and also using Ising model	**K3**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓					
CO2	✓	✓	✓	✓	✓		✓	
CO3	✓	✓	✓	✓	✓		✓	
CO4	✓	✓	✓	✓	✓		✓	
CO5	✓	✓	✓	✓			✓	
Number of matches = 26, Correlations: High								

Paper 6 - QUANTUM MECHANICS – I	**I YEAR - SECOND SEMESTER**

Subject Code	**Subject Name**	**Category**	**L**	**T**	**P**	**Credits**	**Inst. Hours**	**Marks**
PCPYTC22	**QUANTUM MECHANICS – I**	Core				5	6	75

Pre-Requisites
Knowledge of Newton's laws of motion, Schrodinger's equation, integration, differentiation.
Learning Objectives

- To develop the physical principles and the mathematical background important to quantum mechanical descriptions.
- To describe the propagation of a particle in a simple, one-dimensional potential.
- To formulate and solve the Schrodinger's equation to obtain eigenvectors and energies for particle in a three-dimensional potential.
- To explain the mathematical formalism and the significance of constants of motion, and see their relation to fundamental symmetries in nature
- To discuss the Approximation methods like perturbation theory, Variational and WKB methods for solving the Schrödinger equation.

UNITS	Course Details
UNIT I: BASIC FORMALISM	Interpretation of the wave function – Time dependent Schrodinger equation –Time independent Schrodinger equation – Stationary states – Ehrenfest's theorem – Linear vector space – Linear operator – Eigen functions and Eigen Values – Hermitian Operator – Postulates of Quantum Mechanics – Simultaneous measurability of observables – General Uncertainty relation
UNIT II:ONE DIMENSIONAL AND THREE-DIMENSIONAL ENERGY EIGEN VALUE PROBLEMS	Square – well potential with rigid walls – Square well potential with finite walls – Square potential barrier – Alpha emission – Bloch waves in a periodic potential – periodic potential – Linear harmonic oscillator: Operator method – Particle moving in a spherically symmetric potential – System of two interacting particles – Hydrogen atom – Rigid rotator
UNIT III: GENERAL FORMALISM	Dirac notation – Equations of motions – Schrodinger representation – Heisenberg representation – Interaction representation – Coordinate representation – Momentum representation – Symmetries and conservation laws – Unitary transformation – Parity and time reversal
UNIT IV: APPROXIMATION METHODS	Time independent perturbation theory for non-degenerate energy levels – Degenerate energy levels – Stark effect in Hydrogen atom – Ground and excited state – Variation method – Helium atom – WKB approximation – Connection formulae (no derivation) – WKB quantization – Application to simple harmonic oscillator.
UNIT V: ANGULAR MOMENTUM	Eigenvalue spectrum of general angular momentum – Ladder operators and their algebra – Matrix representation – Spin angular momentum – Addition of angular momenta – CG Coefficients – Symmetry and anti – symmetry of wave functions – Construction of wave-functions and Pauli's exclusion principle.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. P. M. Mathews and K. Venkatesan, A Text book of Quantum Mechanics, 2nd edition (37th Reprint), Tata McGraw-Hill, New Delhi, 2010. 2. G. Aruldhas, Quantum Mechanics, 2nd edition, Prentice Hall of India, New Delhi, 2009. 3. David J Griffiths, Introduction to Quantum Mechanics. 4th edition, Pearson, 2011.

	4. SL Gupta and ID Gupta, Advanced Quantum Theory and Fields, 1st Edition, S.Chand& Co., New Delhi, 1982. 5. A. Ghatak and S. Lokanathan, Quantum Mechanics: Theory and Applications, 4thEdition, Macmillan, India, 1984.
REFERENCE BOOKS	1. E. Merzbacher, Quantum Mechanics, 2nd Edition, John Wiley and Sons, New York, 1970. 2. V. K. Thankappan, Quantum Mechanics, 2nd Edition, Wiley Eastern Ltd, New Delhi, 1985. 3. L. D. Landau and E. M. Lifshitz, Quantum Mechanics, 1st edition, Pergomon Press, Oxford, 1976. 4. S. N. Biswas, Quantum Mechanics, Books and Allied Ltd., Kolkata,1999. 5. V. Devanathan, Quantum Mechanics, 2nd edition, Alpha Science International Ltd, Oxford, 2011.
WEB SOURCES	1. http://research.chem.psu.edu/lxjgroup/download_files/chem565-c7.pdf 2. http://www.feynmanlectures.caltech.edu/III_20.html 3. http://web.mit.edu/8.05/handouts/jaffe1.pdf 4. https://hepwww.pp.rl.ac.uk/users/haywood/Group_Theory_Lectures/Lecture_ 1.pdf 5. https://theory.physics.manchester.ac.uk/~xian/qm/chapter3.pdf

COURSE OUTCOMES:

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

CO1	Demonstrates a clear understanding of the basic postulates of quantum mechanics which serve to formalize the rules of quantum Mechanics	K1, K5
CO2	Is able to apply and analyze the Schrodinger equation to solve one dimensional problem and three-dimensional problems	**K3, K4**
CO3	Can discuss the various representations, space time symmetries and formulations of time evolution	**K1**
CO4	Can formulate and analyze the approximation methods for various quantum mechanical problems	**K4, K5**
CO5	To apply non-commutative algebra for topics such as angular and spin angular momentum and hence explain spectral line splitting.	**K3, K4**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓	✓	
CO2		✓		✓	✓	✓	✓	
CO3	✓	✓		✓	✓	✓	✓	

CO4			✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	
Number of matches = 29, Correlations: High								

Paper 7 - PRACTICAL II	**I YEAR - SECOND SEMESTER**

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYPC23	**General Physics PRACTICAL II**	Core				4	6	75

Pre-Requisites
Knowledge and handling of basic general and electronics experiments of Physics
Learning Objectives
➢ To understand the concept of mechanical behavior of materials and calculation of same using appropriate equations. ➢ To calculate the thermodynamic quantities and physical properties of materials. ➢ To analyze the optical and electrical properties of materials. ➢ To observe the applications of FET and UJT. ➢ To study the different applications of operational amplifier circuits. ➢ To learn about Combinational Logic Circuits and Sequential Logic Circuits

Course Details
(Minimum of Twelve Experiments from the list) 1. Determination of Young's modulus and Poisson's ratio by Elliptical fringes - Cornu's Method 2. Determination of Stefan's constant of radiation from a hot body 3. Measurement of Susceptibility of liquid - Quincke's method 4. B-H curve using CRO / DSO 5. Arc spectrum: Copper 6. Determination of Thickness of thin film. - Michelson Interferometer 7. Measurement of Dielectric - Microwave test bench (X-band) 8. Hall Effect in Semiconductor. Determine the Hall coefficient, carrier concentration and carrier mobility 9. GM counter – Absorption coefficient – Maximum range of β rays 10. Solving simultaneous equations – IC 741 11. Op-Amp –Active filters: Low pass, High pass and Band pass filters (Second Order) Batter worth filter 12. Study of attenuation characteristics of Wien's bridge network and design of Wien's bridge oscillator using Op-Amp.

13. Study of attenuation characteristics of Phase shift network and design of Phase shift oscillator using Op-Amp.
14. Construction of Square wave, Triangular wave and Sawtooth wave generator using IC 741
15. Construction of Current to Voltage and Voltage to Current Conversion using IC 741.
16. Study of binary up / down counters - IC 7476 / IC7473
17. Shift register and Ring counter and Johnson counter- IC 7476/IC 7474

TEXT BOOKS	1. Practical Physics, Gupta and Kumar, PragatiPrakasan 2. Kit Developed for doing experiments in Physics- Instruction manual, R.Srinivasan K.R Priolkar, Indian Academy of Sciences 3. Op-Amp and linear integrated circuit, Ramakanth A Gaykwad, Eastern Economy Edition. 4. Electronic lab manual Vol I, K ANavas, Rajath Publishing 5. Electronic lab manual Vol II, K ANavas, PHI eastern Economy Edition
REFERENCE BOOKS	1. An advanced course in Practical Physics, D.Chattopadhayay, C.RRakshit, New Central Book Agency Pvt. Ltd 2. Advanced Practical Physics, S.P Singh, PragatiPrakasan 3. A course on experiment with He-Ne Laser, R.S. Sirohi, John Wiley & Sons (Asia) Pvt.ltd 4. Electronic lab manual Vol II, Kuriachan T.D, Syam Mohan, Ayodhya Publishing 5. Electronic Laboratory Primer a design approach, S. Poornachandra, B.Sasikala, Wheeler Publishing, New Delhi

COURSE OUTCOMES:

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

CO1	Understand the strength of material using Young's modulus	K2
CO2	Acquire knowledge of thermal behaviour of the materials	**K1**
CO3	Understand theoretical principles of magnetism through the experiments.	**K2**
CO4	Acquire knowledge about arc spectrum and applications of laser	**K1**
CO5	Improve the analytical and observation ability in Physics Experiments	**K4**
CO6	Conduct experiments on applications arc spectrum	**K5**
CO7	Analyze various parameters related to operational amplifiers	**K4**
CO8	Understand the concepts involved in arithmetic and logical circuits using IC's	**K2**
CO9	Acquire knowledge about Combinational Logic Circuits and Sequential Logic Circuits	**K3**
CO10	Analyze the applications of dielectric measurement	**K4**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate		

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓		✓	✓	✓
CO2	✓	✓	✓		✓	✓	✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓
CO4	✓	✓		✓	✓	✓	✓	✓
CO5	✓	✓	✓		✓	✓	✓	✓
CO6	✓	✓			✓		✓	✓
CO7	✓	✓	✓	✓		✓	✓	✓
CO8	✓	✓	✓	✓		✓	✓	✓
CO9	✓	✓	✓	✓		✓	✓	✓
CO10	✓	✓		✓		✓	✓	✓
Number of matches = 67, Correlations: High								

Elective - List 2 – 1. GENERAL RELATIVITY AND COSMOLOGY	**I YEAR – SECOND SEMESTER**

Subject Code	Subject Name	Category		P	Credits	Inst. Hours	Marks
PCPYTE21	GENERAL RELATIVITY AND COSMOLOGY	ELECTIVE		3		4	75

Pre-Requisites
Skill in mathematics and mechanics
Learning Objectives
➢ To give an introduction to students in the areas of general relativity and cosmology

UNITS	Course Details
UNIT I: TENSORS	Tensors in index notation - Kronecker and Levi Civita tensors - inner and outer products - contraction - symmetric and antisymmetric tensors - quotient law - metric tensors - covariant and contravariant tensors - vectors - the tangent space - dual vectors - tensors - tensor products - the Levi-Civita tensor - tensors in Riemann spaces
UNIT I: TENSORS FIELD	Vector-fields, tensor-fields, transformation of tensors - gradient and Laplace operator in general coordinates - covariant derivatives and Christoffel connection - Elasticity: Field tensor - field energy tensor - strain tensor - tensor of elasticity- curvature tensor

UNIT III: GENERAL RELATIVITY	The spacetime interval - the metric - Lorentz transformations - space-time diagrams - world-lines - proper time - energy-momentum vector - energy-momentum tensor - perfect fluids - energy-momentum conservation - parallel transport - the parallel propagator - geodesics - affine parameters - the Riemann curvature tensor - symmetries of the Riemann tensor - the Bianchi identity
UNIT IV: TENSOR IN RELATIVITY	Ricci and Einstein tensors - Weyl tensor - Killing vectors - the Principle of Equivalence - gravitational redshift - gravitation as space-time curvature - the Newtonian limit - physics in curved space-time - Einstein's equations - the Weak Energy Condition - causality - spherical symmetry - the Schwarzschild metric - perihelion precession
UNIT V: COSMOLOGY	Expansion of the Universe - thermal history - and the standard cosmological model - Friedmann - Robertson-Walker type models of the Universe - Primordial inflation and the theory of cosmological fluctuations - Theory and observations of the cosmic microwave background and of the large-scale structure of the Universe - Dark matter and dark energy - theoretical questions and observational evidence - inflation - origin of galaxies and other open problems
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. M. R. Spiegel, *Vector Analysis, Schaum'a outline series*, McGraw Hill, New York, 1974. 2. James Hartle, *Gravity: An introduction to Einstein's general relativity,* San Francisco, Addison-Wesley, 2002 3. Sean Carroll, *Spacetime and Geometry: An Introduction to General Relativity*, (Addison-Wesley, 2004). 4. Jerzy Plebanskiand Andrzej Krasinski, *An Introduction to General Relativity and Cosmology,* Cambridge University Press 2006 5. Meisner, Thorne and Wheeler: *Gravitation* W. H. Freeman & Co., San Francisco 1973
REFERENCE BOOKS	1. Robert M. Wald: *Space, Time, and Gravity: the Theory of the Big Bang and Black Holes*, Univ. of Chicago Press. 2. J. V. Narlikar, *Introduction to Cosmology,* Jones &Bartlett 1983 3. Steven Weinberg, *Gravitation and Cosmology,* New York, Wiley, 1972. 4. Jerzy Plebanski and Andrzej Krasinski, *An Introduction to General Relativity and Cosmology,* Cambridge University Press 2006 5. R Adler, M Bazin& M Schiffer, Introduction *to General Relativity*
WEB SOURCES	1. http://www.fulviofrisone.com/attachments/article/486/A%20First%20Course%20In%20General%20Relativity%20-%20Bernard%20F.Schutz.pdf 2. https://link.springer.com/book/9780387406282 3. https://ocw.mit.edu/courses/8-962-general-relativity-spring-2020/resources/lecture-18-cosmology-i/ 4. https://arxiv.org/abs/1806.10122 5. https://uwaterloo.ca/applied-mathematics/future-undergraduates/what-you-can-learn-applied-mathematics/relativity-and-cosmology

COURSE OUTCOMES:

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

CO1	Skillfully handle tensors	K1
CO2	Understanding of the underlying theoretical aspects of general relativity and cosmology	**K2**
CO3	Gain knowledge on space time curvature	**K1**
CO4	Equipped to take up research in cosmology	**K3, K4**
CO5	Confidently solve problems using mathematical skills	**K5**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓		
CO2		✓	✓		✓	✓	✓	
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4				✓	✓	✓	✓	✓
CO5	✓	✓	✓		✓	✓	✓	
Number of matches = 29, Correlations: High								

Elective - List 1 – 1. CRYSTAL GROWTH AND THIN FILMS	**II YEAR – SECONDSEMESTER**

Subject Code	**Subject Name**	**Category**		**Credits**	**Inst. Hours**	**Marks**
PCPYTE22	**CRYSTAL GROWTH AND THIN FILMS**	**ELECTIVE**		**3**	**4**	**75**

Pre-Requisites
Fundamentals of Crystal Physics
Learning Objectives
➢ To acquire the knowledge on Nucleation and Kinetics of crystal growth ➢ To understand the Crystallization Principles and Growth techniques ➢ To study various methods of Crystal growth techniques ➢ To understand the thin film deposition methods ➢ To apply the techniques of Thin Film Formation and thickness Measurement

UNITS	**Course Details**

UNIT I: CRYSTAL GROWTH KINETICS	Basic Concepts, Nucleation and Kinetics of growth Ambient phase equilibrium - super saturation - equilibrium of finite phases equation of Thomson - Gibbs - Types of Nucleation - Formation of critical Nucleus - Classical theory of Nucleation - Homo and heterogeneous formation of 3D nuclei - rate of Nucleation - Growth from vapour phase solutions, solutions and melts - epitaxial growth - Growth mechanism and classification - Kinetics of growth of epitaxial films
UNIT II: CRYSTALLIZATION PRINCIPLES	Crystallization Principles and Growth techniques Classes of Crystal system - Crystal symmetry - Solvents and solutions - Solubility diagram - Super solubility - expression for super saturation - Metastable zone and introduction period - Miers TC diagram - Solution growth - Low and high temperatures solution growth - Slow cooling and solvent evaporation methods - Constant temperature bath as a Crystallizer.
UNIT III: GEL, MELT AND VAPOUR GROWTH	Gel, Melt and Vapour growth techniques Principle of Gel techniques - Various types of Gel - Structure and importance of Gel - Methods of Gel growth and advantages - Melt techniques - Czochralski growth - Floating zone - Bridgeman method - Horizontal gradient freeze - Flux growth - Hydrothermal growth - Vapour phase growth - Physical vapour deposition - Chemical vapour deposition - Stoichiometry.
UNIT IV: THIN FILM DEPOSITION METHODS	Thin film deposition methods of thin film preparation, Thermal evaporation, Electron beam evaporation, pulsed LASER deposition, Cathodic sputtering, RF Magnetron sputtering, MBE, chemical vapour deposition methods, Sol Gel spin coating, Spray pyrolysis, Chemical bath deposition.
UNIT V: THIN FILM FORMATION	Thin Film Formation and thickness Measurement Nucleation, Film growth and structure - Various stages in Thin Film formation, Thermodynamics of Nucleation, Nucleation theories, Capillarity model and Atomistic model and their comparison. Structure of Thin Film, roll of substrate, Roll of film thickness, Film thickness measurement - Interferometry, Ellipsometry, Micro balance, Quartz Crystal Oscillator techniques.
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. V. Markov Crystal growth for beginners: Fundamentals of Nucleation, Crystal Growth and Epitaxy (2004) 2nd edition 2. A. Goswami, Thin Film Fundamentals (New Age, New Delhi, 2008) 3. M. Ohora and R. C. Reid, “Modeling of Crystal Growth Rates from Solution” 4. 4. D. Elwell and H. J. Scheel, “Crystal Growth from High Temperature Solution” 5. Heinz K. Henish, 1973, “Crystal Growth in Gels”, Cambridge University Press. USA.
REFERENCE BOOKS	1. J.C. Brice, Crystal Growth Process (John Wiley, New York, 1986) 2. P. Ramasamy and F. D. Gnanam, 1983, “UGC Summer School Notes”. 3. P. SanthanaRaghavan and P. Ramasamy, “Crystal Growth Processes”,KRU Publications.

	4. H.E. Buckley, 1951, Crystal Growth, John Wiley and Sons, New York 5. B.R. Pamplin, 1980, Crystal Growth, Pergman Press, London.
WEB SOURCES	1. https://www.youtube.com/playlist?list=PLbMVogVj5nJRjLrXp3kMtrIO8kZl1D1Jp 2. https://www.youtube.com/playlist?list=PLFW6lRTa1g83HGEihgwcy7KeTLUuBu3WF 3. https://www.youtube.com/playlist?list=PLADLRin7kNjG1Dlna9MDA53CMKFHPSi9m 4. https://www.youtube.com/playlist?list=PLXHedI-xbyr8xIl_KQFs_R_oky3Yd1Emw 5. https://www.electrical4u.com/thermal-conductivity-of-metals/

COURSE OUTCOMES:

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

CO1	Acquire the Basic Concepts, Nucleation and Kinetics of crystal growth	K1
CO2	Understand the Crystallization Principles and Growth techniques	**K2, K4**
CO3	Study various methods of Crystal growth techniques	**K3**
CO4	Understand the Thin film deposition methods	**K2**
CO5	Apply the techniques of Thin Film Formation and thickness Measurement	**K3, K4**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓		✓	✓		✓
CO2	✓	✓	✓		✓		✓	
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4	✓				✓	✓	✓	✓
CO5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 30, Correlations: High								

Elective - List 2 – 1. PLASMA PHYSICS	II YEAR – SECOND SEMESTER

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTE23	PLASMA PHYSICS	ELECTIVE				3	4	75

Pre-Requisites
Fundamentals of Electricity and Magnetism, Electromagnetic theory, Maxwell's equation, Basic knowledge of electrical and electronics instrumentation.
Learning Objectives
➢ To explore the plasma universe by means of in-site and ground-based observations. ➢ To understand the model plasma phenomena in the universe. ➢ To explore the physical processes which occur in the space environment.

UNITS	Course Details
UNIT I: FUNDAMENTAL CONCEPTS OF PLASMA	Kinetic pressure in a partially ionized - mean free path and collision cross section - Mobility of charged particles - Effect of magnetic field on the mobility of ions and electrons-Thermal conductivity- Effect of magnetic field- Quasi- neutrality of plasma Debye shielding distance - Optical properties of plasma.
UNIT II: MOTION OF CHARGED PARTICLES IN ELECTRIC AND MAGNETIC FIELD	Particle description of plasma- Motion of charged particle in electrostatic field- Motion of charged particle in uniform magnetic field - Motion of charged particle in electric and magnetic fields- Motion of charged particle inhomogeneous magnetic field - Motion of charged particle in magnetic mirror confinement - motion of an electron in a time varying electric field- Magneto- hydrodynamics - Magneto-hydrodynamic equations – Condition for magneto hydrodynamic behaviour.
UNIT III: PLASMA OSCILLATIONS AND WAVES	Introduction, theory of simple oscillations - electron oscillation in a plasma – Derivations of plasma oscillations by using Maxwell's equation - Ion oscillation and waves in a magnetic field - thermal effects on plasma oscillations - Landau damping - Hydro magnetic waves - Oscillations in an electron beam.
UNIT IV: PLASMA DIAGNOSTICS TECHNIQUES	Single probe method - Double probe method - Use of probe technique for measurement of plasma parameters in magnetic field - microwave method - spectroscopic method - -laser as a tool for plasma diagnostics- X-ray diagnostics of plasma - acoustic method - conclusion.
UNIT V: APPLICATIONS OF PLASMA PHYSICS	Magneto hydrodynamic Generator - Basic theory - Principle of Working- Fuel in MHD Generator - Generation of Microwaves Utilizing High Density Plasma - Plasma Diode.
UNIT VI: PROFESSIONAL	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and

COMPONENTS	Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. Plasma Physics- Plasma State of Matter - S. N.Sen, PragatiPrakashan, Meerut. 2. Introduction to Plasma Physics-M. Uman 3. Krall, N. A., and A. W. Trivelpiece. Principles of Plasma Physics. Berkeley, CA: San Francisco Press, 1986. ISBN: 9780911302585.Tanenbaum, B. S. Plasma Physics. New York, NY: McGraw-Hill, 1967. ISBN: 9780070628120. 4. Goldston, R. J., and P. H. Rutherford. Introduction to Plasma Physics. Philadelphia, PA: IOP Publishing, 1995. ISBN: 9780750301831. 5. Hutchinson, I. H. Principles of Plasma Diagnostics. Cambridge, UK: Cambridge University Press, 2005. ISBN: 9780521675741.
REFERENCE BOOKS	1. Chen, F. F. Introduction to Plasma Physics. 2nd ed. New York, NY: Springer, 1984. ISBN: 9780306413322. 2. Introduction to Plasma Theory-D.R. Nicholson 3. Shohet, J. L. The Plasma State. San Diego, CA: Academic Press Inc., 1971. ISBN: 9780126405507. 4. Hazeltine, R. D., and F. L. Waelbroeck. The Framework of Plasma Physics. Boulder, CO: Westview Press, 2004. ISBN: 9780813342139. 5. Huddlestone, R. H., and S. L. Leonard. Plasma Diagnostic Techniques. San Diego, CA: Academic Press, 1965
WEB SOURCES	1. https://fusedweb.llnl.gov/Glossary/glossary.html 2. http://farside.ph.utexas.edu/teaching/plasma/lectures1/index.html 3. http://www.plasmas.org/ 4. http://www.phy6.org/Education/whplasma.html 5. http://www.plasmas.org/resources.htm

COURSE OUTCOMES:

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

CO1	Understand the collision, cross section of charged particles and to able to correlate the magnetic effect of ion and electrons in plasma state.	K1, K2
CO2	Understand the plasma and learn the magneto-hydrodynamics concepts applied to plasma.	**K2**
CO3	Explore the oscillations and waves of charged particles and thereby apply the Maxwell's equation to quantitative analysis of plasma.	**K1, K3**
CO4	Analyze the different principle and techniques to diagnostics of plasma.	**K2, K5**
CO5	Learn the possible applications of plasma by incorporating various electrical and electronic instruments.	**K4**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓		✓

CO2	✓	✓	✓		✓		✓	
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4	✓				✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	
Number of matches = 31, Correlations: High								

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTE24	**ADVANCED OPTICS**	**ELECTIVE**				**3**	**4**	**75**

Pre-Requisites
Knowledge of ray properties and wave nature of light
Learning Objectives
➢ To know the concepts behind polarization and could pursue research work on application aspects of laser ➢ To impart an extensive understanding of fiber and non-linear optics ➢ To study the working of different types of LASERS ➢ To differentiate first and second harmonic generation ➢ Learn the principles of magneto-optic and electro-optic effects and its applications

UNITS	Course Details
UNIT 1: POLARIZATION AND DOUBLE REFRACTION	Classification of polarization – Transverse character of light waves – Polarizer and analyzer – Malu's law – Production of polarized light – Wire grid polarizer and the polaroid – Polarization by reflection – Polarization by double refraction – Polarization by scattering – The phenomenon of double refraction – Normal and oblique incidence – Interference of polarized light: Quarter and half wave plates – Analysis of polarized light – Optical activity
UNIT II: LASERS	Basic principles – Spontaneous and stimulated emissions – Components of the laser – Resonator and lasing action – Types of lasers and its applications – Solid state lasers – Ruby laser – Nd:YAG laser – gas lasers – He-Ne laser – CO_2 laser – Chemical lasers – HCl laser – Semiconductor laser
UNIT III: FIBER OPTICS	Introduction – Total internal reflection – The optical fiber – Ray Theory - Meridonial and Skew ray -classification of fibers: Material, Index and Mode–The numerical aperture – **Attenuation in optical fibers: Material, dispersion, absorption and scattering SRS – SBS – communication window**– Single and multi-mode fibers – Pulse dispersion in multimode optical fibers – Ray dispersion in multimode step index fibers – Fiber-optic

	sensors: precision displacement sensor – Precision vibration sensor
UNIT IV: NON-LINEAR OPTICS	Basic principles – Harmonic generation – Second harmonic generation – Phase matching – Third harmonic generation – Optical mixing – Parametric generation of light – Self-focusing of light- Self de-focussing
UNIT V: MAGNETO-OPTICS AND ELECTRO-OPTICS	Magneto-optical effects – Zeeman effect – Inverse Zeeman effect – Faraday effect – Voigt effect – Cotton-mouton effect – Kerr magneto-optic effect – Electro-optical effects – Stark effect – Inverse stark effect – Electric double refraction – Kerr electro-optic effect – Pockels electro-optic effect
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism
TEXT BOOKS	1. B. B. Laud, 2017, Lasers and Non – Linear Optics, 3rd Edition, New Age International (P) Ltd. 2. AjoyGhatak, 2017, Optics, 6th Edition, McGraw – Hill Education Pvt. Ltd. 3. William T. Silfvast, 1996, Laser Fundamentals Cambridge University Press, New York 4. J. Peatros, Physics of Light and Optics, a good (and free!) electronic book 5. B. Saleh, and M. Teich, Fundamentals of Photonics, Wiley-Interscience,
REFERENCE BOOKS	1. F. S. Jenkins and H. E. White, 1981, Fundamentals of Optics, (4th Edition), McGraw – Hill International Edition. 2. Dieter Meschede, 2004, Optics, Light and Lasers, Wiley – VCH, Varley GmbH. 3. Lipson, S. G. Lipson and H. Lipson, 2011, Optical Physics, 4th Edition, Cambridge University Press, New Delhi, 2011. 4. Y. B. Band, Light and Matter, Wiley and Sons (2006) 5. R. Guenther, Modern Optics, Wiley and Sons (1990)
WEB SOURCES	1. https://www.youtube.com/watch?v=WgzynezPiyc 2. https://www.youtube.com/watch?v=ShQWwobpW60 3. https://www.ukessays.com/essays/physics/fiber–optics–and–it-applications.php 4. https://www.youtube.com/watch?v=0kEvr4DKGRI 5. http://optics.byu.edu/textbook.aspx

COURSE OUTCOMES:

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

CO1	Discuss the transverse character of light waves and different polarization phenomenon	K1
CO2	Discriminate all the fundamental processes involved in laser devices and to analyze the design and operation of the devices	**K2**
CO3	Demonstrate the basic configuration of a fiber optic – communication system and advantages	**K3, K4**
CO4	Identify the properties of nonlinear interactions of light and matter	**K4**
CO5	Interpret the group of experiments which depend for their action on an applied magnetics and electric field	**K5**

K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓	✓	✓		
CO2	✓	✓	✓		✓		✓	
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4	✓				✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	
Number of matches = 31, Correlations: High								

Elective - List 3 –1. SOLID WASTE MANAGEMENT	II YEAR – SECONDSEMESTER

Subject Code	Subject Name	Category	L	T	P	Credits	Inst. Hours	Marks
PCPYTS21	SOLID WASTE MANAGEMENT	ELECTIVE				2	4	75

Pre-Requisites
Basic knowledge of solid waste and its type
Learning Objectives
➢ To gain basic knowledge in solid waste management procedures ➢ To gain industry exposure and be equipped to take up a job. ➢ To harness entrepreneurial skills. ➢ To analyze the status of solid waste management in the nearby areas. ➢ To sensitize the importance of healthy practices in waste managements

UNITS	Course Details
UNIT I: SOLID WASTE MANAGEMENT	Introduction - Definition of solid waste - Types – Hazardous Waste: Resource conservation and Renewal act – Hazardous Waste: Municipal Solid waste and non-municipal solid waste.
UNIT II: SOLID WASTE CHARACTERISTICS	Solid Waste Characteristics: Physical and chemical characteristics - SWM hierarchy - factors affecting SW generation
UNIT III: TOOLS AND EQUIPMENT	Tools and equipment - Transportation - Disposal techniques - Composting and land filling technique

UNIT IV: ECONOMIC DEVELOPMENT	SWM for economic development and environmental protection Linking SWM and climate change and marine litter.
UNIT V: INDUSTRIAL VISIT	SWM Industrial visit – data collection and analysis - presentation
UNIT VI: PROFESSIONAL COMPONENTS	Expert Lectures, Online Seminars - Webinars on Industrial Interactions/Visits, Competitive Examinations, Employable and Communication Skill Enhancement, Social Accountability and Patriotism

TEXT BOOKS	1. Handbook of Solid Waste Management /Second Edition, George Tchobanoglous, McGraw Hill (2002). 2. Prospects and Perspectives of Solid Waste Management, Prof. B BHosett, New Age International (P) Ltd (2006). 3. Solid and Hazardous Waste Management, Second Edition, M.N Rao, snoitacilbuP SB/ PSBBooks (2020). 4. Integrated Solid Waste Management Engineering Principles and Management, Tchobanoglous, McGraw Hill (2014). 5. Solid Waste Management (SWM), Vasudevan Rajaram, PHI learning private limited, 2016
REFERENCE BOOKS	1. Municipal Solid Waste Management, Christian Ludwig, Samuel Stucki, Stefanie Hellweg, Springer Berlin Heisenberg, 2012 2. Solid Waste Management Bhide A. D Indian National Scientific Documentation Centre, New Delhi Edition 1983 ASIN: B0018MZ0C2 3. Solid Waste Techobanoglous George; Kreith, Frank McGraw Hill Publication, New Delhi 2002, ISBN 9780071356237 4. Environmental Studies Manjunath D. L. Pearson Education Publication, New Delhi, 20061SBN-I3: 978-8131709122 5. Solid Waste Management Sasikumar K. PHI learning, New Delhi, 2009 ISBN 8120338693
WEB SOURCES	1. https://www.meripustak.com/Integrated-Solid-Waste-Management-Engineering-Principles-And-Management-Issues-125648 2. https://testbook.com/learn/environmental-engineering-solid-waste-management/ 3. https://www.meripustak.com&gclid=Cj0KCQjwuuKXBhCRARIsA-gM0iVpismAJN93CHA1sX6NuNeOKLXfQJ_jxHCOVH3QXjJ1iACq30KofoaAmFsEALw_wcB 4. https://images.app.goo.gl/tYiW2gUPfS2cxdD28 5. https://amzn.eu/d/5VUSTDI

COURSE OUTCOMES:

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

CO1	Gained knowledge in solid waste management	K1
CO2	Equipped to take up related job by gaining industry exposure	**K5**
CO3	Develop entrepreneurial skills	**K3**
CO4	Will be able to analyze and manage the status of the solid wastes in the nearby areas	**K4**
CO5	Adequately sensitized in managing solid wastes in and around his/her locality	**K5**
K1 - Remember; K2 – Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓		✓		✓
CO2	✓	✓	✓				✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓
CO4	✓					✓	✓	✓
CO5	✓	✓	✓	✓		✓	✓	✓
Number of matches = 29, Correlations: High								

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.Sc. Chemistry**
Programme Code:	UCCH
Duration:	**3 Years (UG)**
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or

	coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team **PO8: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9: Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
Programme Specific Outcomes:	On successful completion of Bachelor of Physics with Computer Applications programme, the student should be able to: **PSO1: Disciplinary Knowledge:** Understand the fundamental principles, concepts, and theories related to physics and computer science. Also, exhibit proficiency in performing experiments in the laboratory. **PSO2: Critical Thinking:** Analyse complex problems, evaluate information, synthesize information, apply theoretical concepts to practical situations, identify assumptions and biases, make informed decisions and communicate effectively **PSO3: Problem Solving:** Employ theoretical concepts and critical reasoning ability with physical, mathematical and technical skills to solve problems, acquire data, analyze their physical significance and explore new design possibilities. **PSO4: Analytical & Scientific Reasoning:** Apply scientific methods, collect and analyse data, test hypotheses, evaluate evidence, apply statistical techniques and use computational models. **PSO5: Research related skills:**

	Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects. **PSO6: Self-directed & Lifelong Learning:** Set learning goals, manage their own learning, reflect on their learning, adapt to new contexts, seek out new knowledge, collaborate with others and to continuously improve their skills and knowledge, through ongoing learning and professional development, and contribute to the growth and development of their field.

PROGRAMME-SPECIFIC OUTCOMES (PSO)

ON COMPLETION OF THE B.SC CHEMISTRY PROGRAMME, THE STUDENTS WILL BE ABLE TO:

PSO1	Utilize his knowledge and interest after studying chemistry as a discipline by summarizing the basic facts and concepts learnt from theory and practical work.
PSO2	Apply principles, theories and techniques of the core subjects to another discipline.
PSO3	Apply the recent developments in chemistry to the welfare of nature and society.
PSO4	Get job opportunities as a chemist by his understanding of industrial process development and its applications.
PSO5	Pursue his higher education in various interdisciplinary subjects connected with technology and research.
PSO6	Handle chemicals, apparatus and instruments with proper analytical tools.
PSO7	Solve the problems arising out of industrial production and environmental pollution.
PSO8	Explore the knowledge of reactions, processes and their applications as an entrepreneur.

MAPPING OF PROGRAMME-SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Program-Specific Outcomes (PSOs)	**Program Outcomes (POs)**									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PSO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO3	✓	✓	✓	✓	✓	✓	✓	✓		✓
PSO4	✓	✓	✓	✓	✓	✓	✓	✓		
PSO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO6	✓	✓	✓	✓	✓	✓	✓	✓		
PSO7	✓	✓	✓	✓	✓	✓	✓	✓		✓
PSO8	✓	✓	✓	✓	✓	✓	✓	✓		✓
Number of matches = 73, Correlation: Very High										

MAPPING CORRELATION BENCHMARK

Mapping	**1-30%**	**31-60%**	**61-70%**	**71-100%**
Matches	**1-24**	**25-50**	**51-56**	**57-80**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

<table>
<tr><td>Title of the Course</td><td colspan="7">GENERAL CHEMISTRY-I</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core I</td></tr>
<tr><td>Category</td><td>Core</td><td>Year
Semester</td><td>I
I</td><td>Credits</td><td>5</td><td>Course Code</td><td>UCCHTC11</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="2">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">The course aims at giving an overall view of the
• various atomic models and atomic structure
• wave particle duality of matter
• periodic table, periodicity in properties and its application in explaining the chemical behaviour
• nature of chemical bonding, and
• fundamental concepts of organic chemistry</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="7">UNIT I: Atomic structure and Periodic trends: Atomic Spectra; Black-Body Radiation and Planck’s quantum theory - Bohr's model of atom. Photoelectric effect, Compton effect; Dual nature of Matter- De- Broglie wavelength-Davisson and Germer experiment Heisenberg’s Uncertainty Principle; Electronic Configuration of Atoms and ions- Hund’s rule, Pauli’exclusion principle and Aufbau principle. Numerical problems involving the core concepts.</td></tr>
<tr><td colspan="7">Unit II: Introduction to Quantum mechanics: Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital; Postulates of quantum mechanics; probability interpretation of wave functions, Formulation of Schrodinger wave equation - Probability and electron density- Probability density and significance of Ψ and Ψ^2. Features of the periodic table - Periodic trends for atomic size- Atomic radii, Ionic, crystal and Covalent radii; ionization energy, electron affinity, electronegativity. Electronegativity scales, applications of electronegativity.</td></tr>
<tr><td colspan="7">UNIT-III: Structure and bonding – I: Ionic bond - Lewis structure of ionic compounds - properties of ionic compounds. Born Haber cycle – lattice energies, Madelung constant; relative effect of lattice energy and solvation energy; Ion polarization – polarising power and polarizability; Fajans’ rules - effects of polarisation on properties of compounds; problems involving these concepts. Shapes of orbitals, overlap of orbitals – σ and Π bonds – hybridization. VSEPR theory - shapes of molecules of the type AB_2, AB_3, AB_4, AB_5, AB_6 and AB_7. Partial ionic character of covalent bond - percentage ionic character- numerical problems based on calculation of percentage ionic character.</td></tr>
<tr><td colspan="7">UNIT-IV: Structure and bonding – II: VB theory – application to hydrogen molecule; concept of resonance - resonance structures of some inorganic species – CO_2, NO_2, CO_3^{2-}, NO_3^-; limitations of VBT; MO theory - bonding, antibonding and nonbonding orbitals, bond order; MO diagrams of H_2, C_2, O_2, O_2^+, O^{2-}, O^{2-}, N_2, NO, HF, CO; magnetic characteristics, comparison of VB and MO theories.
Metallic bond - electron sea model, Band theory-mechanism of conduction in solids; conductors, insulator, semiconductor</td></tr>
<tr><td colspan="7">UNIT-V: Basic concepts in Organic Chemistry and Electronic effects: Types of bond cleavage – heterolytic and homolytic types of reagents - electrophiles, nucleophiles, free radicals; reaction intermediates – carbanions, carbocations, carbenes, arynes and nitrynes. Inductive effect - reactivity of alkyl halides, acidity of halo acids, basicity of amines; inductomeric and electromeric effects. Resonance – resonance energy, conditions for resonance - acidity of phenols, basicity of aromatic amines, stability of carbonium ions, carbanions and free radicals, reactivity of vinyl chloride, dipole moment of vinyl chloride and nitrobenzene, bond lengths; steric inhibition to resonance. Hyperconjugation.</td></tr>
</table>

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinationsUPSC/JAM /TNPSC and others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Madan, R. D. and Sathya Prakash, *Modern Inorganic Chemistry*, 2nded.; S.Chand and Company: New Delhi, 2003. 2. Rao, C.N. R. University General Chemistry, Macmillan Publication: NewDelhi, 2000. *3.* Puri, B. R. and Sharma, L. R. *Principles of Physical Chemistry*, 38thed.; Vishal Publishing Company: Jalandhar, 2002. 4. Bruce, P. Y. and PrasadK. J. R. *Essential Organic Chemistry*, PearsonEducation: New Delhi, 2008. 5. Dash UN, Dharmarha OP, Soni P.L. Textbook of Physical Chemistry, Sultan Chand & Sons: New Delhi,2016
Reference Books	1. Maron, S. H. and Prutton C. P. *Principles of Physical Chemistry*,4thed.; The Macmillan Company: Newyork, 1972. 2. Lee, J. D. *Concise Inorganic Chemistry*, 4th ed.; ELBS WilliamHeinemann: London,1991. 3. Gurudeep Raj, *Advanced Inorganic Chemistry*, 26thed.; Goel PublishingHouse: Meerut, 2001. 4. Atkins, P.W. & Paula, J. *Physical Chemistry*, 10th ed.; Oxford UniversityPress: New York, 2014. *5.* Huheey, J. E. *Inorganic Chemistry: Principles of Structure and Reactivity*, 4th ed .; Addison, Wesley Publishing Company: India,1993.
Website ande-learning source	1) https://onlinecourses.nptel.ac.in 2) http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm 3) http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html 4) https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding 5) https://www.chemtube3d.com/

Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to

CO1: explain the atomic structure, wave particle duality of matter, periodic properties bonding,and properties of compounds.

CO2: classify the elements in the periodic table, types of bonds, reaction intermediates electroniceffects in organic compounds, types of reagents.

CO3: apply the theories of atomic structure, bonding, to calculate energy of a spectral transition,Δx, Δp electronegativity, percentage ionic character and bond order.

CO4: evaluate the relationship existing between electronic configuration, bonding, geometry ofmolecules and reactions; structure reactivity and electronic effects

CO5: construct MO diagrams, predict trends in periodic properties, assess the properties of elements, and explain hybridization in molecules, nature of H – bonding and organic reaction mechanisms.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

Level of Correlation between PSO's and CO'

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Title of theCourse	**Quantitative Inorganic Estimation (Titrimetry) and Inorganic Preparations**						
Paper No.	**Core II**						
Category	**Core**	**Year**	I	**Credits**	2	**Course Code**	UCCHPC12
		Semester	I				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	-	-	3			3	
Prerequisites	Higher secondary chemistry						
Objectives ofthe course	This course aims at providing knowledge on • laboratory safety • handling glass wares • Quantitative estimation • preparation of inorganic compounds						
Course Outline	**Unit I: Chemical Laboratory Safety in Academic Institutions** Introduction - importance of safety education for students, common laboratory hazards, assessment and minimization of the risk of the hazards, prepare for emergencies from uncontrolled hazards; concept of MSDS; importance and care of PPE; proper use and operation of chemical hoods and ventilation system; fire extinguishers-types and uses of fire extinguishers, demonstration of operation; chemical waste and safe disposal. **Common Apparatus Used in Quantitative Estimation (Volumetric)** Description and use of burette, pipette, standard flask, measuring cylinder, conical flask, beaker, funnel, dropper, clamp, stand, wash bottle, watch glass, wire gauge and tripod stand. **Principle of Quantitative Estimation (Volumetric)** Equivalent weight of an acid, base, salt, reducing agent, oxidizing agent; concept of mole, molality, molarity, normality; primary and secondary standards, preparation of standard solutions; theories of acid-base, redox, complexometric, iodimetric and						

	iodometric titrations**;** indicators – types, theory of acid–base, redox, metal ion and adsorption indicators, choice of indicators.
	Unit II: **Quantitative Estimation(Volumetric)** 1. Preparation of standard solution, dilution from stock solution **Permanganometry** 2. Estimation of sodium oxalate using standard ferrous ammonium sulphate **Dichrometry** 3 Estimation of ferric alum using standard dichromate (external indicator) 4. Estimation of ferric alum using standard dichromate (internal indicator) **Iodometry** 5. Estimation of copper in copper sulphate using standard dichromate
	Unit III: **Complexometry** 1. Estimation of hardness of water using EDTA **Estimations** 2. Estimation of iron in iron tablets 3. Estimation of ascorbic acid. **Preparation of Inorganic compounds** 4. Potash alum 5. Tetraammine copper (II) sulphate 6. Hexamminecobalt (III) chloride **7.** Mohr's Salt
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
RecommendedText	**Reference Books:** 1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. *Basic Principles of Practical Chemistry*,2nd ed.; Sultan Chand &Sons: New Delhi, 1997. *2.* Nad, A. K.; Mahapatra, B.; Ghoshal, A.; *An advanced course in Practical Chemistry*, 3rd ed.; New Central Book Agency: Kolkata, 2007.
ReferenceBooks	1. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; *Vogel's Textbook of Quantitative Chemical Analysis*, 6th ed.; Pearson Education Ltd: New Delhi, 2000.
Website and e-learning source	**Web References:** 1) http://www.federica.unina.it/agraria/analytical-chemistry/volumetric-analysis 2) https://chemdictionary.org/titration-indicator/

Course Learning Outcomes (for Mapping with POs and PSOs)
On successful completion of the course the students should be able to
CO1: explain the basic principles involved in titrimetric analysis and inorganic preparations.
CO2: compare the methodologies of different titrimetric analysis.
CO3: calculate the concentrations of unknown solutions in different ways and develop the skillto estimate the amount of a substance present in a given solution.
CO4: assess the yield of different inorganic preparations and identify the end point of various titrations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

<table>
<tr><td>Title of theCourse</td><td colspan="7">ROLE OF CHEMISTRY IN DAILY LIFE</td></tr>
<tr><td>Paper No.</td><td colspan="7">SEC-I</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">NME</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2">UCCHTF11</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours perweek</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>2</td><td>-</td><td colspan="2">-</td><td colspan="3">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary chemistry</td></tr>
<tr><td>Objectives ofthe course</td><td colspan="7">This course aims at providing an overall view of the
• importance of Chemistry in everyday life
• chemistry of building materials and food
• chemistry of Drugs and pharmaceuticals</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="7">UNIT-I
General survey of chemicals used in everyday life. Air - components and their importance; photosynthetic reaction, air pollution, green - house effect and the impact on our life style. Water - Sources of water, qualities of potable water, soft and hard water, methods of removal of hardness-water pollution</td></tr>
<tr><td colspan="7">Unit-II
Building materials - cement, ceramics, glass and refractories - definition, composition and application only. Plastics - polythene, PVC, bakelite, polyesters, melamine-formaldehyde resins -preparation and uses only.</td></tr>
<tr><td colspan="7">UNIT-III
Food and Nutrition - Carbohydrates, Proteins, Fats - definition and their importance as food constituents – balanced diet – Calories minerals and vitamins (sources and their physiological importance). Cosmetics – tooth paste, face powder, soaps and detergents, shampoos, nail polish, perfumes - general formulation and preparations - possible hazards of cosmetic use.</td></tr>
<tr><td colspan="7">UNIT-IV
Chemicals in food production – fertilizers - need, natural sources; urea,NPK fertilizers and super phosphate. Fuel – classification - solid, liquid and gaseous; nuclear fuel examples and uses.</td></tr>
<tr><td colspan="7">UNIT-V
Pharmaceutical drugs - analgesics and antipyretics - paracetamol and aspirin. Colour chemicals - pigments and dyes - examples and applications. Explosives - classification and examples.</td></tr>
<tr><td>Recommended Text</td><td colspan="7">1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010.
2. A textbook of pharmaceutical chemistry by Jayashree Ghosh, S Chand publishing, 2012.
3. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006.</td></tr>
</table>

	4. B. K, Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.Introduction to forensic chemistry, Kelly M. Elkins, CRC Press Taylor & Francis Group, 2019. 5. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand & Co. Publishers, second edition, 2006.
ReferenceBooks	1.Randolph. Norris Shreve, Chemical Process Industries, McGraw-Hill,Texas, fourthedition, 1977. 2.W. A. Poucher, Joseph A. Brink, Jr. Perfumes, Cosmetics and Soaps, Springer, 2000. 3. A. K. De, Environmental Chemistry, NewAge International Public Co., 1990.
Website and e-learningsource	1. https://education.nationalgeographic.org/resource/greenhouse-effect/ 2. https://nios.ac.in/media/documents/SrSec313NEW/313_Chemistry_Eng/313_Chemistry_Eng_Lesson30.pdf

Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to

CO1: learn about the chemicals used in everyday life as well as air pollution and waterpollution.

CO2: get knowledge on building materials cement, ceramics, glass and plastics, polythene,PVC bakelite, polyesters,

CO3: acquire information about Food and Nutrition. Carbohydrates, Proteins, Fats. Also have awareness about Cosmetics Tooth pastes, face powder, soaps and detergents.

CO4: discuss about the fertilizers like urea, NPK fertilizers and super phosphate. Fuelclassification solid, liquid and gaseous; nuclear fuel - examples and uses

CO5: have an idea about the pharmaceutical drugs analgesics and antipyretics like paracetamol and aspirin and also about pigments and dyes and its applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

GENERIC ELECTIVE

<table>
<tr><td>Title of theCourse</td><td colspan="7">ALLIED CHEMISTRY
(FOR PHYSICS & BIOCHEMISTRY STUDENTS)</td></tr>
<tr><td>Paper No.</td><td colspan="7">Generic Elective I</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">UCPYTA11/ UCBITA11</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>4</td><td colspan="2">-</td><td colspan="2"></td><td colspan="2">4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims to provide knowledge on the
• basics of atomic orbitals, chemical bonds, hybridization
• concepts of thermodynamics and its applications.
• concepts of nuclear chemistry
• importance of chemical industries
• Qualitative and analytical methods.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT I: Chemical Bonding and Nuclear Chemistry
Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. Molecular orbital diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties.
Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions - group displacement law. Nuclear binding energy - mass defect. Nuclear fission and nuclear fusion - differences – Stellar energy. Applications of radioisotopes – carbon dating techniques and medicinal applications.</td></tr>
<tr><td></td><td colspan="7">Unit II: Industrial Chemistry
Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required). Silicones: Synthesis, properties and uses of silicones.
Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate.</td></tr>
<tr><td></td><td colspan="7">UNIT III: Fundamental Concepts in Organic Chemistry
Hybridization: Orbital overlap hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Polar effects: Inductive effect and consequences on Ka and K_b of organic acids and bases, electrometric, mesomeric. Aromaticity, Hyper conjugation and Steric factors - examples and explanation. Reaction mechanisms: Aromatic electrophilic substitution; nitration, halogenation, Friedel-Craft’s alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.</td></tr>
<tr><td></td><td colspan="7">UNIT IV: Thermodynamics and Phase Equilibria
Thermodynamics: Types of systems, reversible and irreversible processes, isothermal and adiabatic processes and spontaneous processes. Statements of first law and second law of thermodynamics. Carnot’s cycle and efficiency of heat engine. Entropy and its significance. Free energy change and its importance (no derivation). Conditions for spontaneity in terms of entropy and Gibbs free energy. Relationship between Gibbs free energy and entropy. Phase Equilibria: Phase rule - definition of terms in it. Applications of phase rule to water system. Two component system - Reduced phase rule and its application to a simple eutectic system (Pb-Ag).</td></tr>
</table>

	UNIT V: Analytical Chemistry Introduction to qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques – extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. V.Veeraiyan, Text book of Ancillary Chemistry; High mountpublishing house, Chennai, first edition,2009. 2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 3. S.ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand andCompany, NewDelhi, twenty third edition, 2012. 4. P. L. Soni, H. M. Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninthedition, 2007.
Reference Books	1. P. L. Soni, Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007. 2. B. R. Puri, L. R. Sharma, M. S. Pathania, Textbook Physical Chemistry; V ishal Publishing Co., New Delhi, forty seventh edition, 2018. 3. B. K, Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.

Course Learning Outcomes (for Mapping with POs and PSOs)
On completion of the course the students should be able to
CO 1: gain in-depth knowledge about the theories of chemical bonding, nuclear reactions and its applications.
CO 2: evaluate the efficiencies and uses of various fuels and fertilizers
CO 3: explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.
CO 4: apply various thermodynamic principles, systems and phase rule.
CO 5: explain various methods to identify an appropriate method for the separation of chemical components

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

Title of theCourse	PRACTICAL: ALLIED CHEMISTRY - I (FOR PHYSICS AND BIOCHEMISTRY)						
Paper No.	Generic Elective V						
Category	Generic Elective	Year	I	Credits	1	CourseCode	UCPYPA11/ UCBIPA11
		Semester	I				
Instructional hours per week	Lecture	Tutorial	Lab Practice			Total	
	-	-	3			3	
Prerequisites	Higher secondary chemistry						
Objectives of the course	This course aims to provide knowledge on the • basics of preparation of solutions. • principles and practical experience of volumetric analysis						
Course Outline	**VOLUMETRIC ANALYSIS** 1. Estimation of sodium hydroxide using standard sodiumcarbonate. 2. Estimation of hydrochloric acid using standard oxalic acid. 3. Estimation of ferrous sulphate using standard Mohr's salt. 4. Estimation of oxalic acid using standard ferrous sulphate. 5. Estimation of potassium permanganate using standardsodium hydroxide. 6. Estimation of magnesium using EDTA. 7. Estimation of ferrous ion using diphenyl amine as indicator.						
Reference Books	1. V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry; Sultan Chand & sons, Second edition, 1997.						
Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette. CO 2: design, carry out, record and interpret the results of volumetric titration. CO 3: apply their skill in the analysis of water/hardness. CO4: analyze the chemical constituents in allied chemical products							

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12

Weighted percentage of Course Contribution toPSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

Title of the Course	**GENERAL CHEMISTRY-II**						
Paper No.	**Core III**						
Category	**Core**	**Year**	**I**	**Credits**	**5**	**Course Code**	**UCCHTC21**
		Semester	**II**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	5	**1**	**-**			**6**	
Prerequisites	General Chemistry I						
Objectives ofthe course	This course aims at providing an overall view of the • chemistry of acids, bases and ionic equilibrium • properties of s and p-block elements • chemistry of hydrocarbons • applications of acids and bases • compounds of main block elements and hydrocarbons						
Course Outline	**UNIT-I: Acids, bases and Ionic equilibria** Concepts of Acids and Bases - Arrhenius concept, Bronsted-Lowry concept, Lewis concept; Relative strengths of acids, bases and dissociation constant; dissociation of poly basic acids, ionic product of water, pH scale, pH of solutions; Degree of dissociation, common ion effect, factors affecting degree of dissociation; acid base indicators, theory of acid base indicators – action of phenolphthalein and methyl orange. Buffer solutions – mechanism of buffer action in acid and basic buffer, Henderson-Hasselbalch equation; Salt hydrolysis - salts of weak acids and strong bases, weak bases and strong acids, weak acids and weak bases - hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant and degree of hydrolysis; Solubility product - determination and applications; numerical problems involving the core concepts.						

	Unit-II: Chemistry of s - Block Elements Hydrogen: Position of hydrogen in the periodic table. Alkali metals: Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates. Diagonal relationship of Li with Mg. Preparation, properties and uses of NaOH, Na_2CO_3, KBr, $KClO_3$ alkaline earth metals. Anomalous behaviour of Be. **Chemistry of p- Block Elements** preparation and structure of diborane and borazine. Chemistry of borax. Extraction of Al and its uses. Alloys of Al. Comparison of carbon with silicon. Carbon-di-sulphide – Preparation, properties, structure and uses. Percarbonates, per monocarbonates and per dicarbonates.
	UNIT-III: Chemistry of p- Block Elements General characteristics of elementsof Group 15; chemistry of $H_2N\text{-}NH_2$, NH_2OH, HN_3 and HNO_3. Chemistry of PH_3, PCl_3, PCl_5, $POCl_3$, P_2O_5 and oxy acids of phosphorous (H_3PO_3 and H_3PO_4). General properties of elements of group16 - Structure and allotropy of elements - chemistry of ozone - Classification and properties of oxides - oxides of sulphur and selenium – Oxy acids of sulphur (Caro's and Marshall's acids). Chemistry of Halogens: General characteristics of halogen with reference to electro-negativity, electron affinity, oxidation states and oxidizing power. Halogen acids (HF, HCl, HBr and HI), oxides and oxy acids ($HClO_4$). Inter-halogen compounds (ICl, ClF_3, BrF_5 and IF_7), pseudo halogens [$(CN)_2$ and $(SCN)_2$] and basic nature of Iodine. Noble gases: Position in the periodic table. Preparation, properties and structure of XeF_2, XeF_4, XeF_6 and $XeOF_4$; uses of noble gases.
	UNIT-IV: Hydrocarbon Chemistry-I **Alkenes** - Nomenclature, general methods of preparation – Mechanism of ß-elimination reactions – E_1 and E_2 mechanism - factors influencing – stereochemistry – orientation – Hofmann and Saytzeff rules. Reactions of alkenes – addition reactions – mechanisms – Markownikoff's rule, Kharasch effect, oxidation reactions – hydroxylation, oxidative degradation, epoxidation, ozonolysis; polymerization. **Alkadienes -** Nomenclature - classification – isolated, conjugated and cumulated dienes; stability of conjugated dienes; mechanism of electrophilic addition to conjugated dienes - 1, 2 and 1, 4 additions; free radical addition to conjugated dienes– Diels–Alder reactions – polymerisation – polybutadiene, polyisoprene (natural rubber), vulcanisation, polychloroprene. **Alkynes -** Nomenclature; general methods of preparation, properties and reactions; acidicnature of terminal alkynes and acetylene, polymerisation and isomerisation.
	UNIT-V: Hydrocarbon Chemistry - II **Cycloalkanes:** Nomenclature, Relative stability of cycloalkanes, Bayer's strain theory and its limitations. Conformational analysis of cyclohexane, mono and di substituted cyclohexanes. Geometrical isomerism in cyclohexanes. Benzene**:** Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, Huckel's (4n+2) rule and its applications. Electrophilic substitution reactions - General mechanism of aromatic electrophilic substitution - nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation. Mono substituted and disubstituted benzene - Effect of substituent – orientation and reactivity. **Polynuclear Aromatic hydrocarbons**: Naphthalene – nomenclature, Haworth synthesis; physical properties, reactions – electrophilic substitution reaction, nitration, sulphonation, halogenation, Friedel – Crafts acylation & alkylation, preferential substitution at - position – reduction, oxidation – uses.
Extended Professional Component (is a part of internal component only,	Questions related to the above topics, from various competitive examinations UPSC/JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)

Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Madan R D, Sathya Prakash, (2003), Modern Inorganic Chemistry, 2nded, S.Chand and Company, New Delhi. 2. Sathya Prakash, Tuli G D,Basu S K and Madan R D, (2003), Advanced Inorganic Chemistry, 17th ed., S.Chand and Company, New Delhi. 3. Bahl B S, Arul Bhal, (2003), Advanced Organic Chemistry, 3rd ed., S.Chand and Company, New Delhi. 4. Tewari K S, Mehrothra S N and Vishnoi N K, (1998), Text book of Organic Chemistry, 2nd ed., Vikas Publishing House, New Delhi. 5. Puri B R, Sharma L R, (2002), Principles of Physical Chemistry, 38th ed., Vishal Publishing Company, Jalandhar.
ReferenceBooks	1. Maron S H and Prutton C P, (1972), Principles of Physical Chemistry, 4th ed., The Macmillan Company, Newyork. 2. Barrow G M, (1992), Physical Chemistry, 5th ed., Tata McGraw Hill, New Delhi. 3. Lee J D, (1991), Concise Inorganic Chemistry, 4thed., ELBS William Heinemann, London. 4. Huheey J E, (1993), Inorganic Chemistry: Principles of Structure andReactivity, 4th ed., Addison Wesley Publishing Company, India. 5. Gurudeep Raj, (2001), Advanced Inorganic Chemistry Vol – I, 26th ed.,Goel Publishing House, Meerut. 6. Agarwal O P, (1995), Reactions and Reagents in Organic Chemistry,8thed., Goel Publishing House, Meerut.
Website and e-learning source	1. https://onlinecourses.nptel.ac.inhttp://cactus.dixie.edu/smblack/chem1010/lecture_notes/4B.html 2. http://www.auburn.edu/~deruija/pdareson.pdfhttps://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding **MOOC components** 3. http://nptel.ac.in/courses/104101090/ 4. Lecture 1: Classification of elements and periodic properties http://nptel.ac.in/courses/104101090/

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

CO1: explain the concept of acids, bases and ionic equilibria; periodic properties of s and pblock elements, preparation and properties of aliphatic and aromatic hydrocarbons

CO2: discuss the periodic properties of sand p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids

CO3: classify hydrocarbons, types of reactions, acids and bases, examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons

CO4: explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements

CO5: assess the application of hard and soft acids indicators, buffers, compounds of s and p-block elements and hydrocarbons

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Title of the Course	**PRACTICAL II -QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS**						
Paper No.	**Core IV**						
Category	**Core**	**Year**	**I**	**Credits**	**2**	**Course Code**	**UCCHPC22**
		Semester	**II**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	-	**-**	**3**			**3**	
Prerequisites	General Chemistry II						
Objectives ofthe course	This course aims at providing knowledge on • laboratory safety • handling glass wares • analysis of organic compounds • preparation of organic compounds						
	UNIT I Safety rules, symbols and first-aid in chemistry laboratory. Basic ideas about Bunsen burner, its operation and parts of the flame.Chemistry laboratory glassware –basis information and uses						
	Unit II **Qualitative Organic Analysis** Preliminary examination, detection of special elements - nitrogen, sulphur and halogens Aromatic and aliphatic nature, Test for saturation and unsaturation, identification of functional groups using solubility tests Confirmation of functional groups • monocarboxylic acid, dicarboxylic acid • monohydric phenol, polyhydric phenol • aldehyde, ketone, ester • carbohydrate (reducing and non-reducing sugars)						

	• primary, secondary, tertiary amine • monoamide, diamide, thioamide • anilide, nitro compound Preparation of derivatives for functional groups
	UNIT III **Preparation of Organic Compounds** i. Nitration - picric acid from Phenol ii. Halogenation - p-bromo acetanilide from acetanilide iii. Oxidation - benzoic acid from Benzaldehyde iv. Microwave assisted reactions in water: v. Methyl benzoate to Benzoic acid vi. Salicylic acid from Methyl Salicylate vii. Rearrangement - Benzil to Benzilic Acid viii. Hydrolysis of benzamide to Benzoic Acid
	Separation and Purification Techniques (Not for Examination) 1. Purificationof organic compounds by crystallization (from water / alcohol)and distillation 2. Determination of melting and boiling points of organic compounds. 3.**Steam distillation** - Extraction of essential oil from citrus fruits/eucalyptus leaves. **4. Chromatography (any one) (Group experiment)** (i) Separation of amino acids by Paper Chromatography (ii)Thin Layer Chromatography - mixture of sugars / plant pigments /permanganatedichromate. (iii) Column Chromatography - extraction of carotene, chlorophyll and xanthophyll from leaves / separation of anthracene - anthracene picrate. 5. **Electrophoresis –** Separation of amino acids and proteins. **(Demonstration)** 6. Isolation of casein from milk/Determination of saponification value of oil or fat/Estimation of acetic acid from commercial vinegar. (Any one Group experiment) (4,5& 6–not for ESE)
ReferenceBooks	1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. *Basic Principlesof Practical Chemistry*, 2nd ed.; Sultan Chand: New Delhi, 2012. 2. Manna, A.K. *Practical Organic Chemistry*, Books and Allied: India,2018. 3. Gurtu, J. N; Kapoor, R. *Advanced Experimental Chemistry (Organic),*Sultan Chand: New Delhi, 1987. 4. Furniss,B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. *Vogel's Textbook of Practical Organic Chemistry*, 5th ed.; Pearson: India,1989.
Website ande-learning source	1. https://www.vlab.co.in/broad-area-chemical-sciences

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

CO1: observe the physical state, odour, colour and solubility of the given organic compound.

CO2: identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.

CO3: compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non-reducing sugars and explain the reactions behind it.

CO4: exhibit a solid derivative with respect to the identified functional group.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Title of the Course	**DAIRY CHEMISTRY**						
Paper No.	**SEC- II**						
Category	**NME**	**Year**	I	**Credits**	2	**Course Code**	UCCHTS21
		Semester	II				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	2	-	-			2	
Prerequisites	Higher secondary chemistry						
Objectives ofthe course	This course aims at providing an overall view of the • chemistry of milk and milk products • processing of milk • preservation and formation of milk products.						
Course Outline	**UNIT I: Composition of Milk** Milk-definition-general composition of milk- constituents of milk - lipids, proteins, carbohydrates, vitamins and minerals - physical properties of milk - colour, odour, acidity, specific gravity, viscosity and conductivity -Factors affecting the composition of milk - adulterants, preservatives with neutralizer- examples and their detection- estimation of fat, acidity and total solids in milk.						
	Unit II: Processing of Milk Microbiology of milk - destruction of micro - organisms in milk, physico – chemical changes taking place in milk due to processing - boiling, pasteurization – types of pasteurization -Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization.						
	UNIT III: Major Milk Products Cream - definition - composition - chemistry of creaming process - gravitational and centrifugal methods of separation of cream - estimation of fat in cream. Butter - definition - composition - theory of churning – desi butter - salted butter, estimation of acidity and moisture content in butter. Ghee - major constituents - common adulterants added to ghee and their detection – rancidity - definition - prevention - antioxidants and synergists - natural and synthetic.						
	UNIT IV: Special Milk						

	Standardised milk - definition - merits - reconstituted milk - definition - flowdiagram of manufacture - Homogenised milk - flavoured milk – vitaminised milk - toned milk - Incitation milk - Vegetable toned milk - humanized milk - condensed milk - definition, composition and nutritive value.
	UNIT V: Fermented and other Milk Products Fermented milk products – fermentation of milk - definition, conditions, cultured milk - definition of culture - example, conditions - cultured cream, butter milk - Bulgarious milk -acidophilous milk – Yoheer Indigeneous products- khoa and chhena definition - Ice cream -definition-percentagecomposition-types-ingredients-manufacture of ice – cream, stabilizers - emulsifiers and their role – milk powder – definition – need for making milk powder – drying process - types of drying.
Recommended Text	1. K. Bagavathi Sundari, Applied Chemistry, MJP Publishers, first edition,2006. 2. K. S. Rangappa and K.T. Acharya, Indian Dairy Products, Asia PublishingHouse New Delhi, 1974. 3.Text book of dairy chemistry, M.P. Mathur, D. Datta Roy, P. Dinakar, IndianCouncil of Agricultural Research, 1 st edition, 2008. 4. A Text book of dairy chemistry, Saurav Singh, Daya Publishing house, 1 stedition, 2013. 5. Text book of dairy chemistry, P. L. Choudhary, Bio-Green book publishers,2021.
Reference Books	1. Robert Jenness and S. Patom, Principles of Dairy Chemistry, S.Wiley, NewYork, 2005. 2. F.P.Wond, Fundamentals of Dairy Chemistry,Springer,Singapore,2006. 3. Sukumar De, Outlines of Dairy Technology, Oxford University Press, NewDelhi, 1980. 4. P.F.Fox and P.L.H. Mcsweeney, Dairy Chemistry and Biochemistry,Springer, Second edition, 2016. 5. Dairy chemistry and biochemistry, P. F. Fox, T. Uniacke-Lowe, P.L.H. McSweeney, J.A. OMahony, Springer, Second edition, 2015.
Website and e-learning source	1.https://egyankosh.ac.in/bitstream/123456789/61871/1/UNIT%208%20Milk%20Composition%2C%20Its%20Constituents%20and%20Nutritional%20Importance.pdf 2.https://dairyprocessinghandbook.tetrapak.com/chapter/fermented-milk-products

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

CO 1: understand about general composition of milk – constituents and its physical properties.

CO 2: acquire knowledge about pasteurization of Milk and various types of pasteurization - Bottle, Batch and HTST Ultra High Temperature Pasteurization.

CO 3: learn about Cream and Butter their composition and how to estimate fat in cream and Ghee

CO 4: explain about Homogenized milk, flavoured milk, vitaminised milk and toned milk.

CO 5: have an idea about how to make milk powder and its drying process - types of drying process.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

<table>
<tr><td>Title of the Course</td><td colspan="7">ALLIED CHEMISTRY – II
(FOR PHYSICS BIOCHEMISTRY STUDENTS)</td></tr>
<tr><td>Paper No.</td><td colspan="7">Generic Elective II</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">UCPYTA21/ UCBITA21</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>4</td><td>-</td><td colspan="2">-</td><td colspan="3">4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Chemistry for physics and biochemistry - I</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims at providing knowledge on the
• Co-ordination Chemistry and Water Technology
• Carbohydrates and Amino acids
• basics and applications of electrochemistry
• basics and applications of kinetics and catalysis
• Various photochemical phenomenon</td></tr>
<tr><td rowspan="4">Course Outline</td><td colspan="7">UNIT I: Co-ordination Chemistry and Water Technology
Co-ordination Chemistry: Definition of terms-IUPAC Nomenclature - Werner'stheory - EAN rule - Pauling's theory – Postulates - Applications to $[Ni(CO)4]$, $[Ni(CN)4]^{2-}$,$[Co(CN)6]^{3-}$ Chelation - Biological role of Haemoglobin and Chlorophyll (elementary idea) – Applications in qualitative and quantitative analysis.
Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques - BOD, COD.</td></tr>
<tr><td colspan="7">Unit II: Carbohydrates and Amino acids
Carbohydrates: Classification, preparation and properties of glucose, fructose and sucrose. Discussion of open chain ring structures of glucose and fructose. Glucose – fructose inter-conversion. Properties of starch and cellulose.
Amino acids: Classification - preparation and properties of alanine, preparation of di-peptides using Bergmann method. RNA and DNA (elementary idea only).</td></tr>
<tr><td colspan="7">UNIT III: Electrochemistry
Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water - pH, pKa, pKb. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention.</td></tr>
<tr><td colspan="7">UNIT IV: Kinetics and Catalysis
Order and molecularity. Integrated rate expression for I and II (2A --> Products) order reactions. Pseudo first order reaction, methods of determining order of a reaction – Half-life period – Catalysis - homogeneous and heterogeneous, catalyst used in Contact and Haber's processes. Concept of energy of activation and Arrhenius</td></tr>
</table>

	equation.
	UNIT V: Photochemistry Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen-chloride reaction. Phosphorescence, fluorescence, chemiluminescence and photosensitization and photosynthesis (definition with examples).
Extended Professional Component (is a part of internal component only, Not to be includedin the external examination question paper)	Questions related to the above topics, from various competitiveexaminations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mountpublishing house, Chennai, first edition,2009. 2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 3. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand andCompany, New Delhi, twenty third edition, 2012. 4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; SultanChand & sons, New Delhi, twenty ninth edition, 2007.
Reference Books	1. P.L.Soni, Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007. 2. R.Puri, L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018. 3. B.K,Sharma, Industrial Chemistry; Meerut, sixteenth edition, 2014. GOEL publishing house,
Website and e-learning source	1. https://www.samareducation.com/2021/07/coordination-compounds-chemistry-class-12-notes.html 2. https://uomustansiriyah.edu.iq/media/lectures/6/6_2021_09_18!10_01_14_AM.pdf

Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to

CO 1: write the IUPAC name for complex, different theories to explain the bonding incoordination compounds and water technology

CO 2: explain the preparation and property of carbohydrate, amino acids and nucleic acids.

CO 3: apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuelcells.

CO 4: identify the reaction rate, order for chemical reaction and explain the purpose of acatalyst.

CO 5: outline the various type of photochemical process.

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3

CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage ofCourse Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

<table>
<tr><td>Title of the Course</td><td colspan="7">PRACTICAL: ALLIED CHEMISTRY - II
(FOR PHYSICS AND BIOCHEMISTRY)</td></tr>
<tr><td>Paper No.</td><td colspan="7">Generic Elective VI</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Generic Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">1</td><td rowspan="2">Cours eCode</td><td rowspan="2">UCPYPA21/ UCBIPA21</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>-</td><td>-</td><td colspan="2">3</td><td colspan="3">3</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Chemistry for Physics and Biochemistry - I</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims to provide knowledge on
• identification of organic functional groups
• different types of organic compounds with respect to their properties.
• determination of elements in organic compounds.</td></tr>
<tr><td></td><td colspan="7">SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS
The analysis must be carried out as follows:
(a) Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehydeand glucose].
(b) Detection of elements (N, S, Halogens).
(c) To distinguish between aliphatic and aromatic compounds.
(d) To distinguish – Saturated and unsaturated compounds.</td></tr>
<tr><td>Reference Books</td><td colspan="7">V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles of Practical Chemistry; Sultan Chand & sons, Second edition, 1997.</td></tr>
<tr><td colspan="8">Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to
CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette.
CO 2: design, carry out, record and interpret the results of volumetric titration.
CO 3: apply their skill in the analysis of water/hardness.</td></tr>
</table>

CO4: analyze the chemical constituents in allied chemical products

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution toPSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	**M. Sc., Chemistry**
Programme Code	
Duration	**PG – 2YEARS**
Programme Outcomes (Pos)	**PO1: Problem Solving Skill** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. **PO2: Decision Making Skill** Foster analytical and critical thinking abilities for data-based decision-making. **PO3: Ethical Value** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities. **PO4: Communication Skill** Ability to develop communication, managerial and interpersonal skills. **PO5: Individual and Team Leadership Skill** Capability to lead themselves and the team to achieve organizational goals. **PO6: Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment. **PO7: Entrepreneurial Skill** Equip with skills and competencies to become an entrepreneur. **PO8: Contribution to Society** Succeed in career endeavors and contribute significantly to society. **PO 9 Multicultural competence** Possess knowledge of the values and beliefs of multiple cultures and a global perspective. **PO 10: Moral and ethical awareness/reasoning**

	Ability to embrace moral/ethical values in conducting one's life.
Programme Specific Outcomes (PSOs)	**PSO1 – Placement** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions. **PSO 2 - Entrepreneur** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. **PSO3 – Research and Development** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5 – Contribution to the Society** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

PROGRAMME SPECIFIC OUTCOMES (PSO) On completion of the M.Sc Chemistry Programme, By the end of the program, the students will be able to

PSO1	Orient the skill and knowledge in Computation and its applications in chemistry and handle the suitable software for the subject and correlate it with experimental data.
PSO2	Apply the multi-dimensional aspects of chemistry and its applications in Material science, Molecular modelling, Drug discovery and Process Development.
PSO3	Utilize the basic knowledge of structure, reactivity, characterization and applications of chemicals in the development of novel chemical compounds.
PSO4	Handle the instruments employed in maintaining the quality and control of chemicals in the manufacturing process.
PSO5	Extract, elucidate the structure and synthesize natural products from the available sources
PSO6	Apply the knowledge of reactions and mechanisms in the synthesis of new chemicals, their analysis and applications.
PSO7	Carry out any kind of project in quality control, research and process development in the chemical industry, enhancing the job opportunities of the students.
PSO8	Communicate and work collaboratively with Technologists and Environmentalists leading to sustainable living.

MAPPING OF PROGRAMME-SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Program -Specific Outcomes (PSOs)	**Program Outcomes (POs)**									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PSO1	✓	✓	✓	✓	✓	✓	✓	✓		
PSO2	✓	✓	✓	✓	✓	✓	✓	✓		
PSO3	✓	✓	✓	✓	✓	✓	✓			
PSO4	✓	✓	✓	✓	✓	✓	✓			
PSO5	✓	✓	✓	✓	✓	✓	✓	✓		
PSO6	✓	✓	✓	✓	✓	✓	✓	✓		
PSO7	✓	✓	✓	✓	✓	✓	✓			✓
PSO8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 64, Correlation: Very High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

<table>
<tr><td>Title of the Course</td><td colspan="7">ORGANIC REACTION MECHANISM - I</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core I</td></tr>
<tr><td>Category</td><td>Core</td><td>Year
Semester</td><td>I
I</td><td>Credits</td><td>4</td><td>Course Code</td><td>PCCHTC11</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="2">-</td><td colspan="3">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of organic chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To understand the feasibility and the mechanism of various organic reactions.
To comprehend the techniques in the determination of reaction mechanisms.
To understand the concept of stereochemistry involved in organic compounds.
To correlate and appreciate the differences involved in the various types of organic reaction mechanisms.
To design feasible synthetic routes for the preparation of organic compounds.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT-I: Methods of Determination of Reaction Mechanism: Reaction intermediates. The transition state, Reaction coordinate diagrams, Thermodynamic and kinetic requirements of reactions: Hammond postulate. Methods of determining mechanism: non-kinetic methods - product analysis. Determination of intermediates-isolation, detection, and trapping. Cross-over experiments - isotopic labeling, isotope effects and stereo chemical evidences. Kinetic methods - relation of rate and mechanism. Effect of structure on reactivity: Hammett and Taft equations. Linear free energy relationship, partial rate factor, substituent and reaction constants.</td></tr>
<tr><td></td><td colspan="7">UNIT-II: Aromaticity, Aromatic and Aliphatic Electrophilic Substitution: Aromaticity: Aromaticity in benzenoid, non-benzenoid, heterocyclic compounds and annulenes.
Aromatic electrophilic substitution: Orientation and reactivity in substituted aromatic compounds. Reactions involving nitrogen electrophiles: nitration, nitrosation and diazonium coupling; Sulphur electrophiles: sulphonation; Halogen electrophiles: chlorination and bromination; Carbon electrophiles: Friedel-Crafts alkylation, acylation and arylation reactions. Aliphatic electrophilic substitution Mechanisms: SE2 and SEi, SE1- Mechanism and evidences.</td></tr>
<tr><td></td><td colspan="7">UNIT-III: Aromatic and Aliphatic Nucleophilic Substitution: Aromatic nucleophilic substitution: Mechanisms - S_NAr, S_N1 and Benzyne mechanisms - Evidences - Reactivity, Effect of structure, leaving group and attacking nucleophile. Reactions: Oxygen and Sulphur-nucleophiles, Bucherer and Rosenmund reactions, von Richter, Sommelet - Hauser and Smiles rearrangements. S_N1, ion pair, S_N2 mechanisms and evidences, Neighbouring group mechanism. Aliphatic nucleophilic substitutions at an allylic carbon, aliphatic trigonal carbon and vinyl carbon.S_N1, S_N2, S_Ni, and S_E1 mechanism and evidences, Swain- Scott, Grunwald-Winstein relationship - Ambident nucleophiles.</td></tr>
<tr><td></td><td colspan="7">UNIT-IV: Stereochemistry-I: Introduction to molecular symmetry and chirality – axis, plane, center, alternating axis of symmetry. Optical isomerism due to asymmetric and dissymmetric molecules with C, N, S based chiral centers. Optical</td></tr>
</table>

	purity, prochirality, enantiotopic and diastereotopic atoms, groups, faces, axial and planar chirality, chirality due to helical shape. Racemic modifications by thermal, anion, cation, reversible formation, epimerization, mutarotation. Projection Formula-Fischer, Sawhorse, Newman and its interconversion. Absolute and Relative configurations - Cram's and Prelog's rules: R, S-notations, proR and proS. Cahn-Ingold-Prelog rules- Erythro and threo compounds.Configurations of allenes, spiranes, biphenyls, cyclooctene, helicene and ansa compounds. Resolution of racemic modifications, asymmetric transformations, asymmetric synthesis. Stereoselective and stereospecific synthesis.
	UNIT-V: Stereochemistry-II: Conformation and reactivity of acyclic systems, intramolecular rearrangements, chemical consequence of conformational equilibrium - Curtin-Hammett Principle. Conformation analysis of disubstituted cyclohexanol, cyclohexane and cyclohexane carboxylic derivatives and decalines - Brett's rule. Optical rotation and optical rotatory dispersion- ORD curves, octant rule, configuration and conformation- Cotton effect.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. J. March and M. Smith, Advanced Organic Chemistry, 5th edition, John-Wiley and Sons.2001. 2. E. S. Gould, Mechanism and Structure in Organic Chemistry, Holt, Rinehart and Winston Inc., 1959. 3. P.S.Kalsi, Stereochemistry of carbon compounds, 8th edition, New Age International Publishers, 2015. 4. P. Y. Bruice, Organic Chemistry, 7th edn, Prentice Hall, 2013. 5. J.Clayden, N. Greeves, S. Warren, Organic Compounds, 2nd edition, Oxford University Press, 2014.
Reference Books	1. F.A. Carey and R.J. Sundberg, Advanced Organic Chemistry Part-A and B, 5th edition, Kluwer Academic / Plenum Publishers, 2007. 2. D. G. Morris, Stereochemistry, RSC Tutorial Chemistry Text 1, 2001. 3. N.S. Isaacs, Physical Organic Chemistry, ELBS, Longman, UK, 1987. 4. E. L. Eliel, Stereochemistry of Carbon Compounds, Tata-McGraw Hill, 2000. 5. I. L. Finar, Organic chemistry, Vol-1 & 2, 6th edition, Pearson Education Asia, 2004.
Website and e-learning source	1.https://sites.google.com/site/chemistryebookscollection02/home/organic-chemistry/organic 2. https://www.organic-chemistry.org/
Course Learning Outcomes (for Mapping with POs and PSOs) Students will be able	

CLO1: To recall the basic principles of organic chemistry.
CLO2: To understand the formation and detection of reaction intermediates of organic reactions.
CLO3: To predict the reaction mechanism of organic reactions and stereochemistry of organic compounds.
CLO4: To apply the principles of kinetic and non-kinetic methods to determine the mechanism of reactions.
CLO5: To design and synthesize new organic compounds by correlating the stereochemistry of organic compounds.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

Strong - 3 **Medium-2** **Low-1**

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions.	
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview.	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain.	
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge.	
Evaluate	Longer essay/ Evaluation essay, Critique or justify with pros and cons.	

(K5)	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations.

In order to avoid pull the score down of each PO, it is suggested that the usage L-Low (1) to the minimum.

The S, M, L is based on the course outcome. The mapping is based on the revised Bloom's Taxonomy Verbs used to describe your course outcome.

- Remember and Understanding – Lower level
- Apply and Analyze – Medium Level
- Evaluate and Create – Strong Level

Title of the Course	**STRUCTURE AND BONDING IN INORGANIC COMPOUNDS**						
Paper No.	**Core II**						
Category	**Core**	**Year**	**I**	**Credits**	**4**	**Course Code**	**PCCHTC12**
		Semester	**I**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	5	**1**	**-**			**6**	
Prerequisites	**Basic concepts of Inorganic Chemistry**						
Objectives of the course	To determine the structural properties of main group compounds and clusters. To gain fundamental knowledge on the structural aspects of ionic crystals. To familiarize various diffraction and microscopic techniques. To study the effect of point defects and line defects in ionic crystals. To evaluate the structural aspects of solids.						
Course Outline	**UNIT-I: Bonding in Organometallic compounds:** Classification of Organometallic compounds based on M-C bond – 18 and 16 electron rule; Bonding in metal – olefin complexes (Ziese's salt), metal-acetylene and metal-allyl complexes; Metal-cyclopentadienyl complexes – Examples and MO approach to bonding in metallocenes; fluxional isomerism. Metal – carbonyl complexes: MO diagram of CO; Structure and bonding − bonding modes, MO approach of M-CO bonding, π-acceptor nature of carbonyl group, synergistic effect Carbonyl clusters: Low and high nuclearity carbonyl clusters.						
	UNIT-II: Reactions of Organometallic compounds: Reactions of organometallic compounds: Oxidative addition, reductive elimination (α & β eliminations), migratory insertion reaction and metathesis reaction. Organo-metallic catalysis: Hydrogenation of olefins (Wilkinson's catalyst), hydroformylation of olefins using cobalt catalysts (oxo process), oxidation of olefin (Wacker process), olefin isomerisation, water gas shift reaction, cyclo-oligomerisation of acetylenes- Reppe's catalysts, Monsonto process.						
	UNIT-III: Structure Determination methods: Photoelectron Spectroscopy: Theory, Types, origin of fine structures - shapes of vibrational fine structures – adiabatic and vertical transitions, PES of homonuclear diatomic (N_2, O_2), heteronuclear diatomic molecules (CO, HCl) and polyatomic molecules (H_2O, CO_2, CH_4, NH_3) – evaluation of vibrational constants of these molecules. Koopman's theorem- applications and limitations. Optical Rotatory Dispersion – Principle of CD and ORD; Δ and λ isomers in complexes, Assignment of absolute configuration using CD and ORD.						
	UNIT-IV: Nuclear Chemistry: Nuclear properties, Nuclear spin and moments,						

	origin of nuclear forces, salient features of the liquid drop and shell models of the nucleus. Compound Nucleus theory, high energy nuclear reactions, nuclear fission and fusion reactions as energy sources. Modes of radioactive decay: Orbital electron capture; nuclear isomerism, detection and determination of activity by cloud chamber, Nuclear emulsion, Bubble chamber, G.M. counter Scintillation and Cherenkov counters. Direct reactions: photonuclear and thermo nuclear reactions.
	UNIT-V: Nuclear Reaction: Types, reaction cross section, Q-value, threshold energy, Stellar Process and energy: synthesis of new elements, Hydrogen burning, Carbon burning. Life Cycle of the star. The e, s, r, p and x processes. Nuclear reactors: fast breeder reactors, particle accelerators, cyclotron and synchrotron. Radio analytical methods: Isotope dilution analysis, Radiometric titrations, Radio-immuno assay, Neutron activation analysis and its applications.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. A R West, Solid state Chemistry and its applications, 2ndEdition (Students Edition), John Wiley & Sons Ltd., 2014. 2. Essentials of Nuclear Chemistry by H J Arniker. 3. L Smart, E Moore, Solid State Chemistry – An Introduction, 4th Edition, CRC Press, 2012. 4. K. F. Purcell and J. C. Kotz, Inorganic Chemistry; W.B. Saunders company: Philadelphia, 1977. 5. J. E. Huheey, E. A. Keiter and R. L. Keiter, Inorganic Chemistry; 4th ed.; Harper and Row: NewYork, 1983.
Reference Books	1. D. E. Douglas, D.H. McDaniel and J. J. Alexander, Concepts and Models in Inorganic Chemistry, 3rd Ed, 1994. 2. R J D Tilley, Understanding Solids - The Science of Materials, 2nd edition, Wiley Publication, 2013. 3. C N R Rao and J Gopalakrishnan, New Directions in Solid State Chemistry, 2nd Edition, Cambridge University Press, 199. 4. T. Moeller, Inorganic Chemistry, A Modern Introduction; John Wiley: New York, 1982. 5. D. F. Shriver, P. W. Atkins and C.H. Langford; Inorganic Chemistry; 3rd ed.; Oxford University Press: London, 2001.
Website and e-learning source	https://ocw.mit.edu/courses/3-091-introduction-to-solid-state-chemistry-fall-2018/video_galleries/lecture-videos/
	Course Learning Outcomes (for Mapping with POs and PSOs) Students will be able **CO1**: Predict the geometry of main group compounds and clusters.

	CO2: Explain about the packing of ions in crystals and apply the radius ratio rule to predict the coordination number of cations. **CO3**: Understand the various types of ionic crystal systems and analyze their structural features. **CO4**: Predict the properties of nuclei, the modes of radioactive decay and determine the radiation activity. **CO5**: Predict the types of nuclear reactions and determines the life cycles of stars.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**
CO 2	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**
CO 3	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO 4	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**
CO 5	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**M**	**S**	**S**

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

<table>
<tr><td>Title of the Course</td><td colspan="8">PRACTICAL: ORGANIC CHEMISTRY - I</td></tr>
<tr><td>Paper No.</td><td colspan="8">Core III</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td colspan="2" rowspan="2">PCCHTC13</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>-</td><td>1</td><td colspan="3">4</td><td colspan="3">5</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Basic concepts of organic chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">To understand the concept of separation, qualitative analysis and preparation of organic compounds.
To develop analytical skill in the handling of chemical reagents for separation of binary and ternary organic mixtures.
To analyze the separated organic components systematically and derivative them suitably.
To construct suitable experimental setup for the organic preparations involving two stages.
To experiment different purification and drying techniques for the compound processing.</td></tr>
<tr><td rowspan="2">Course Outline</td><td colspan="8">UNIT-I: Separation and organic analysis:
Two component mixtures</td></tr>
<tr><td colspan="8">UNIT-II: Single stage preparation:
Any Six preparations from the following
(i) Preparation of o-benzyl benzoic acid
(ii) p-Nitrobenzoic acid from p-nitrotoluene
(iii) Anthraquinone from anthracene
(iv) Benzhydrol from Benzophenone
(v) m-Nitroaniline from m-dinitrobenzene
(vi) 1,2,3,4 – Tetrahydrocarbazole from cyclohexanone
(vii) p-chlorotoluene form p-toluidine
(viii) 2,3 – Dimethylindole from phenyl hydrazine and 2 – butanone
(ix) Methyl orange form sulphanilic acid
(x) Diphenyl methane from benzyl chloride</td></tr>
<tr><td>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</td><td colspan="8">Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved
(To be discussed during the Tutorial hours)</td></tr>
<tr><td>Skills acquired from this course</td><td colspan="8">Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</td></tr>
<tr><td>Recommended Text</td><td colspan="8">1. A R West, Solid state Chemistry and its applications, 2ndEdition (Students Edition), John Wiley & Sons Ltd., 2014.
2. A K Bhagi and G R Chatwal, A textbook of inorganic polymers, Himalaya</td></tr>
</table>

	Publishing House, 2001. 3. L Smart, E Moore, Solid State Chemistry – An Introduction, 4th Edition, CRC Press, 2012.
Reference Books	1. D. E. Douglas, D.H. McDaniel and J. J. Alexander, Concepts and Models in Inorganic Chemistry, 3rd Ed, 1994. 2. R J D Tilley, Understanding Solids - The Science of Materials, 2nd edition, Wiley Publication, 2013. 3. C N R Rao and J Gopalakrishnan, New Directions in Solid State Chemistry, 2nd Edition, Cambridge University Press, 199.
Website and e-learning source	https://ocw.mit.edu/courses/3-091-introduction-to-solid-state-chemistry-fall-2018/video_galleries/lecture-videos/

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To recall the basic principles of organic separation, qualitative analysis and preparation.

CO2: To explain the method of separation and analysis of separated organic mixtures and convert them as derivatives by suitable preparation method.

CO3: To determine the characteristics of separation of organic compounds by various chemical reactions.

CO4: To develop strategies to separate, analyze and prepare organic compounds.

CO5: To formulate a method of separation, analysis of organic mixtures and design suitable procedure for organic preparations.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 – Low

<table>
<tr><td>Title of the Course</td><td colspan="7">PRACTICAL: PHYSICAL CHEMISTRY - I</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core IX</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">PCCHTC14</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>-</td><td>1</td><td colspan="3">4</td><td colspan="2">5</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic knowledge of physical chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To understand the principle of conductivity experiments through conductometric titrations.
To evaluate the order of the reaction, temperature coefficient, and activation energy of the reaction by following pseudo first order kinetics.
To construct the phase diagram of two component system forming congruent melting solid and find its eutectic temperatures and compositions.
To determine the kinetics of adsorption of oxalic acid on charcoal.
To develop the potential energy diagram of hydrogen ion, charge density distribution and Maxwell’s speed distribution by computational calculation.</td></tr>
<tr><td rowspan="3">Course Outline</td><td colspan="7">UNIT-I:
Partition Coefficient
1. Determination of Association factor and distribution coefficient of Benzoic acid in benzene-water
2. Determination of partition coefficient of succinic acid between water and Ether.
Adsorption
3. Adsorption of oxalic acid on charcoal & determination of surface area (Freundlich isotherm only).</td></tr>
<tr><td colspan="7">UNIT-II:
Kinetics
1. Study the kinetics of acid hydrolysis of an ester, determine the temperature coefficient and also the activation energy of the reaction.
2. Study the kinetics of the reaction between acetone and iodine in acidic medium and determine the order with respect to iodine and acetone.
3. Determination of rate constant for the acid catalysed inversion of cane sugar using polarimeter.
4. Determination of relative strength of two acids by studying the kinetics of ester hydrolysis.</td></tr>
<tr><td colspan="7">UNIT-III:
Phase diagram
Construction of phase diagram for a simple binary system
1. Naphthalene-phenanthrene
2. Benzophenone- diphenyl amine.
Colligative property
3. Determination of K_f value of a given solvent and molecular weight of solute by Rast method.</td></tr>
<tr><td>Extended Professional Component (is a part of internal component only,</td><td colspan="7">Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved
(To be discussed during the Tutorial hours)</td></tr>
</table>

Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. B. Viswanathan and P. S. Raghavan, Practical Physical Chemistry, Viva Books, New Delhi, 2009. 2. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996. 3. V.D. Athawale and Parul Mathur, Experimental Physical Chemistry, New Age International (P) Ltd., New Delhi, 2008. 4. E.G. Lewers, Computational Chemistry: Introduction to the Theory and Applications of Molecular and Quantum Mechanics, 2nd Ed., Springer, New York, 2011.
Reference Books	1. J. B. Yadav, Advanced Practical Physical Chemistry, Goel Publishing House, 2001. 2. G.W. Garland, J.W. Nibler, D.P. Shoemaker, Experiments in Physical Chemistry, 8th edition, McGraw Hill, 2009. 3. J. N. Gurthu and R. Kapoor, Advanced Experimental Chemistry, S. Chand and Co., 1987. 4. Shailendra K Sinha, Physical Chemistry: A laboratory Manual, Narosa Publishing House Pvt, Ltd., New Delhi, 2014. 5. F. Jensen, Introduction to Computational Chemistry, 3rd Ed., Wiley-Blackwell.
Website and e-learning source	https://web.iitd.ac.in/~nkurur/2015-16/Isem/cmp511/lab_handout_new.pdf

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To recall the principles associated with various physical chemistry experiments.

CO2: To scientifically plan and perform all the experiments.

CO3: To observe and record systematically the readings in all the experiments.

CO4: To calculate and process the experimentally measured values and compare with graphical data.

CO5: To interpret the experimental data scientifically to improve students' efficiency for societal developments.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 – Low

Title of the Course	**PHARMACEUTICAL CHEMISTRY**						
Paper No.	**Elective I**						
Category	**Elective**	**Year**	**I**	**Credits**	**4**	**Course Code**	**PCCHTE11**
		Semester	**I**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	3	**1**	**-**			**4**	
Prerequisites	**Basic knowledge on drugs and doses**						
Objectives of the course	To understand the advanced concepts of pharmaceutical chemistry. To recall the principle and biological functions of various drugs. To train the students to know the importance as well the consequences of various drugs. To have knowledge on the various analysis and techniques. To familiarize on the drug dosage and its structural activities.						
Course Outline	**UNIT-I: Physical properties in Pharmaceuticals:** Physical properties of drug molecule: Refractive index- Definition, explanation, formula, importance, determination, specific & molar refraction. Optical activity- monochromatic & polychromatic light, optical activity, angle of rotation, specific rotation examples, measurement. Dielectric constant & Induced Polarization- Explanation & determination. Rheology of pharmaceutical systems: Introduction, Definition, Applications, concept of viscosity, Newton's law of flow, Kinematic, Relative, Specific, Reduced & Intrinsic viscosity. Newtonian system, non-Newtonian system- Plastic flow.						
	UNIT-II: Isotopic Dilution analysis: Principle and applications, Neutron activation analysis: Advantages and limitations, Scintillation counters, Body scanning. Introduction to radiopharmaceuticals. Properties of various types of radiopharmaceuticals, Radiopharmaceuticals as diagnostics, as therapeutics, for research and sterilization. Physico-chemical Properties and drug action. Physico chemical properties of drugs like Partition coefficient, solubility, surface activity and degree of ionization.						
	UNIT-III: Drug dosage and product development: Introduction to drug dosage Forms and Drug Delivery system – Definition of Common terms. Drug Regulation and control, pharmacopoeias formularies, sources of drug, drug nomenclature, routes of administration of drugs products, need for a dosage form, classification of dosage forms. Drug dosage and product development.						
	UNIT-IV: Development of new drugs: Introduction, procedure followed in						

	drug design, the research for Lead compounds, molecular modification of lead compounds. Structure-Activity Relationship (SAR): Factors effecting bioactivity, Resonance, Inductive effect, isoterism, bioisosterism, spatial considerations, biological properties of simple functional groups, theories of drug activity. Drug receptor interactions, the additivity of group contributions, physico-chemical parameters, lipophilicity parameters, electronic parameter, ionization constants, steric parameters, chelation parameters, redox potential, indicator-variables.
	UNIT-V: Computers in Pharmaceutical Chemistry: Need of computers for chemistry. Computers for Analytical Chemists-Introduction to computers: Organization of computers, CPU, Computer memory, I/O devices, information storage, software components. Application of computers in chemistry: Programming in high level language (C+) to handle various numerical methods in chemistry – least square fit, solution to simultaneous equations, interpolation, extrapolation, data smoothing, numerical differentiation and integrations.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Physical Chemistry- Bahl and Tuli. 2. Text Book of Physical Pharmaceutics, IInd edition, Vallabh Prakashan-. C.V.S. Subramanyam. 3. Medicinal Chemistry (Organic Pharmaceutical Chemistry), G.R Chatwal, Himalaya Publishing house. 4. Instrumental method of Analysis: Hubert H, Willard, 7th edition. 5. Textbook of Pharmaceutical Chemistry by, Jayshree Ghosh, S. Chand & company Ltd. Pharmaceutical Chemistry by Dr. S. Lakshmi, Sultan chand & Sons.
Reference Books	1. Computers in chemistry, K.V. Raman, Tata Mc.Graw-Hill, 1993. 2. Computers for Chemists, S.K Pundir, Anshu bansal, A pragate prakashan., 2 nd edition, New age international (P) limited, New Delhi. 3. Physical Pharmacy and Pharmaceutical Sciences by Martins, Patrick J. Sinko, Lippincott. William and Wilkins. 4. Cooper and Gunn's Tutorial Pharmacy ,6th edition by S.J. Carter, CBS Publisher Ltd. 5. Ansels pharmaceutical Dosage forms and Drug Delivery System by Allen Popvich and Ansel, Indian edition-B.I. Publication Pvt. Ltd.

Website and e-learning	https://www.ncbi.nlm.nih.gov/books/NBK482447/ https://training.seer.cancer.gov/treatment/chemotherapy/types.html

source	

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To identify the suitable drugs for various diseases.

CO2: To apply the principles of various drug action and drug design.

CO3: To acquire the knowledge on product development based on SAR.

CO4: To apply the knowledge on applications of computers in chemistry.

CO5: To synthesize new drugs after understanding the concepts SAR.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 – Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

Title of the Course	**NANO MATERIALS AND NANO TECHNOLOGY**						
Paper No.	**Elective I**						
Category	**Elective**	**Year**	**I**	**Credits**	**4**	**Course Code**	**PCCHTE12**
		Semester	**I**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	3	**1**	**-**			**4**	
Prerequisites	**Basic knowledge of crystallography and material science**						
Objectives of the course	To understand the concept of nano materials and nano technology. To understand the various types of nano materials and their properties. To understand the applications of synthetically important nano materials. To correlate the characteristics of various nano materials synthesized by new technologies. To design synthetic routes for synthetically used new nano materials.						
Course Outline	**UNIT-I:** Introduction of nanomaterials and nanotechnologies, Introduction-role of size, classification-0D, 1D, 2D, 3D. Synthesis-Bottom –Up, Top–Down, consolidation of Nano powders. Features of nanostructures, Background of nanostructures. Techniques of synthesis of nanomaterials,						

	Tools of the nanoscience. Applications of nanomaterials and technologies.
	UNIT-II: Bonding and structure of the nanomaterials, Predicting the Type of Bonding in a Substance crystal structure. Metallic nanoparticles, Surfaces of Materials, Nanoparticle Size and Properties. Synthesis- Physical and chemical methods - inert gas condensation, arc discharge, laser ablation, sol-gel, solvothermal and hydrothermal-CVD-types, metallo organic, plasma enhanced, and low-pressure CVD. Microwave assisted and electrochemical synthesis.
	UNIT-III: Mechanical properties of materials, theories relevant to mechanical properties. Techniques to study mechanical properties of nanomaterials, adhesion and friction, thermal properties of nanomaterials Nanoparticles: gold and silver, metal oxides: silica, iron oxide and alumina - synthesis and properties.
	UNIT-IV: Electrical properties, Conductivity and Resistivity, Classification of Materials based on Conductivity, magnetic properties, electronic properties of materials. Classification of magnetic phenomena. Semiconductor materials – classification-Ge, Si, GaAs, SiC, GaN, GaP, CdS,PbS. Identification of materials as p and n –type semiconductor-Hall effect - quantum and anomalous, Hall voltage - interpretation of charge carrier density. Applications of semiconductors: p-n junction as transistors and rectifiers, photovoltaic and photogalvanic cell.
	UNIT-V: Nano thin films, nanocomposites. Application of nanoparticles in different fields. Core-shell nanoparticles - types, synthesis, and properties. Nanocomposites - metal-, ceramic- and polymer-matrix composites-applications. Characterization – SEM, TEM and AFM - principle, instrumentation and applications.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. S.Mohan and V. Arjunan, Principles of Materials Science, MJP Publishers, 2016. 2. Arumugam, Materials Science, Anuradha Publications,2007. 3. Giacavazzo et. al., Fundamentals of Crystallography, International Union of Crystallography. Oxford Science Publications, 2010 4. Woolfson, An Introduction to Crystallography, Cambridge University Press, 2012. 5. James F. Shackelford and Madanapalli K. Muralidhara, Introduction to Materials Science for Engineers. 6th ed., PEARSON Press, 2007.
Reference Books	1. S.Mohan and V. Arjunan, Principles of Materials Science, MJP Publishers, 2016.

	2. Arumugam, Materials Science, Anuradha Publications,2007. 3. Giacavazzo et. al., Fundamentals of Crystallography, International Union of Crystallography. Oxford Science Publications, 2010 4. Woolfson, An Introduction to Crystallography, Cambridge University Press, 2012. 5. James F. Shackelford and Madanapalli K. Muralidhara, Introduction to Materials Science for Engineers. 6th ed., PEARSON Press, 2007.
Website and e-learning source	1. http://xrayweb.chem.ou.edu/notes/symmetry.html. 2. http://www.uptti.ac.in/classroom-content/data/unit%20cell.pdf.

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To explain methods of fabricating nanostructures.

CO2: To relate the unique properties of nanomaterials to reduce dimensionality of the material.

CO3: To describe tools for properties of nanostructures.

CO4: To discuss applications of nanomaterials.

CO5: To understand the health and safety related to nanomaterial.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 – Low

<table>
<tr><td>Title of the Course</td><td colspan="8">MOLECULAR SPECTROSCOPY</td></tr>
<tr><td>Paper No.</td><td colspan="8">Elective II</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td colspan="2" rowspan="2">PCCHTE13</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>4</td><td>1</td><td colspan="3">-</td><td colspan="3">5</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Basic knowledge of spectroscopy</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">To understand the influence of rotation and vibrations on the spectra of the polyatomic molecules.
To study the principle of Raman spectroscopy, ESR spectroscopy, EPR spectroscopy and fragmentation patterns in Mass spectroscopy.
To highlight the significance of Franck - Condon principle to interpret the selection rule, intensity and types of electronic transitions.
To interpret the first and second order NMR spectra in terms of splitting and coupling patterns using correlation techniques such as COSY, HETCOR, NOESY.
To carry out the structural elucidation of molecules using different spectral techniques.</td></tr>
<tr><td rowspan="4">Course Outline</td><td colspan="8">UNIT-I: Rotational and Raman Spectroscopy: Interaction of Electromagnetic radiation with matter – Classification of molecules – Diatomic rigid rotator and Energy levels – Selection rule - Rotational spectra of polyatomic molecules. Intensities of rotational spectral lines, effect of isotopic substitution. Non-rigid rotators. Classical theory of the Raman effect, polarizability ellipsoids, quantum theory of the Raman effect, Pure rotational Raman spectra of linear, symmetric and asymmetric top molecules, Stokes and anti-Stokes lines. Vibrational Raman spectra, Raman activity of vibrations, rule of mutual exclusion.</td></tr>
<tr><td colspan="8">UNIT-II: Vibrational Spectroscopy: Vibrations of molecules, Simple harmonic and anharmonic oscillators- vibrational energy expression, energy level diagram, effect of isotopic substitution. Diatomic vibrating rotor, vibrational-rotational spectra of diatomic molecules. Vibrations of polyatomic molecules – symmetry properties, overtone and combination frequencies, fermi resonance. Influence of rotation on vibrational spectra of polyatomic molecule, P, Q, R branches.</td></tr>
<tr><td colspan="8">UNIT-III: Electronic spectroscopy: Electronic Spectroscopy: Electronic spectroscopy of diatomic molecules, Frank-Condon principle, dissociation and predissociation spectra. $\pi \rightarrow \pi^*$, $n \rightarrow \pi^*$ transitions and their selection rules. Photoelectron Spectroscopy: Basic principles. Lasers: Laser action, population inversion, properties of laser radiation.</td></tr>
<tr><td colspan="8">UNIT-IV: NMR and ESR spectroscopy: Chemical shift, Factors influencing chemical shifts: electronegativity and electrostatic effects; Mechanism of shielding and deshielding. Spin systems: First order and second order coupling of AB systems, Simplification of complex spectra. Spin-spin interactions: Homonuclear coupling interactions - AX, AX_2, AB types. Vicinal, geminal and long-range coupling-spin decoupling. Nuclear Overhauser effect (NOE), Factors influencing coupling constants and Relative intensities. ^{13}CNMR - Brief introduction to 2D NMR – COSY, NOESY. ESR spectroscopy Characteristic features of ESR spectra, line shapes and line</td></tr>
</table>

	widths; ESR spectrometer. The g value and the hyperfine coupling parameter (A), origin of hyperfine interaction. Spin orbit coupling and significance of g-tensors, zero field splitting, Kramer's degeneracy, application to transition metal complexes of Mn^{2+} including biological molecules and inorganic free radicals.
	UNIT-V: Mass Spectrometry and Mossbauer Spectroscopy: Ionization techniques- Electron ionization (EI), chemical ionization (CI), desorption ionization (FAB/MALDI), electrospray ionization (ESI), isotope abundance, molecular ion, fragmentation processes of organic molecules, deduction of structure through mass spectral fragmentation, high resolution. Effect of isotopes on the appearance of mass spectrum. Principle of Mossbauer spectroscopy: Doppler shift, recoil energy. Isomer shift, quadrupole splitting, magnetic interactions. Applications: Mossbauer spectra of high and low-spin Fe and Sn compounds.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. C. N. Banwell and E. M. McCash, *Fundamentals of Molecular Spectroscopy*, 4th Ed., Tata McGraw Hill, New Delhi, 2000. 2. R. M. Silverstein and F. X. Webster, *Spectroscopic Identification of Organic Compounds*, 6th Ed., John Wiley & Sons, New York, 2003. 3. W. Kemp, *Applications of Spectroscopy*, English Language Book Society, 1987. 4. D. H. Williams and I. Fleming, *Spectroscopic Methods in Organic Chemistry*, 4th Ed., Tata McGraw-Hill Publishing Company, New Delhi, 1988. 5. R. S. Drago, *Physical Methods in Chemistry*; Saunders: Philadelphia, 1992.
Reference Books	1. P.W. Atkins and J. de Paula, *Physical Chemistry*, 7th Ed., Oxford University Press, Oxford, 2002. 2. I. N. Levine, *Molecular Spectroscopy*, John Wiley & Sons, New York, 1974. 3. A. Rahman, *Nuclear Magnetic Resonance-Basic Principles*, Springer-Verlag, New York,1986. 4. K. Nakamoto, *Infrared and Raman Spectra of Inorganic and coordination Compounds*, PartB: 5th ed., John Wiley& Sons Inc., New York, 1997. 5. J. A. Weil, J. R. Bolton and J. E. Wertz, *Electron Paramagnetic Resonance*; Wiley Interscience, 1994.
Website and e-learning source	1. https://onlinecourses.nptel.ac.in/noc20_cy08/preview 2. https://www.digimat.in/nptel/courses/video/104106122/L14.html

Course Learning Outcomes (for Mapping with POs and PSOs)
Students will be able:
CO1: To understand the importance of rotational and Raman spectroscopy.
CO2: To apply the vibrational spectroscopic techniques to diatomic and polyatomic molecules.
CO3: To evaluate different electronic spectra of simple molecules using electronic spectroscopy.
CO4: To outline the NMR, ^{13}C NMR, 2D NMR – COSY, NOESY and to outline the ESR spectroscopic techniques.
CO5: To develop the knowledge on principle, instrumentation and structural elucidation of simple molecules using Mass Spectrometry, EPR and Mossbauer Spectroscopy techniques.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**
CO 2	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**
CO 3	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO 4	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**
CO 5	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**M**	**S**	**S**

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

<table>
<tr><td>Title of the Course</td><td colspan="7">PHARMOCOGNOSY AND PHYTOCHEMISTRY</td></tr>
<tr><td>Paper No.</td><td colspan="7">Elective V</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">PCCHTE14</td></tr>
<tr><td>Semester</td><td>III</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>3</td><td>1</td><td colspan="3">-</td><td colspan="2">4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic knowledge of chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To develop the knowledge of natural products, biological functions and pharmacological uses.
To develop knowledge on primary and secondary metabolites and their sources.
To understand the concepts of isolation methods and separation of bioactive compounds.
To provide the knowledge on selected glycosides and marine drugs.
To familiarize the guidelines of WHO and different sampling techniques.</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="7">UNIT-I: Pharmacognosy and Standardization of Herbal drugs: Introduction, definition, development classification and Source of Drugs: Biological, mineral, marine,and plant tissue cultures. Study of pharmacognostic of a crude drug. Biosynthesis: Shikimic acid pathway and acetate pathway. Systematic analysis of Crude drugs. Standardization of Herbal drugs. WHO guidelines, Sampling of crude drug, Methods of drug evaluation. Determination of foreign matter, moisture Ash value. Phytochemical investigations-General chemical tests.</td></tr>
<tr><td colspan="7">UNIT-II: Extraction Techniques: General methods of extraction, types – maceration, Decoction, percolation, Immersion and soxhlet extraction.
Advanced techniques- counter current, steam distillation, supercritical gases, sonication, Micro waves assisted extraction. Factors affecting the choice of extraction process.</td></tr>
<tr><td colspan="7">UNIT-III: Drugs containing Terpenoids and volatile oils: Terpenoids: Classification, Isoprene rule, Isolation and separation techniques, General properties Camphor, Menthol, Eucalyptol. Volatile Oils or Essential Oils: Method of Preparations, Classifications of Volatile oils, Camphor oil, Geranium oil, Citral- Structure uses. Pentacyclic triterpenoids: amyrines; taraxasterol: Structure and pharmacological applications.</td></tr>
<tr><td colspan="7">UNIT-IV: Drugs containing alkaloids: Occurrence, function of alkaloids in plants, pharmaceutical applications. Isolation, Preliminary Qualitative tests and general properties. General methods of structural elucidation. Morphine, Reserpine, papaverine - chemical properties, structure and uses. papaverine - structure, chemical properties and uses.</td></tr>
<tr><td colspan="7">UNIT-V: Plant Glycosides and Marine drugs: Glycosides: Basic ring system, classification, isolation, properties, qualitative analysis. Pharmacological activity of Senna glycosides, Cardiac glycosides-Digoxin, digitoxin, Steroidal saponins glycosides- Diosgenin, hecogenin. Plant pigments: Occurrence and general methods of structure determination, isolation and synthesis of quercetin and cyanidin chloride. Marine drugs - Selected Drug Molecules: Cardiovascular active substances, Cytotoxic compounds, antimicrobial compounds, antibiotic compounds, Anti-inflammatory agents. Marine toxins.</td></tr>
<tr><td>Extended</td><td colspan="7">Questions related to the above topics, from various competitive examinations</td></tr>
</table>

Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Gurdeep R Chatwal (2016), Organic chemistry of Natural products, Volume I&II, 5th edition, Himalaya publishing House. 2. S.V.Bhat, B.A. Nagasampagi, M.Sivakumar (2014), Chemistry of Natural Products, Revised edition, Narosa Publishers.
Reference Books	1. Jeffrey B. Harborne (2012), Phytochemical methods: A Guide to Modern Techniques of Plant Analysis, 4th edition, Indian reprint, Springer. 2. Ashutoshkar (2007), Pharmacognosy and Pharmacobiotechnology, 2 nd edition, New age international (P) limited, New Delhi.

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To recall the sources of natural medicines and analysis of crude drugs.
CO2: To understand the methods of evaluation based on various parameters.
CO3: To analyze the isolated drugs
CO4: To apply various techniques to discover new alternative medicines.
CO5: To evaluate the isolated drugs for various pharmacological activities

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Lo

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

<table>
<tr><td>Title of the Course</td><td colspan="7">ORGANIC REACTION MECHANISM-II</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core IV</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">PCCHTC21</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic knowledge of organic chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To understand the concept of aromaticity in benzenoid, non-benzenoid, heterocyclic and annulene compounds.
To understand the mechanism involved in various types of organic reactions with evidences.
To understand the applications of synthetically important reagents.
To correlate the reactivity between aliphatic and aromatic compounds.
To design synthetic routes for synthetically used organic reactions.</td></tr>
<tr><td rowspan="3">Course Outline</td><td colspan="7">UNIT-I: Elimination and Free Radical Reactions: Mechanisms: E2, E1, and E1cB mechanisms. Syn- and anti-eliminations. Orientation of the double bond: Hoffmann and Saytzeff rules. Reactivity: Effect of substrate, attacking bases, leaving group and medium. Stereochemistry of eliminations in acyclic and cyclic systems, pyrolytic elimination. Long lived and short-lived radicals – Production of radicals by thermal and photochemical reactions, Detection and stability of radicals, characteristics of free radical reactions and free radical, reactions of radicals; polymerization, addition, halogenations, aromatic substitutions, rearrangements. Reactivity: Reactivity on aliphatic, aromatic substrates, reactivity in the attacking radical, effect of solvent.</td></tr>
<tr><td colspan="7">UNIT-II: Oxidation and Reduction Reactions: Mechanisms: Direct electron transfer, hydride transfer, hydrogen transfer, displacement, addition-elimination, oxidative and reductive coupling reactions. Mechanism of oxidation reactions: Dehydrogenation by quinones, selenium dioxides, mercuric acetate, lead tetraacetate, permanganate, manganese dioxide, osmium tetroxide, oxidation of saturated hydrocarbons, alkyl groups, alcohols, halides and amines. Reactions involving cleavage of C-C bond & C=C bond. Oxidative decarboxylation, allylic oxidation, oxidation by chromium trioxide-pyridine, DMSO-Oxalyl chloride (Swern oxidation) , dimethyl sulphoxide- dicyclohexyl carbodiimide (DMSO-DCCD). Mechanism of reduction reactions: Wolff-Kishner, Clemmenson, Rosenmund, reduction with Trialkyl and triphenyltin hydrides, Hydroboration , MPV reduction, $LiAlH_4$, $NaBH_4$ and selectrides.</td></tr>
<tr><td colspan="7">UNIT-III: Rearrangements: Rearrangements to electron deficient carbon: Pinacol-pinacolone and semi-pinacolone rearrangements -applications and stereochemistry, Wagner-Meerwein, Demjanov, Dienone-phenol, Baker-Venkataraman, Benzilic acid and Wolff rearrangements. Rearrangements to electron deficient nitrogen: Hofmann, Curtius, Schmidt, Lossen, Beckmann and abnormal Beckmann rearrangements. Rearrangements to electron deficient oxygen: Baeyer-Villiger oxidation and Dakin rearrangements. Rearrangements to electron rich atom: Favorskii, Quasi-Favorskii, Stevens, [1,2]-Wittig and [2,3]-Wittig rearrangements. Fries and Photo Fries rearrangement. Intramolecular</td></tr>
</table>

	rearrangements – Claisen, abnormal Claisen, Cope, oxy-Cope Benzidine rearrangements.
	UNIT-IV: Addition to Carbon Multiple Bonds: Mechanisms: (a) Addition to carbon-carbon multiple bonds- Addition reactions involving electrophiles, nucleophiles, free radicals, carbenes and cyclic mechanisms-Orientation and reactivity, hydrogenation of double and triple bonds, Michael reaction, addition of oxygen and Nitrogen; (b) Addition to carbon-hetero atom multiple bonds: Mannich reaction, acids, esters, nitrites, addition of Grignard reagents, Wittig reaction, Prins reaction. Stereochemical aspects of addition reactions. Addition to Carbon-Hetero atom Multiplebonds: Addition of Grignard reagents, organozinc and organolithium reagents to carbonyl and unsaturated carbonyl compounds. Mechanism of condensation reactions involving enolates –Stobbe reactions. Hydrolysis of esters and amides, ammonolysis of esters.
	UNIT-V: Reagents and Modern Synthetic Reactions: Lithium diisopropylamine (LDA), Azobisisobutyronitrile (AIBN), Sodium cyanoborohydride ($NaBH_3CN$), *meta*-Chloroperbenzoic acid (m-CPBA), Dimethyl aminiopyridine (DMAP), n-Bu_3SnD, Triethylamine (TEA), Diazobicyclo[5.4.0]undec-7-ene (DBU), Diisopropylazodicarboxylate (DIAD), Diethylazodicarboxylate (DEAD), *N*-bromosuccinimide (NBS), Trifluoroacetic acid (TFA), Tetramethyl piperiridin-1-oxyl (TEMPO), Phenyltrimethylammonium tribromide (PTAB). Diazomethane and Zn-Cu, Diethyl maleate (DEM), Copper diacetylacetonate ($Cu(acac)_2$), $TiCl_3$, $NaIO_4$, Pyridinium chlorochromate (PCC), Pyridinium dichromate (PDC), Meisenheimer complex**.** Suzuki coupling, Heck reaction, Negishi reaction, Baylis-Hillman reaction.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.

Recommended Text	1. J. March and M. Smith, *Advanced Organic Chemistry*, 5th ed., John-Wiley and Sons. 2001. 2. E. S. Gould, *Mechanism and Structure in Organic Chemistry*, Holt, Rinehart and Winston Inc., 1959. 3. P. S. Kalsi, *Stereochemistry of carbon compounds*, 8thedn, New Age International Publishers, 2015. 4. P. Y.Bruice, *Organic Chemistry*, 7thedn.,Prentice Hall, 2013. 5. R. T. Morrison, R. N. Boyd, S. K. Bhattacharjee*Organic Chemistry*, 7th edn., Pearson Education, 2010.
Reference Books	1. S. H. Pine, *Organic Chemistry*, 5thedn, McGraw Hill International Editionn, 1987.

	2. L. F. Fieser and M. Fieser, *Organic Chemistry*, Asia Publishing House, Bombay, 2000. 3. E.S. Gould, *Mechanism and Structure in Organic Chemistry*, Holt, Rinehart and Winston Inc., 1959. 4. T. L. Gilchrist, *Heterocyclic Chemistry*, Longman Press, 1989. 5. J. A. Joule and K. Mills, *Heterocyclic Chemistry*, 4th ed., John-Wiley, 2010.
Website and e-learning source	1. https://sites.google.com/site/chemistryebookscollection02/home/organic-chemistry/organic 2. https://www.organic-chemistry.org/

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To recall the basic principles of aromaticity of organic and heterocyclic compounds.
CO2: To understand the mechanism of various types of organic reactions.
CO3: To predict the suitable reagents for the conversion of selective organic compounds.
CO4: To correlate the principles of substitution, elimination, and addition reactions.
CO5: To design new routes to synthesis organic compounds.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

<table>
<tr><td>Title of the Course</td><td colspan="8">PHYSICAL CHEMISTRY-I</td></tr>
<tr><td>Paper No.</td><td colspan="8">Core V</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td colspan="2" rowspan="2">PCCHTC22</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="4">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="4">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Basic concepts of physical chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">To recall the fundamentals of thermodynamics and the composition of partial molar quantities.
To understand the classical and statistical approach of the functions
To compare the significance of Maxwell-Boltzman, Fermi-Dirac and Bose-Einstein
To correlate the theories of reaction rates for the evaluation of thermodynamic parameters.
To study the mechanism and kinetics of reactions.</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="8">UNIT-I: Introductory quantum chemistry: Wave particle duality, Uncertainty principle, Particle wave and Schrodinger wave equation, wave function. Properties of wave function, Normalized, Orthogonal, orthonormal, Eigen values, Eigen functions, Hermitian properties of operators. Introduction to quantum mechanics-black body radiation, photoelectric effect, hydrogen spectrum. Need for quantum mechanics, Postulates. of Quantum Mechanics, Schrodinger wave equation, Time independent and time dependent</td></tr>
<tr><td colspan="8">UNIT-II: Quantum models: Particle in a box-1D, two dimensional and three-dimensional, degeneracy, application to linear conjugated molecular system, free particles, ring systems. Harmonic Oscillator-wave equation and solution, force constant and its significance. Rigid Rotor-wave equation and solution, calculation of rotational constants and bond length of diatomic molecules.</td></tr>
<tr><td colspan="8">UNIT-III: Irreversible Thermodynamics: Theories of conservation of mass and energy entropy production in open systems by heat, matter and current flow, force and flux concepts. Onsager theory-validity and verification-Onsager reciprocal relationships. Electro kinetic and thermo mechanical effects-Application of irreversible thermodynamics to biological systems.</td></tr>
<tr><td colspan="8">UNIT-IV: Kinetics of Reactions: Effect of temperature on reaction rates, Theories of reaction rate - collision theory of reaction rates, Unimolecular reactions -Lindeman hypothesis- molecular beams, collision cross sections, effectiveness of collisions, Transition state theory-evaluation of thermodynamic parameters of activation-applications of ARRT to unimolecular and bimolecular reactions. Potential energy surfaces - Factors determine the reaction rates in solution - primary salt effect and secondary salt effect, Homogeneous catalysis- acid- base catalysis-mechanism of acid base catalyzed reactions-Bronsted catalysis law, enzyme catalysis - Michelis-Menton equation.</td></tr>
<tr><td colspan="8">UNIT-V: Kinetics of complex and fast reactions: Kinetics of complex reactions, reversible reactions, consecutive reactions, parallel reactions, chain reactions. Chain reactions-chain length, kinetics of $H_2 - Cl_2$ & $H_2 - Br_2$ reactions (Thermal and Photochemical reactions) - Rice Herzfeld</td></tr>
</table>

	mechanism. Study of fast reactions-relaxation methods- temperature and pressure jump methods electric and magnetic field jump methods -stopped flow flash photolysis methods and pulse radiolysis. Kinetics of polymerization-free radical, cationic, anionic polymerization.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. J. Rajaram and J.C. Kuriacose, Thermodynamics for Students of Chemistry, 2nd edition,S.L.N.Chand and Co., Jalandhar, 1986. 2. I. M. Klotz and R.M. Rosenberg, Chemical thermodynamics, 6th edition, W.A. BenjaminPublishers, California, 1972. 3. M.C. Gupta, Statistical Thermodynamics, New Age International, Pvt. Ltd., New Delhi, 1995. 4. K.J. Laidler, Chemical Kinetics, 3rd edition, Pearson, Reprint - 2013. 5. J. Rajaram and J. C. Kuriokose, Kinetics and Mechanisms of chemical transformation,M acmillan India Ltd, Reprint - 2011.
Reference Books	1. D.A. Mcqurrie And J.D. Simon, Physical Chemistry - A Molecular Approach, Viva Books Pvt. Ltd., New Delhi, 1999. 2. R.P. Rastogi and R.R. Misra, Classical Thermodynamics, Vikas Publishing, Pvt. Ltd., New Delhi, 1990. 3. S.H. Maron and J.B. Lando, Fundamentals of Physical Chemistry, Macmillan Publishers, New York, 1974 4. K.B. Ytsiimiriski, "Kinetic Methods of Analysis", Pergamom Press,1996. 5. Gurdeep Raj, Phase rule, Goel Publishing House, 2011.
Website and e-learning source	1. https://nptel.ac.in/courses/104/103/104103112/ 2. https://bit.ly/3tL3GdN

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To explain the classical and statistical concepts of thermodynamics.

CO2: To compare and correlate the thermodynamic concepts to study the kinetics of chemical reactions.

CO3: To discuss the various thermodynamic and kinetic determination.

CO4: To evaluate the thermodynamic methods for real gases ad mixtures.

CO5: To compare the theories of reactions rates and fast reactions.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

Title of the Course	**PRACTICAL: INORGANIC CHEMISTRY - I**						
Paper No.	**Core VI**						
Category	**Core**	**Year**	**I**	**Credits**	**4**	**Course Code**	**PCCHPC23**
		Semester	**II**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	-	**1**	**5**			**6**	
Prerequisites	Basic principles of gravimetric and qualitative analysis						
Objectives of the course	To understand and enhance the visual observation as an analytical tool for the quantitative estimation of ions. To recall the principle and theory in preparing standard solutions. To train the students for improving their skill in estimating the amount of ion accurately present in the solution To estimate metal ions, present in the given solution accurately without using instruments. To determine the amount of ions, present in a binary mixture accurately.						
Course Outline	**UNIT-I: Analysis of mixture of cations:** Analysis of a mixture of four cations containing two common cations and two rare cations. Cations to be tested. Group-I : W, Tl and Pb. Group-II : Se, Te, Mo, Cu, Bi and Cd. Group-III : Tl, Ce, Th, Zr, V, Cr, Fe, Ti and U. Group-IV : Zn, Ni, Co and Mn. Group-V : Ca, Ba and Sr.						

	Group-VI : Li and Mg.
	UNIT-II: Colorimetric analysis of metals 1. Iron 2. Nickel 3. Manganese 4. Copper
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. A. JeyaRajendran, Microanalytical Techniques in Chemistry: Inorganic Qualitative Analysis, United global publishers, 2021. 2. V. V. Ramanujam, *Inorganic Semimicro Qualitative Analysis*; 3rded., The National Publishing Company, Chennai, 1974. 3. *Vogel's Text book of Inorganic Qualitative Analysis,* 4thed., ELBS, London.
Reference Books	1. G. Pass, and H. Sutcliffe, *Practical Inorganic Chemistry*; Chapman Hall, 1965. 2. W. G. Palmer, Experimental *Inorganic Chemistry*; Cambridge University Press, 1954.

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To identify the anions and cations present in a mixture of salts.

CO2: To apply the principles of semi micro qualitative analysis to categorize acid radicals and basic radicals.

CO3: To acquire the qualitative analytical skills by selecting suitable confirmatory tests and spot tests.

CO4: To choose the appropriate chemical reagents for the detection of anions and cations.

CO5: To estimate the heavy metals by colorimetric analysis.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

Title of the Course	**MEDICINAL CHEMISTRY**						
Paper No.	**Elective III**						
Category	**Elective**	**Year**	**I**	**Credits**	**4**	**Course Code**	**PCCHTE21**
		Semester	**II**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	3	**1**	**-**			**4**	
Prerequisites	**Basic knowledge of medicinal chemistry**						
Objectives of the course	To study the chemistry behind the development of pharmaceutical materials. To gain knowledge on mechanism and action of drugs. To understand the need of antibiotics and usage of drugs. To familiarize with the mode of action of diabetic agents and treatment of diabetes. To identify and apply the action of various antibiotics.						
Course Outline	**UNIT-I: Introduction to receptors:** Introduction, targets, Agonist, antagonist, partial agonist. Receptors, Receptor types, Theories of Drug – receptor interaction, Drug synergism, Drug resistance, physicochemical factors influencing drug action.						
	UNIT-II: Antibiotics: Introduction, Targets of antibiotics action, classification of antibiotics, enzyme-based mechanism of action, SAR of penicllins and tetracyclins, clinical application of penicillins, cephalosporin. Current trends in antibiotic therapy.						
	UNIT-III: Anesthetics: General anesthetics – sedatives – hypnotics – anti seizure agents – antidepressants – psychotherapeutic drugs – hallucinogens, stimulants opioids – drugs in the treatment of neuromuscular disorder.						
	UNIT-IV: Antihypertensive agents and diuretics: Classification of cardiovascular agents, introduction to hypertension, etiology, types, classification of antihypertensive agents, classification and mechanism of action of diuretics, Furosemide, Hydrochlorothiazide, Amiloride.						
	UNIT-V: Analgesics, Antipyretics and Anti-inflammatory Drugs: Introduction, Mechanism of inflammation, classification and mechanism of action and paracetamol, Ibuprofen, Diclofenac, naproxen, indomethacin, phenylbutazone and meperidine. Medicinal Chemistry of Antidiabetic Agents Introduction, Types of diabetics, Drugs used for the treatment, chemical classification, Mechanism of action, Treatment of diabetic mellitus. Chemistry of insulin, sulfonyl urea.						
Extended Professional	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved						

Component (is a part of internal component only, Not to be included in the external examination question paper)	(To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry, 2. Wilson, Charles Owens: Beale, John Marlowe; Block, John H, Lipincott William, 12th edition, 2011. 3. Graham L. Patrick, An Introduction to Medicinal Chemistry, 5th edition, Oxford University Press, 2013. Jayashree Ghosh, A text book of Pharmaceutical Chemistry, S. Chand and Co. Ltd, 1999,1999 edn. 4. O. LeRoy, Natural and synthetic organic medicinal compounds, Ealemi, 1976. 5.S. Ashutosh Kar, Medicinal Chemistry, Wiley Eastern Limited, New Delhi, 1993, New edn.
Reference Books	1. Foye's Princles of Medicinal Chemistry, Lipincott Williams, Seventh Edition, 2012 2. Burger's Medicinal Chemistry, Drug Discovery and Development, Donald J. Abraham, David P. Rotella, Alfred Burger, Academic press, 2010. 3. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, John M. Beale Jr and John M. Block, Wolters Kluwer, 2011, 12th edn. 4. P. Parimoo, A Textbook of Medical Chemistry, New Delhi: CBS Publishers.1995. 5. S. Ramakrishnan, K. G. Prasannan and R. Rajan, Textbook of Medical Biochemistry,Hyderabad: Orient Longman. 3rd edition, 2001.
Website and e-learning source	1. https://www.ncbi.nlm.nih.gov/books/NBK482447/ 2. https://training.seer.cancer.gov/treatment/chemotherapy/types.html 3. https://www.classcentral.com/course/swayam-medicinal-chemistry-12908

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: Predict a drugs properties based on its structure.

CO2: Describe the factors that affect its absorption, distribution, metabolism, and excretion, and hence the considerations to be made in drug design.

CO3: Predict the role of sedatives, hypnotics and psychotherapeutic drugs.

CO4: Designed to give the knowledge of different theories of drug actions at molecular level.

CO5: To identify different targets for the development of new drugs for the treatment of infectious and GIT.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

Title of the Course	**GREEN CHEMISTRY**						
Paper No.	**Elective III**						
Category	**Elective**	**Year**	**I**	**Credits**	**4**	**Course Code**	**PCCHTE22**
		Semester	**II**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	3	**1**	**-**			**4**	
Prerequisites	Basic knowledge of general chemistry						
Objectives of the course	To discuss the principles of green chemistry. To propose green solutions for chemical energy storage and conversion. Propose green solutions for industrial production of Petroleum and Petrochemicals. Propose solutions for pollution prevention in Industrial chemical and fuel production, Automotive industry and Shipping industries. Propose green solutions for industrial production of Surfactants, Organic and inorganic chemicals.						
Course Outline	**UNIT-I:** Introduction- Need for Green Chemistry. Goals of Green Chemistry. Limitations/ of Green Chemistry. Chemical accidents, terminologies, International green chemistry organizations and Twelve principles of Green Chemistry with examples.						
	UNIT-II: Choice of starting materials, reagents, catalysts and solvents in detail, Green chemistry in day today life. Designing green synthesis - green reagents: dimethyl carbonate. Green solvents: Water, Ionic liquids-criteria, general methods of preparation, effect on organic reaction. Supercritical carbon dioxide- properties, advantages, drawbacks and a few examples of organic reactions in CO_2. Green synthesis - adipic acid and catechol.						

	UNIT-III: Environmental pollution, Green Catalysis-Acid catalysts, Oxidation catalysts, Basic catalysts, Polymer supported catalysts-Poly styrene aluminum chloride, polymeric super acid catalysts, Poly supported photosensitizers.
	UNIT-IV: Phase transfer catalysis in green synthesis-oxidation using hydrogen peroxide, crown ethers-esterification, saponification, anhydride formation, Elimination reaction, Displacement reaction. Applications in organic synthesis.
	UNIT-V: Micro wave induced green synthesis-Introduction, Instrumentation, Principle and applications. Sonochemistry – Instrumentation, Cavitation theory - Ultra sound assisted green synthesis and Applications.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Ahluwalia, V.K. and Kidwai, M.R. New Trends in Green Chemistry, Anamalaya Publishers, 2005. 2. W. L. McCabe, J.C. Smith and P. Harriott, Unit Operations of Chemical Engineering, 7thedition, McGraw-Hill, NewDelhi,2005. 3. J. M. Swan and D. St. C. Black, Organometallics in Organic Synthesis, Chapman Hall,1974. 4. V. K. Ahluwalia and R. Aggarwal, Organic Synthesis: Special Techniques, Narosa Publishing House, New Delhi,2001. 5. A. K. De, Environmental Chemistry, New Age Publications, 2017.
Reference Books	1. Anastas, P.T. and Warner, J.K. Oxford Green Chemistry -Theory and Practical, University Press, 1998 2. Matlack, A.S. Introduction to Green Chemistry, Marcel Dekker, 2001 3. Cann, M.C. and Connely, M.E. Real-World Cases in Green Chemistry, American Chemical Society, Washington, 2000 4. Ryan, M.A. and Tinnesand, M., Introduction to Green Chemistry, American Chemical Society Washington, 2002. 5. Chandrakanta Bandyopadhyay, An Insight into Green Chemistry, Books and Allied (P) Ltd, 2019.
Website and e-learning source	1. https://www.organic-chemistry.org/ 2. https://www.studyorgo.com/summary.php

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To recall the basic chemical techniques used in conventional industrial preparations and in green innovations.

CO2: To understand the various techniques used in chemical industries and in laboratory.

CO3: To compare the advantages of organic reactions assisted by renewable energy sources and non-renewable energy sources.

CO4: To apply the principles of PTC, ionic liquid, microwave and ultrasonic assisted organic

synthesis. **CO5**: To design and synthesize new organic compounds by green methods.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

Title of the Course	**BIO-INORGANIC CHEMISTRY**						
Paper No.	**Elective IV**						
Category	**Elective**	**Year**	**I**	**Credits**	**4**	**Course Code**	**PCCHTE23**
		Semester	**II**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	3	**1**	**-**			**4**	
Prerequisites	Basic knowledge of chemistry						
Objectives of the course	To understand the role of trace elements. To understand the biological significance of iron, sulphur. To study the toxicity of metals in medicines. To have knowledge on diagnostic agents. To discuss on various metalloenzymes properties.						
Course Outline	**UNIT-I: Introduction to Bioinorganic Chemistry** - Biodistribution of metal ions, Selection and insertion of metal ions for protein sites-transport and storage. proteins-Bioinorganic site of nucleic acid chemistry-Interactions with Metal Ions-Nuclease and Peptidase Models (coordination linked to Bio-inorganic). Thermodynamic aspects: HSAB concept-Chelate effect- pKa value of ligands- Tuning of redox potential-kinetic aspect-ligand exchange rate-substitution reactions.						
	UNIT-II: Essential trace elements: Selective transport and storage of metal ions: Ferritin, Transferrin and siderophores; Na^+ and K^+ transport, Calcium signalling						

	proteins. Enzymes: Introduction & properties. Effect of pH, temperature on enzyme reactions. Factors contributing to the efficiency of enzyme. Metalloenzymes: Zinc enzymes–carboxypeptidase and carbonic anhydrase. Iron enzymes–catalase, peroxidase. Copper enzymes – superoxide dismutase, Coenzymes - Vitamin-B12 coenzymes.
	UNIT-III: Transport Proteins: Oxygen carriers -Hemoglobin and myoglobin - Structure and oxygenation, Bohr Effect. Binding of CO, NO, CN – to Myoglobin and Hemoglobin. Biological redox system: Cytochromes-Classification, cytochrome a, b and c. Cytochrome P-450. Non-heme oxygen carriers-Hemerythrin and hemocyanin. Iron-sulphur proteins- Rubredoxin and Ferredoxin (Fe_2S_2, Fe_4S_4) - Structure and classification.
	UNIT-IV: Nitrogen Fixation: Introduction, types of nitrogen fixing microorganisms. Nitrogenase enzyme - Metal clusters in nitrogenise - redox property - Dinitrogen complexes transition metal complexes of dinitrogen - nitrogen fixation via nitride formation and reduction of dinitrogen to ammonia. Photosynthesis: photosystem-I and photosystem-II-chlorophylls structure and function.
	UNIT-V: Metals in medicine: Metals in treatment (Pt, Au, Li, Zn, Cu) & Metal Toxicity (Hg, Cd, Zn, Pb, Sb). Therapeutic Compounds: Vanadium-Based Diabetes Drugs; Platinum-Containing Anticancer Agents. Chelation therapy; Cancer treatment. Diagnostic Agents: Technetium Imaging Agents; Gadolinium MRI Imaging Agents. Iodine in various applications. Finding volume of the blood using radioactive element.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Williams, D. R. –Introdution to Bioinorganic chemistry. 2. F. M. Fiabre and D.R. Williams– The Principles of Bioinorganic Chemistry, Royol Soceity of Chemistry, Monograph for Teachers-31 3. K.F. Purcell and Kotz., Inorganic chemistry, WB Saunders Co., USA. 4. G.N. Mugherjea and Arabinda Das, Elements of Bioinorganic Chemistry - 1993. 5. R. Gopalan, V. Ramalingam, *Concise Coordination Chemistry*, S. Chand, **2001**.
Reference Books	1. M. Satake and Y. Mido, Bioinorganic Chemistry- Discovery Publishing House, New Delhi (1996) 2. M.N. Hughes, 1982, The Inorganic Chemistry of Biological processes, II Edition, Wiley London. 3. R. W. Hay, Bio Inorganic Chemistry, Ellis Horwood, 1987. 4. R. M. Roat-Malone, Bio Inorganic Chemistry, John Wiley, 2002. 5. T. M. Loehr, Iron carriers and Iron proteins, VCH, 1989.
Website and e-learning source	1. https://www.pdfdrive.com/instant-notes-in-inorganic-chemistry-the-instant-notes-chemistry-series-d162097454.html 2. https://www.pdfdrive.com/shriver-and-atkins-inorganic-chemistry-5th-edition-d161563417.html

Course Learning Outcomes (for Mapping with POs and PSOs)
Students will be able:
CO1: The students will be able to analyses trace elements.
CO2: Students will be able to explain the biological redox systems.
CO3: Students will gain skill in analyzing the toxicity in metals.
CO4: Students will have experience in diagnosis.
CO5: Learn about the nitrogen fixation and photosynthetic mechanism.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 – Low

Title of the Course	**MATERIAL SCIENCE**						
Paper No.	**Elective IV**						
Category	**Elective**	**Year**	**I**	**Credits**	**4**	**Course Code**	**PCCHTE24**
		Semester	**II**				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	3	**1**	**-**			**4**	
Prerequisites	**Basic knowledge of solid-state chemistry**						
Objectives of the course	To understand the crystal structure, growth methods and X-ray scattering. To explain the optical, dielectric and diffusion properties of crystals. To recognize the basis of semiconductors, superconductivity materials and magnets. To study the synthesis, classification and applications of nanomaterials. To learn about the importance of materials used for renewable energy conversion.						
Course Outline	**UNIT-I: Crystallography:** Symmetry - Unit cell and Miller indices - crystal systems - Bravais lattices - point groups and space groups - X-ray diffraction-Laue equations - Bragg's law - reciprocal lattice and its application to geometrical crystallography. Crystal structure–powder and single crystal applications. Electron charge density maps, neutron diffraction-method and						

	applications.
	UNIT-II: Crystal growth methods: Nucleation–equilibrium stability and metastable state. Single crystal –Low and high temperature, solution growth– Gel and sol-gel. Crystal growth methods- nucleation– equilibrium stability and metastable state. Single crystal–Low and high temperature, solution growth– Gel and sol-gel. Melt growth - Bridgeman-Stockbarger, Czochralski methods. Flux technique, physical and chemical vapour transport. Lorentz and polarization factor - primary and secondary extinctions.
	UNIT-III: Properties of crystals: Optical studies - Electromagnetic spectrum (qualitative) refractive index – reflectance – transparency, translucency and opacity. Types of luminescence – photo-, electro-, and injection luminescence, LEDs – organic, Inorganic and polymer LED materials - Applications. Dielectric studies- Polarisation - electronic, ionic, orientation, and space charge polarisation. Effect of temperature. dielectric constant, dielectric loss. Types of dielectric breakdown–intrinsic, thermal, discharge, electrochemical and defect breakdown.
	UNIT-IV: Special Materials: Superconductivity: Meissner effect, Critical temperature and critical magnetic Field, Type I and II superconductors, BCS theory-Cooper pair, Applications. Soft and hard magnets – Domain theory Hysteresis Loop-Applications. Magneto and gian magneto resistance. Ferro, ferri and antiferromagnetic materials-applications, magnetic parameters for recording applications. Ferro-, Piezo-, and pyro electric materials – properties and applications. Shape memory Alloys-characteristics and applications, Non-linear optics-Second Harmonic Generators, mixing of Laser wavelengths by quartz, ruby and $LiNbO_3$.
	UNIT-V: Materials for Renewable Energy Conversion: Solar Cells: Organic, bilayer, bulk heterojunction, polymer, perovskite based. Solar energy conversion: lamellar solids and thin films, dye-sensitized photo voltaic cells, coordination compounds anchored onto semiconductor surfaces - Ru(II) and Os(II) polypyridyl complexes. Photochemical activation and splitting of water, CO2 and N2. Manganese based photo systems for water-splitting. Complexes of Rh, Ru, Pd and Pt - photochemical generation of hydrogen from alcohol.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. S. Mohan and V. Arjunan, Principles of Materials Science, MJP Publishers, 2016. 2. Arumugam, Materials Science, Anuradha Publications, 2007. 3. Giacavazzo et. al., Fundamentals of Crystallography, International Union of Crystallography. Oxford Science Publications, 2010

	4. Woolfson, An Introduction to Crystallography, Cambridge University Press, 2012. 5. James F. Shackelford and Madanapalli K. Muralidhara, Introduction to Materials Science for Engineers. 6th ed., PEARSON Press, 2007.
Reference Books	1. Suggested Readings 1. M.G. Arora, Solid State Chemistry, Anmol Publications, New Delhi, 2001. 2. R.K. Puri and V. K. Babbar, Solid State Physics, S Chand and Company Ltd, 2001. 3. C. Kittel, Solid State Physics, John-Wiley and sons, NY, 1966. 4. H.P. Meyers, Introductory Solid State Physics, Viva Books Private Limited, 1998. 5. A.R. West, Solid State Chemistry and Applications, John-Wiley and sons, 1987.
Website and e-learning source	1. http://xrayweb.chem.ou.edu/notes/symmetry.html. 2. http://www.uptti.ac.in/classroom-content/data/unit%20cell.pdf. 3. https://bit.ly/3QyVg2R

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

CO1: To understand and recall the synthesis and characteristics of crystal structures, semiconductors, magnets, nanomaterials and renewable energy materials.

CO2: To integrate and assess the structure of different materials and their properties.

CO3: To analyse and identify new materials for energy applications.

CO4: To explain the importance of crystal structures, piezoelectric and pyroelectric materials, nanomaterials, hard and soft magnets, superconductors, solar cells, electrodes, LED uses, structures and synthesis.

CO5: To design and develop new materials with improved property for energy applications.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

<table>
<tr><td>Title of the Course</td><td colspan="7">COMPUTATIONAL CHEMISTRY</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core VIII</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">4</td><td rowspan="2">Course Code</td><td rowspan="2">PCCHTSE2</td></tr>
<tr><td>Semester</td><td>III</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td></td><td>3</td><td>1</td><td colspan="3">-</td><td colspan="2">4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Knowledge of Computers and information about Chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">The main objective of the course is to introduce basic operating system and basic commands.
To gain knowledge of electronic structure calculation of molecules systems and molecular modeling in the field of computational chemistry software.</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="7">UNIT-I: Basics of Computers: Hardware and Software – Types of Languages: Higher level and lower languages, examples. BIOS and RAM: Significance. – Central Processing Unit and GPU Input Devices and Types of computing: Parallel and Sequential. Types: Personal Computers, Notebook, Workstation, Servers and Supercomputers- Definitions and examples. Storage Device: Magnetic tapes vs Solid State disks. Memory devices: OLED and OFET descriptions.</td></tr>
<tr><td colspan="7">UNIT-II: Approach to computing: Flowcharts/mindmaps: Significance of flowcharts and example to compute simple examples in chemistry like pH of a solution, Temperature conversion (F to C) and van-der Waals' equation, First Order rate equation – all using BASIC programming. About useful programming languages for Chemistry: Examples C and C++ and Python (only introduction). Resources on the internet – Drawing of Chemical Structures and saving formats: ChemSketch and similar freeware. Online services for property prediction and internet basics (Example: Molinspiration)- Format conversions: OpenBabel</td></tr>
<tr><td colspan="7">UNIT-III: Applications of Computational Sciences in Chemistry: Computational Quantum Chemistry and its applications, Prediction of Molecular Properties using Computational chemistry softwares, Overview of Quantum Chemistry Theories like HF, SCF and Approximation methods and their level of accuracy and hierarchy of computational requirements. Basis Sets used in computation. Overview of Computer aided Drug Design and prediction of Material properties. Analysis of optimized structure for geometry parameters like bond length, angle and torsional angle. Charge on the atoms – Mulliken, Lowdin and NBO charges and population.</td></tr>
<tr><td colspan="7">UNIT-IV: Computational Methods and Software: Molecular Dynamics, Semi-empirical methods, Ab-initio and Density Functional Theory – Definitions and Significance. Introduction to Software available for all the above methods (Opensource like AMBER, MOPAC, GAMESS) including web based (online submission). Input generation using coordinates and z matrix. Generation of coordinates for Water, Hydrogen Peroxide, Formaldehyde, Methane, Ethane, Ethylene, Benzene and Aniline. Calculation of properties from these methods, including zero-point energy and reaction coordinates (description).</td></tr>
<tr><td colspan="7">UNIT-V: Cheminformatics and Molecular Modeling: Molecular descriptors to include HOMO, LUMO, Softness, Hardness, Dipole moment and log P. Fukui functions for predicting reactivity of molecules using FMO - Nucleophilicity and Electrophilicity - Band gap estimation in eV and their significance. QSAR and QSPR: Relating bio-reactivity with structure using simple IC_{50} values. Use of Hammett-Taft equation and Lipinski Rule – Drug Designing basics to include action mechanism and using PDB structures for docking with software and Score prediction. Conformational Analysis – Ramachandran Plot. Protein Data Base and its significance.</td></tr>
<tr><td>Extended Professional Component (is a</td><td colspan="7">Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved
(To be discussed during the Tutorial hours)</td></tr>
</table>

part of internal component only, Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Molecular Modeling – Principles and Applications, A. R. Leach (Addison Wesley Longman) 2. Introduction to Computational Chemistry, F. Jensen (Wiley) Essentials of Computational Chemistry – Theories and Models, C. J. Cramer (Wiley)
Reference Books	1. Computational Chemistry – A Practical Guide fo Applying Techniques to Real World Problems, David Young (Wiley) 2. Exploring Chemistry with Electronic Structure Methods, J. B. Foresman and A. Frisch (Gaussian Inc.)
Website and e-learning source	1. https://ocw.mit.edu/courses/5-04-principles-of-inorganic-chemistry-ii-fall-2008/pages/syllabus/

Course Learning Outcomes (for Mapping with POs and PSOs)
Students will be able
CO1: execute the basic operations of different types of languages in computers.
CO2: develop computing methods through various languages.
CO3: develop computational methods for understanding its applications in chemistry.
CO4: develops software for computation methods.
CO5: predict the reactivity of molecules through database.

CO-PO Mapping (Course Articulation Matrix)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	S	S	S	M
CO 2	M	S	S	S	S	M	S	S	S	S
CO 3	S	S	M	S	S	S	S	M	S	S
CO 4	M	S	S	S	S	M	S	S	S	S
CO 5	M	S	M	S	S	M	S	M	S	S

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 – Low

Programme Outcomes: **Biochemistry**	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team **PO8: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9: Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability toembrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and

Programme Specific Outcomes:	**PSO1 – Placement:** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions. **PSO 2 - Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations **PSO3 – Research and Development:** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World:** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5 – Contribution to the Society:** To contribute to the development of the society by collaborating with stakeholders for mutual benefit

PROGRAM OUTCOMES

PO1	Acquire knowledge in Biochemistry and apply the knowledge in their day to day life for betterment of self and society
PO2	Develop critical ,analytical thinking and problem solving skills
PO3	Develop research related skills in defining the problem, formulate and test the hypothesis, analyse, interpret and draw conclusion from data
PO4	Address and develop solutions for societal and environmental needs of local, regional and national development
PO5	Work independently and engage in lifelong learning and enduring proficient progress
PO6	Provoke employability and entrepreneurship among students along with ethics and communication skills

PROGRAM SPECIFIC OUTCOMES

PSO1	Comprehend the knowledge in the biochemical, analytical, biostatistical and computational areas
PSO2	Ability to understand the technical aspects of existing technologies that help in addressing the biological and medical challenges faced by human kind
PSO3	Acquiring analytical and hands on skills to perform research in multidisciplinary environments
PSO4	Use library search tools and online databases and sources to locate and retrieve scientific information about a topic and techniques related to biochemistry

Eligibility for admission

Candidate for admission to the first year of B.Sc. Degree Course in Bio-Chemistry shall be required to have passed the Higher Secondary Examination with Chemistry and Biology or Chemistry, Botany and Zoology or Biochemistry and Chemistry.

3. Highlights of the Revamped Curriculum

- The curriculum is created to improve the relationship between business and academia
- Every semester, practicals based on the course taken that semester will aid students in applying what they have learned
- Students will benefit from the introduction of skill based elective courses including Bioinformatics, Nanobiotechnology, Therapeutic nutrition, and Medical Laboratory technology as they keep up with technological advancements in their fields of study
- The fourth semester internship will give students a chance to apply what they have learned in class to a real world working experiment
- Skill enhancement courses help students venture new platforms in career.
- Equip students with employability skills,generate self employment and small scale entrepreneurs.

4.Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits

I	**Foundation Course** It depicts the overview of entry education and makes the students assimilate with the biochemistry course. This course will inculcate knowledge of the academic skills, laboratory skills and research	It gives a strong determination to undergo the course.Be committed and interested in learning the subject
I, II, III, IV	**Skill Enhancement papers (Discipline centric / Generic / Entrepreneurial)**	Improve employabilityDevelop the skill as Laboratory Analyst To make students compete with industrial expectations.
		Incorporating the interest on health, diet, lifestyle diseases will enable the students gain knowledge to get exposed themselves in medical field
		Biomedical Instrumentation skills will aid the students gain knowledge on the various instruments used in the field of medical laboratory and research.
		Entrepreneurial skill training will increase the chance to build their career independently.Learning this skills will encourage the students to enhance creativity, innovation and collaboration
		Discipline /subject specific skill will serve as a route for employability
V & VI	**Elective papers-** An open choice of topics categorized under Generic and Discipline Centric	It reinforces additional knowledge inputs along with core course.Students are familiarized with multi-disciplinary,crossdisciplinary and inter disciplinary subjects. It broadens the knowledge on immunological aspects, pharmacology and research. Additional Employability skills are facilitated through computational biology and Bioentrepreneurship.

V semester Vacation activity	**Internship/ Industrial visit/Field visit**	Hand on training in Medical Labs/ Industry/ Research centres enable the students to explore the practical aspects in career path. They gain confident to fix their career.
VI Semester	**Project with Viva – voce**	Self-learning is enhanced·It serves as a platform to express their innovative ideas in a practical way, which serves as a pathway to enter in the field of research.
VI Semester	**Introduction of Professional Competency skill**	The revamped curriculum caters the education to all category of learners; Learning multidisciplinary papers, updated in the curriculum will help the students to fix their career in the fields of Medical, pharmaceutical, forensic, nutritional, diagnostic coding ,etc ·Students are trained in the field of research to bring out the progress in the field of Medical, Agriculture ,Nutrition ,etc which will be a back bone for health and wealth creation and improve the quality of life
Extra Credits: **For Advanced Learners / Honours degree**		ETo cater to the needs of peer learners / research aspirants
Skills acquired from the Courses		Analytical, Laboratory operating, Predicting, Experimenting, Critical thinking, Problem solving, Communication, Interpersonal, Time management and Multi-tasking Skills

I YEAR: SEMESTER I

Course Code	Course Name	Category	L	T	Credits	Inst. hrs	Marks		
							CIA	EXE	Total
UCBITC11	**Core Paper1- Nutritional Biochemistry**	**Core**	**4**	**2**	**4**	**6**	**25**	**75**	**100**

NUTRITIONAL BIOCHEMISTRY

Learning Objectives

The objectives of this course are to

- Create awareness about the role of nutrients in maintaining proper health
- Understand the nutritional significance of carbohydrates, lipids and proteins.
- Understand the importance of a balanced diet.
- Study the effect of additives, emulsifiers, and flavour-enhancing substances in food.
- Study the significance of Nutraceuticals.

Unit I : Concepts of food and nutrition. Basic food groups-energy yielding, body building and protective foods. Modules of energy- calorific and nutritive value of foods. Measurement of Calories by bomb calorimeter. Basal metabolic rate (BMR)- definition, determination of BMR and factors affecting BMR. Respiratory quotient (RQ) of nutrients. SDA-definition. Body mass index (BMI) – measurement and significance. **18 Hrs**

Unit II: Physiological role and nutritional significance of carbohydrates, lipids and protein. Evaluation of proteins by nitrogen balance method- Biological value of proteins- Digestibility coefficient, Protein efficiency ratio and Net Protein Utilization. Protein energy malnutrition – Kwashiorkar and Marasmus. Obesity-Types and preventive measures.

18 Hrs

Unit III: Balanced diet, example of low cost balanced diet- for infants, children, adolescents, adults and elderly people. ICMR classification of five food groups and its significance food pyramid. Junk foods- definition and its adverse effects. **18 Hrs**

Unit IV : Food additives: definition and function. Preservatives- sorbic acid, benzoaic acid. Antimicrobials- propyl 4-hydroxybenzoate. Food colours: natural colours- anthocyanins,

carotenoids and xanthophylls, permitted and non-permitted synthetic food colours. Flavouring agents- monosodium glutamate. Sweeteners: natural- sucrose, D-fructose; artificial- aspartame, saccharin. Emulsifiers and stabilizers- gelatine, agar-agar, guargum. Antioxidants and anticaking agents. Government regulations for food additives. **18 Hrs**

Unit V: Nutraceuticals- definition, properties and function. Food Supplements, dietary supplements prebiotics and probiotics and functional Foods. Food as medicine. Natural pigments from plants– carotenoids and its benefits. Dietary fibre. **18 Hrs**

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Cognizance of basic food groups viz. Carbohydrates, proteins and lipids and their nutritional aspects as well as calorific value	PO1,PO5
CO2	Identify and explain nutrients in foods and the specific functions in maintaining health.	PO1
CO3	Classify the food groups and its significance	PO1,PO2
CO4	Understand the effect of food additives	PO1,PO2
CO5	Describe the importance of nutraceuticals and pigments	PO1,PO5,PO6

Text books

1. B. Srilakshmi, Food Science, 6th Multicolour Edition, 2015, New Age International Publishers, New Delhi, India.
2. B. Srilakshmi, Dietetics, 7th Multicolour Edition, 2014, New Age International Publishers, New Delhi, India.
3. Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd-Bredbenner. Wardlaw's Perspectives in Nutrition: A Functional Approach, 2013, McGraw-Hill, Inc., NY, USA.
4. M. Swaminadhan, Principles of Nutrition and Dietics, 1995, Bappco.
5. Tom Brody, Nutritional Biochemistry, 2nd Ed, 1998, Academic press, USA.
6. Garrow, JS,James WPT and Ralph A, Human nutrition and dietetics, 10th Ed, 2000, Churchill Livingstone.
7. Andreas M. Papas, Antioxidant Status, Diet, Nutrition, and Health, 1st Ed, 1998, CRC.

Reference Books

1. Branen, A.L., Davidson PM &Salminen S. 2001. Food Additives.2nd Ed. Marcel Dekker.

2. Gerorge, A.B. 1996. Encyclopedia of Food and Color Additives. Vol. III. CRC Press.
3. Advances in food biochemistry, FatihYildiz (Editor), CRC Press, Boca Raton, USA, 2010.
4. Food biochemistry & food processing, Y.H. Hui (Editor), Blackwell Publishing, Oxford, UK, 2006.
5. Geoffrey Campbell-Platt. 2009. Food Science and Technology. Wiley-Blackwell, UK.

Web resources

http://old.noise.ac.in/SecHmscicour/english/LESSON O3.pdf

https://study.com/academy/lesson/energy-yielding-nutrients-carbohydratesfat-protein.html.

https://www.nhsinform.scot/healthy-living/food-and-nutrition/eatingwell/vitamins-and-minerals

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3				2		3	3	3	3
CO 2	3						3	3		3
CO 3	3	2					3	1		3
CO 4	3	2					3	3		3
CO5	3				2	2	3	3		3

S-Strong(3) M-Medium (2) L-Low (1)

I YEAR: SEMESTER I
PRACTICAL I -NUTRITIONAL BIOCHEMISTRY

Course Code	Course Name	Category	L	T	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCBIPC12	**Core paper 2 Practical 1- Nutritional Biochemistry**	**Core**	**0**	**0**	**3**	**3**	**25**	**75**	**100**

Learning objectives

The objectives of this course are to

- Impart hands-on training in the estimation of various constituents by titrimetric method
- Prepare Biochemical preparations
- Determine the ash content and extraction of lipid

TITRIMETRY 20 Hrs

1. Estimation of ascorbic acid.
2. Estimation of glucose by Benedict's method.
3. Estimation of amino acid (glycine).

BIOCHEMICAL PREPARATIONS 15 Hrs

Preparation of the following substances and its qualitative tests.

4. Lecithin from egg yolk.
5. Starch from potato.
6. Casein and Lactalbumin from milk.

GROUP EXPERIMENT 10Hrs

7. Determination of Iodine number of Fat.
8. Determination of Acid Number of Fat.

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Estimate the important biochemical constituents in the food samples.	PO1,PO3
CO2	Prepare the macronutrients from the rich sources.	PO1,PO3
CO3	Determine the quality of the food samples.	PO1,PO3
CO4	Carry out titrimetric methods of determination of biochemical constituents in samples.	PO1,PO3,PO6

Text books

1.Laboratory manual in Biochemistry, J. Jayaraman, 2nd edition, NewAge International Publishers, 2011,

2. An Introduction to Practical Biochemistry, David T. Plummer, 3 rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.

Reference books

1. Biochemical Methods, Sadasivam S and Manickam A, 4h edition, NewAge International Publishers, 2016

2. Essentials of Food and Nutrition, Vol. I & II, M.S. Swaminathan.
3Bowman and Robert M. 2006. Present Knowledge in Nutrition.9th edition, International Life Sciences Publishers.
4. Indrani TK. 2003. Nursing Manual of Nutrition and Therapeutic Diet, 1st edition Jaypee Brothers medical publishers.
5. Martha H. and Marie A. 2012. Biochemical, Physiological, and Molecular Aspects of Human Nutrition.3rd edition.Chand Publishers.

Web resources

1.https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors
2.http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf
3.https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y
4.https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3		3				3	3	3	3
CO 2	3		3				3	3	3	3
CO 3	3		3				3	3	3	3
CO 4	3		3			3	3	3	3	3

S-Strong(3) M-Medium (2) L-Low (1)

I YEAR - FOUNDATION COURSE SYLLABUS
BASICS IN BIOCHEMISTRY

Course Code	Course Name	Category	L	T	Credits	Inst. Hours	Marks		
							CIA	External	Total
UCBITF11	**BASICS IN BIOCHEMISTRY**	**Core**	**2**		**2**	**2**	**25**	**75**	**100**

Learning objectives

- The students can understand biomolecules and their functions.
- Able to differentiate DNA and RNA and its types.
- Understand the significance of Enzymes and coenzymes.
- Importance of Immunity and various immune cells.
- Basic instruments in biochemical labs.

Module I :

Biological macromolecules- definition, role of carbohydrates and lipids. Outline the classification of carbohydrates-Mono, Di, and Polysaccharides. Lipids Classification - simple, complex and derived lipids. **6 hrs**

Module II:
Nucleic acids- Central dogma, Watson crick model of DNA, Mode of Replication. RNA - Structure and type's m-RNA, t-RNA, r-RNA with function. **6 hrs**

Module III:
Proteins classification- Simple. Conjugated Proteins- Keratin, Collagen, Silk fibroin, Hemoglobin. Enzymes- general features and properties. Cofactors- definition, coenzymes and prosthetic groups. **6 hrs**

Module IV:
Immune system- Definition of Immunity, Role of various immune cells- neutrophils, eosinophils, basophils, B-lymphocytes, T-lymphocytes, monocytes, macrophages, mast cells, dendritic cells and natural killer cells. **6 hrs**

Module V:
Principles and applications of- colorimeter, UV-visible spectrophotometer, paper chromatography and thin layer chromatography. **6 hrs**

Text books

1. Satyanarayan,U (2014) Biochemistry (4th ed), Arunabha SenBooks & Allied (P) Ltd, Kolkata.
2. David L.Nelson and Michael M.Cox (2012) Lehninger Principlesof Biochemistry (6th ed) W.H. Freeman.
3. Arumugam. N, Cell Biology, Saras Publication, 10th Ed, 2019.

Reference Books

1. Voet.D & Voet. J.G (2010) Biochemistry , (4th ed), John Wiley &Sons, Inc.
2. Metzler D.E (2003). The chemical reactions of living cells (2nded), Academic Press.
3. Zubay G.L (1999) Biochemistry , (4th ed), Mc Grew-Hill.
4. Lubert Stryer (2010) Biochemistry,(7th ed), W.H.Freeman

Web resources

1. https://bio.libretexts.org/Bookshelves/Biochemistry/Book%3A_Bio c hemistry_Online_(Jakubowski)
2. https://www.thermofisher.com/in/en/home/life-science/protein- biology/protein-biology-learning-center/protein-biology-resource- library/pierce-protein-methods/protein-glycosylation.html
3. https://ocw.mit.edu/courses/biology/7-88j-protein-folding-and- human-disease-spring-2015/study-materials/
4. https://www.open.edu/openlearn/science-maths- technology/science/biology/nucleic-acids-and-chromatin/content- section- 3.4.2
5. https://www.genome.gov/genetics-glossary/Cell-Membrane
6. https://nptel.ac.in/content/storage2/courses/102103012/pdf/mod3.pdf

I YEAR: SEMESTER II
CELL BIOLOGY

Course Code	Course Name	L	T	Cr.	Hrs	Marks		
						CIA	External	Total
UCBITC21	Core paper 3: Cell Biology	5	1	5	6	25	75	100

Learning Objectives

The main objectives of this course are to

- Provide a basic understanding of the architecture of cells and its organelles.
- Understand the organization of prokaryotic and eukaryotic genomes.
- Educate on the structural organization of bio membrane and transport mechanism
- Impart knowledge on cell cycle, cell division and basics of cells
- Familiarize the concept of mechanism of cell-cell interactions.

Module I:

Architecture of cells- Structural organization of prokaryotic and eukaryotic cells. Microbial, plant and animal cells. Structure, types and function of ribosomes. **18 Hrs**

Module II:

Biomembranes-Structural organization of lipid bilayer model and basic functions- transport across cell membranes- uniport, symport and antiport. Passive and active transport.

The ultrastructure and functions of endoplasmic reticulum (RER, SER), Golgi apparatus.

18 Hrs

Module III:

The ultrastructure and functions of the nucleus. Organization of Genome -prokaryotic, and eukaryotic genome. Organization of chromatin – histones, nucleosome concept, formation of chromatin structure.

Cell Cycle-Definition and Phases of Cell cycle. Cell Division-Mitosis and Meiosis and its significance. **18 Hrs**

Module IV:

Cytoskeleton- microfilament, microtubules and intermediary filament- structure, composition and functions.

Extracellular matrix – Collagen, laminin, fibronectin and proteoglycans- structure and biological role.

18 Hrs

Module V:

The ultrastructure of mitochondria, lysosome, peroxisome and their functions.

Structure and role of cadherin, selectins, integrins, Cell -cell interactions- types- gap junctions, tight junctions and desmosomes. **18 Hrs**

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Explain the structure and functions of basic components of prokaryotic and eukaryotic cells, especially the organelles.	PO1
CO2	Familiarize the cytoskeleton and chromatin	PO1,PO2
CO3	Illustrate the structure, composition and functions of cell membrane related to membrane transport	PO1,PO2
CO4	Elaborate the phases of cell cycle and cell division-mitosis and meiosis and characteristics of cancer cells.	PO1, PO2
CO5	Relate the structure and biological role of extracellular matrix in cellular interactions	PO1,PO2

Text books

1. Arumugam. N, Cell Biology, Saras Publication, 10th Ed, 2019.
2. Devasena.T., Cell Biology, Oxford University Press India, 2012.
3. Bruce Alberts and Dennis Bray, Essential Cell Biology, 4th Ed, Garland Science, 2013.

Reference Books

1. S.C, R. Cell Biology, New Age Publishers, 2008.
2. Cooper, G.A. The Cell: A Molecular Approach, Sinauer Associates Inc, 2013.
3. E.M.F.,D.R, Cell and Molecular Biology, Lippincott, Williams, Wilkins, Philadelphia, 2006.
4. Lodish H.A, Berk C.A, Kaiser M, Krieger M.P, Scott A, Bretscher H, Ploegh and Matsudaira. Molecular Cell Biology, 6th Edition, WH. Freeman Publishers, New York, USA, 2007.

Web resources

https://nicholls.edu/biol-ds/bio1155/Lectures/Cell%20Biology.pdf
https://www.medicalnewstoday.com/article/320878.php
https://biologydictionary.net /cell

Mapping with Program Outcome

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3	3					3			3
CO 3	3	3					3			3
CO 4	3	3					3	3		3
CO5	3	3					3			3

S-Strong(3) M-Medium (2) L-Low (1)

I YEAR :SEMESTER II
PRACTICAL II CELL BIOLOGY

Course Code	Course Name	L	T	Cr.	Hrs	Marks		
						CIA	External	Total
UCBIPC22	Core Practical paper 4: Cell Biology	5	1	5	6	25	75	100

Learning Objectives

The main objectives of this course are to

- Learn the parts of microscope.
- Investigate the cells under a microscope.
- Image the cells using different stains
- Identify the cells, organelles and stages of cell division
- Identify the spotters.

I MICROSCOPY AND STAINING TECHNIQUES 25 Hrs

1. Study the parts of light and compound microscopes.
2. Examination of prokaryotic and eukaryotic cells.
3. Examination of Hematoxylin & Eosin stained slides.
4. Visualization of animal cells by methylene blue.
5. Visualization of nuclear fraction.
6. Visualization of mitochondria.

II GROUP EXPERIMENT 10Hrs

7. Identification of different stages of mitosis in onion root tip.
8. Detection of collagen fibres in animal tissues.

III SPOTTERS 5Hrs

9. a) **Cells**: Plant and Animal cell
   b) **Organelles**: Mitochondria, Chloroplast, Endoplasmic reticulum,
   c) **Mitosis stages**–Prophase, Anaphase, Metaphase, Telophase

Course Outcomes

CO	On completion of this course, students will be able to	Program outcomes
CO1	Identify The Parts Of Microscope.	PO1,PO2
CO2	Preparation of Slides	PO1,PO2
CO3	Identify The Stages Of Mitosis	PO1,PO2
CO4	Visualize Nucleus, Mitochondria and collagen by staining methods	PO1,PO2
CO5	Identify the spotters of cells,organelles stages of cell division	PO1,PO2

Text books

1.Rickwood,DandJ.R.HarriscellBiology:EssentialTechniques,Johnwikey1996.

2. Davis, J.M. Basic Cell culture: A practical approach, IRL 1994.
3.Ganesh M.K. and Shivashankara A.R. 2012. Laboratory Manual for Practical Biochemistry Jaypee publications, 2ndEdn.

Referencebooks

1) Essential practical handbook of Cell biology ,Genetics andMicrobiology -A Practical manual- Debarati Das Academic publishers, ISBN, 9789383420599, 1st Edition 2017
2)
CellbiologyPractical,Dr.VenuguptaISBN8193651219,Prestigepublisher,1stJan2018.
3) Cell and Molecular biology, DeRobertis, 8th edition, 1st June, 1987

Web resources

1.http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
2. https://www.microscopemaster.com/organelles.html
3. https://www.pdfdrive.com/biochemistry-books.htm
4.http://medcell.med.yale.edu/histology/cell_lab.php#:~:text=The%20electron%20microscope%20is%20necessary,and%20small%20granules%20and%20vesicles.
5. http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
6.https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-geneticdiversity/a/phases-of-meiosis
7. https://www.microscopemaster.com/organelles.html
8. https://www.pdfdrive.com/biochemistry-books.html

Mapping with Program Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO 4
CO 1	2	3					3	3	3	3
CO 2	2	3					3	3	3	3
CO 3	2	3					3	3	3	3
CO 4	2	3					3	3	3	3

S-Strong(3) M-Medium (2) L-Low (1)

SKILL ENHANCEMENT COURSE -SEC (NME)
FIRST-YEAR SEMESTER II
HEALTH AND NUTRITION

Course Code	Course Name	Category	L	T	Cr	Hrs	Marks		
							CIA	ESE	T
UCBITS21	**NME: Health and Nutrition**	**SEC**	**1**	**1**	**2**	**2**	**25**	**75**	**100**

Learning Objectives

The main objectives of this course are to

- Gain basic health knowledge.
- Understand about vitamins.
- Learn about the functions of fat on health.
- Understand the types of minerals and its functions

- Know about the importance of carbohydrates and proteins on health

Unit I:

Health – definition, Factors affecting human health. Importance of health care of children, adults and elderly people.A balanced diet and calorific value. **6Hrs**

Unit II:

Vitamins-definition, classification, sources, functions and deficiency symptoms. Recommended daily allowances. **6Hrs**

Unit III:

Sources and functions of dietary fats, role of fats in health and diseases. **6Hrs**

Unit IV: **6Hrs**

Minerals- sources, biological functions, deficiency disorders with special reference to Calcium, Phosphorus, Potassium, Copper, Iron, Zinc, Iodine and Selenium.

Unit V:

Dietary sources, biological functions and deficiency disorders of proteins and carbohydrates. Calorific value of proteins and carbohydrates. Kwashiorkor and Marasmus – supplementation programs in India and their implications. **6Hrs**

Course Outcomes

CO	**On completion of this course, students will be able to**	**Program outcomes**
CO1	Understand about the importance of health and diet	PO1
CO2	Discuss the classification properties and deficiencies of vitamins	PO1
CO3	Understand about sources and functions of fats and lipids on health	PO1.PO4
CO4	Detail about the different typed of minerals and its role in health	PO1,PO4
CO5	Relatetherole of proteins and carbohydrates on health	PO1,PO4

Text books

1 S.Davidson and J.R.Passmore (1986) Human Nutrition and Dietetics, (8th ed), Churchill Livingstone

2. J. S. Garrow, W. Philip T. James, A. Ralph (2000), Human Nutrition and Dietetics (10th ed), Churchill Livingstone

3. M.Swaminathan (1995) Principles of Nutrition and Dietetics, Bappco

Reference Books

1. Margaret Mc Williams (2012). Food Fundamentals (10th ed), Prentice Hall

Web Resources

1. https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-differentages.

2. nhp.gov.in/healthyliving/healthydiet

3. www.anme.com.mx/libros/PrinciplesofNutrition.pdf

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3	3		3
CO 2	3						3	3		3
CO 3	3			2			3	3		3
CO 4	3			2			3	3		3
CO5	3			2			3	3		3

S-Strong (3) M-Medium (2) L-Low (1)

Course	**CORE COURSE I**
Title of the Course:	**BASICS OF BIOCHEMISTRY**
Course Code	**PCBITC11**
Credits:	**4**
Pre-requisites, if any:	**Basic Knowledge of Biochemistry and Biomolecules**
Course Objectives	The main objectives of this course are to: **1.**Students will be introduced to the structure of biomolecules. **2.**The significance of carbohydrates in biological processes will be understood. **3.** The Properties and biological significance of lipids in the biological system will be studied **4.** Students will learn about the concepts of protein structure and their significance in biological processes and creatively comprehend the membrane components with their biological significance. **5.** Students will gain knowledge about the structures and functional Roles of nucleic acids in the biological system
Course Outcomes	Onsuccessfulcompletionofthecourse, the students should be able to: **CO1:**Explainthechemicalstructureandfunctionsofcarbohydrates.(K1,K2) **CO2:** Using the knowledge of lipid structure and function, explain howitplaysaroleinSignallingpathways(K3,K4) **CO3:**Describethevariouslevelsofstructuralorganisationofproteinsandtheroleofproteinsinbiologicalsystem(K4,K5) **CO4:**Applytheknowledgeofproteinsincell-cell interactions.(K3,K4) **CO5.**Applyingtheknowledgeofnucleicacidsequencinginresearch anddiagnosis(K2,K3,K4)
Units	

I	Carbohydrates-Classification, structure (configurations and conformations, anomeric forms), function and properties of monosaccharides, mutarotation, Disaccharides and oligo saccharides with suitable examples. Polysaccharides-Homopolysaccharides (starch, glycogen, cellulose)Heteropolysaccharides-Glycosaminoglycans– source, structure, functions of hyaluronic acid, chondroitin sulphates, keratan sulphate, Glyco proteins-protea glycans.O-LinkedandN-linked glycoproteins.Biologicalsignificanceofglycan.Bloodgrouppoly saccharides.Bacterial cell wall(peptidoglycans,teichoicacid)andplantcellwallcarbohydrate s.
II	Lipids–Classification of lipids, structure, properties and functionsoffatty acids, triacylglycerols, phospholipids, glycolipids, sphingolipidsandsteroids– Biologicalimportance.Eicosanoids-classification,structureandfunctionsofprostaglandins,thrombo xanes,leukotrienes.Lipoproteins– Classification,structure,transport(endogenousandexogenousP athway)andtheirbiological significance.
III	Overview of Aminoacids - classification, structure and propertiesof amino acids, Biological role.Non Protein amino acids and theirbiologicalsignificance.Proteins–classificationbasedoncomposition,structureandfunctions.Prim ary,secondary,supersecondary (motifs) (Helix-turn –helix, helix-loop-helix, Beta-alpha-betamotif,RosemannRossmannfold,Greekkey),tertiaryandqua ternary structure of proteins. Structural characteristics of collagenand hemoglobin. Determination of amino acid sequence.Chemicalsynthesis of a peptide, Forces involved in stabilization of proteinstructure.Ramachandranplot.
IV	MembraneProteins-Typesandtheirsignificance.Cytoskeleton proteins- actin,tubulin,intermediatefilaments .Biologicalroleofcytoskeletalproteins.Membranestructure-fluidmosaicmodel
V	Nucleic acids – types and forms (A, B, C and Z) of DNA. Watson-Crickmodel-Primary,secondaryandtertiarystructuresofDNA.Mitochondrial and chloroplast DNA. DNA supercoiling. Determination of nucleic acidsequencesbyMaxamGilbertandSanger'smethods.Forcesst abilizing nucleic acid structure. Properties of DNA and RNA. C-Value, C-value paradox, Cot curve.MajorandminorclassesofRNA,their structureandbiologicalfunctions.

ReadingList (PrintandOnline)	7. https://bio.libretexts.org/Bookshelves/Biochemistry/Book%3A_Biochemistry_Online_(Jakubowski) 8. https://www.thermofisher.com/in/en/home/life-science/protein-biology/protein-biology-learning-center/protein-biology-resource-library/pierce-protein-methods/protein-glycosylation.html 9. https://ocw.mit.edu/courses/biology/7-88j-protein-folding-and-human-disease-spring-2015/study-materials/ 10. https://www.open.edu/openlearn/science-maths-technology/science/biology/nucleic-acids-and-chromatin/content-section-3.4.2 11. https://www.genome.gov/genetics-glossary/Cell-Membrane https://nptel.ac.in/content/storage2/courses/102103012/pdf/mod3.pdf
Self-Study	1. ClassificationofSugars 2. Nutritionalclassifcationoffattyacids
Recommended Texts	4. DavidL.NelsonandMichaelM.Cox(2012)LehningerPrinciplesofBiochemistry(6thed)W.H.Freeman. 5. Voet.D&Voet.J.G(2010)Biochemistry,(4thed),JohnWiley&Sons,Inc. 6. MetzlerD.E(2003).Thechemicalreactionsoflivingcells(2nded),AcademicPress. 7. ZubayG.L(1999)Biochemistry,(4thed),McGrew-Hill. 8. LubertStryer(2010)Biochemistry,(7thed),W.H.Freeman 9. Satyanarayan,U (2014)Biochemistry (4thed),ArunabhaSenBooks&Allied(P)Ltd,Kolkata.

Methodof Evaluation:

Test I	Test II	Assignment	End Semester Examination	Total
10	10	5	75	100

Recall(K1)-Simpledefinitions, MCQ, Recallsteps,Conceptdefinitions.
Understand/Comprehend(K2)-
MCQ,True/False,Shortessays,Conceptexplanations,shortsummary oroverview.
Application(K3)-
Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.
Analyse(K4)–Problem-savingquestions,Finishaprocedureinmanysteps,Differentiatebetweenvariousideas.
Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons
Create(K6)–Checkknowledgeinspecificoroffbeat situations.Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	M	S	M	M	M	S	M	M
CO2	S	M	L	S	M	M	M	S	M	M
CO3	S	M	M	S	S	M	L	S	M	M
CO4	S	M	M	S	M	M	M	S	M	M
CO5	S	S	M	S	S	M	M	S	M	M

Strong:18 Medium:29 Low:3

Course	**CORECOURSE II**
Title of the Course:	**BIOCHEMICAL AND MOLECULAR BIOLOGY TECHNIQUES**
COURSE CODE	**PCBITC12**
Credits:	**4**
Pre-Requisites ,if any:	**Comprehensive Knowledge of Tools of Biochemistry/Molecular Biology**
Course Objectives	Biochemical techniques combine various sinter-disciplinary methods inbiologicalresearchandthecourseaimstoprovidestudentswiththefollowing objectives: 1. To understand the various techniques used in biochemical investigation and microscopy. 2. To explain chromatographic techniques.\and their applications 3. To explain electrophoretic techniques. 4. Tocomprehendthespectroscopictechniquesanddemonstratetheirapplications inbiochemicalinvestigations. 5. To acquire knowledge of radio labelling techniques and centrifugation.

CourseOutcomes	After completion of the course, the students should be able to: **CO1.** Attain good knowledge in modern used in biochemicalinvestigationandmicroscopyandapplytheexperimental protocolstoplan and carry out simple investigations in biological research. (K1, K5)**CO2.**Demonstrateknowledgetoimplementthetheoreticalbasisofchromatographyinupcomingpracticalcoursework.(K3,K5) **CO3.**Demonstrateknowledgetoimplementthetheoreticalbasisofelectrophoretictechniquesinresearchwork.(K3,K5) **CO4.**Tacklemoreadvancedandspecializedspectroscopictechniquesthatarepertinenttoresearch.(K1,K2&K5) **CO5.** Tackle more advanced and specialized radioisotope andcentrifugationtechniquesthatarepertinenttoresearchwork.(K1,K2& K5)
Units	
I	General approaches to biochemical investigation, cell culture techniquesandmicroscopictechniques.Organandtissueslicetechnique,celldistribution andhomogenizationtechniques,cellsorting,andcellcounting,tissueCulturetechniques.Cryopreservation,Biosensors-principle and applications. Principle, working and applications of lightmicroscope,darkfield,phasecontrastandfluorescentmicroscope.Electron microscope-Principle,instrumentationofTEMandSEM.
II	Chromatographic Techniques: Basic principles of chromatography- adsorption and partition techniques. Chiral Chromatography and counter current Chromatography. Adsorption Chromatography. Affinity chromatography. Gas liquid chromatography-principle,instrumentation,columndevelopment,detectorsandapplications.Lowpressurecolumnchromatography– principle,instrumentation,columnpacking,detection,quantitationandcolumnefficiency,Highpressureliquidchromatography-principle,instrumentation,deliverypump,sampleinjectionunit,columnpacking, development,detectionandapplication.ReverseHPLC.
III	ElectrophoreticTechniques: Generalprinciplesofelectrophoresis,supportingmedium,factorsaffectingelectrophoresis,Isoelectricfocusing-principle,ampholyte,developmentofpHgradientandapplication.PAGE-gelcasting-horizontal, vertical, slab gels, sample application, detection-staining using CBB, silver, fluorescent stains. SDS PAGE-principle and application in molecular weight determination principle of disc gel electrophoresis, 2DPAGE.Electrophoresis of nucleic acids-Agarose gelelectrophoresis ofDNA and RNA. pulsed field gel electrophoresis-principle, apparatus, application.2D electrophoresis and Capillaryelectrophoresis.

IV	Spectroscopictechniques: Basic laws of light absorption- principle, instrumentation and applicationsof UV-Visible, IR, ESR, NMR, Mass spectroscopy.Luminometry(Luciferasesystem,chemiluminescence).X - Raydiffraction. Atomic absorption spectroscopy - principle and applications-Determinationoftraceelements
V	RadiolabelingTechniquesandCentrifugation: Natureofradioactivity-detectionandmeasurementofradioactivity,methods based upon ionisation (GM counter) and excitation (scintillationcounter),autoradiographyandapplicationsofradioactiveisotopes,Biologicalhazardsofradiationandsafetymeasuresinhandlingradioactiveisotopes. BasicprinciplesofCentrifugation.Preparativeultracentrifugation-Differentialcentrifugation,Densitygradientcentrifugation.Analytical ultracentrifugation-Molecularweightdetermination.
Reading List(Print andOnline)	Principles and techniques of biochemistry and molecular biology:https://www.kau.edu.sa/Files/0017514/Subjects/principals%20and%20techiniques%20of%20biochemistry%20and%20molecular%20biology%207th%20ed%
Self-Study	1. Typesofrotors 2. Colorimetry–principleandapplications
Recommended Texts	1. KeithWilson,JohnWalker(2010)PrinciplesandTechniquesofBiochemistry and Molecular Biology (7th ed) Cambridge UniversityPress 2. DavidSheehan(2009),PhysicalBiochemistry:PrinciplesandApplications(2nded),Wiley-Blackwell 3. DavidM.Freifelder(1982)PhysicalBiochemistry:ApplicationstoBiochemistryandMolecularBiology,W.H.Freeman 4. Rodney F.Boyer (2012), Biochemistry Laboratory: Modern Theory andtechniques,(2nded),PrenticeHall 5. KalochRajan(2011),AnalyticaltechniquesinBiochemistryandMolecularBiology,Springer 6. Segel I.H (1976) Biochemical Calculations (2nd ed),John Wiley andSons 7. Robyt JF (2015) Biochemical techniques: Theory and Practice (1st ed),CBS Publishers&Distributors

Methodof Evaluation:

TestI	TestII	Assignment	EndSemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-

MCQ,True/False,Shortessays,Conceptexplanations,shortsummary oroverview.

Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.

Analyse(K4)–Problem-savingquestions,Finishaprocedureinmanysteps,Differentiatebetweenvarious ideas.
Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons
Create(K6)–Checkknowledgeinspecificoroffbeat situations.Discussion.
MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	M	S	S	L	L	S	S	M
CO2	S	M	M	S	M	L	M	S	S	L
CO3	S	M	L	S	M	M	M	S	M	L
CO4	S	S	L	S	S	M	M	S	M	M
CO5	S	S	M	S	M	M	M	S	M	M

S-Strong:21 M-Medium: 21 L-Low: 08

Course	**CORECOURSE-III**
Title of the Course:	**PHYSIOLOGY AND CELL BIOLOGY**
COURSE CODE	**PCBITC13**
Credits:	**4**
Pre-Requisites,ifany:	**Anatomy,CellsandBiologicalCompounds**
Course Objectives	To understand the functions and activities of organs, tissues or cells and ofphysicalandchemical phenomenainvolvedinthehumanbody
CourseOutcomes	Aftercompletionofthecourse,thestudentsshouldbeableto: **CO1.**specificallyunderstandthebiologicalandchemicalprocesseswithinahuman cell(K1,K2,K5,K6) **CO2.**identifyandpreventdiseases(K2,K3,K4,k5,K6) **CO3.**understanddefectsindigestion,nutritionaldeficienciesandintolerances,andgastrointestinalpathologies(K1,K2,K3,K4,K5,K6) **CO4.**identifygeneralcharacteristicsinindividualswithimbalancesofacid-base,fluidandelectrolytes.(K1, K2,K3,K4, K5,K6) **CO5.** process the mechanism: the transmission of biochemicalinformationbetweencellmembraneandnucleus.(K1, K2,K5)
Units	
I	Major classes of cell junctions- anchoring, tight and gap junctions. Majorfamilies of cell adhesion molecules (CAMs)- cadherins, integrins. Typesoftissues.TypesEpithelium..Cellcycle-mitosisandmeiosis,Cellcycle-phases and regulation. Cell death mechanisms- an overview-apoptosis,necrosis.
II	Reproductivesystem-sexualdifferentiationanddevelopment;spermtransport, sperm capacitation, semen analyses and Acrosome reaction.Clinical relevance of female reproductive physiology- menstrual cycle,pregnancyandmenopause. Fertilizationandinfertilityissues. Overview of invitro fertilization
III	Digestive system- structure and functions of different components ofdigestive system, digestion and absorption of carbohydrates, lipids andproteins, role of bile salts in digestion and absorption, mechanism of HClformation in stomach, role of various enzymes and hormones involved indigestive system. Composition of blood, lymph and CSF. Blood cells -WBC, RBC and energy metabolism of RBC, Blood clotting mechanism.

IV	Respiratorysystem-Gaseoustransportandacid-basehomeostasis.Mechanism of the movement of O2 and CO2 through lungs, arterial andvenouscirculation.Bohreffect,oxygenandcarbondioxidebindinghaemoglobin.pHmaintenancebycellularandintracellularproteins.Phosphateandbicarbonatebuffers. Regulation of fluid and electrolytebalance.
V	Sensory transduction, Nerve impulse transmission- nerve cells, synapses,reflex arc structure, resting membrane potential, Nernst equation, actionpotential,impulsetransmission,neurotransmission,neurotransmitterreceptors, synaptosomes, synaptotagmin, Chemistry of musclecontraction – actin and myosin filaments, theories involved in musclecontraction,mechanismofmusclecontraction,energysourcesformusclecontraction.
Reading List(Printandonline)	https://www.genome.gov/genetics-glossary/Cell-Cyclehttps://my.clevelandclinic.org/health/diseases/16083-infertility-causeshttps://www.webmd.com/heartburn-gerd/reflux-diseasehttps://www.ncbi.nlm.nih.gov/pmc/articles/PMC5760509/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3249628/
Self-Study	1. Variationincelldifferentiationandprogression 2. LeschNyhansyndrome,oroticaciduria andGERD
Recommended Texts	1. Karp,G.(2010).CellandMolecularBiology:ConceptsandExperiments(6thed).JohnWiley&Sons.Inc. 2. BruceAlberts andDennis Bray(2013),Essential Cell Biology,(4th ed),GarlandScience. 3. DeRobertis,E.D.P.andDeRobertis,E.M.F.(2010).CellandMolecularBiology.(8thed).LippincottWilliamsandWilkins,Philadelphia. 4. Cooper, G.M. andHausman, R.E. (2009). TheCell:A MolecularApproach.(5thed).Sunderland,Mass.SinauerAssociates,Inc. 5. WayneM.Baker(2008)theWorldoftheCell. (7thed).PearsonBenjaminCummingsPublishing,SanFrancisco. CellBiology 6. JohnE.Hall(2010).GuytonandHallTextbook ofMedicalPhysiology(12thed),Saunders 7. Harrison'sEndocrinology by J. Larry Jameson Series: Harrison's Specialty,19thEditionPublisher:McGraw-Hill,Year:2016.

MethodofEvaluation:

Test I	Test II	Assignment	End Semester Examination	Total	Grade
10	10	5	75	100	

Methods of assessment:
Recall(K1)-Simple definitions, MCQ, Recallsteps, Concept definitions.
Understand/Comprehend(K2)-
MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary or overview.
Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.
Analyse(K4)-Problem-
savingquestions,Finishaprocedureinmanysteps,Differentiatebetweenvariousideas.
Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosand cons.
Create(K6)-Check knowledge in specific co offbeat situations. Discussion
Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	S	S	S	M
CO2	S	S	S	S	S	L	S	S	S	M
CO3	S	S	S	S	S	M	M	S	S	M
CO4	S	S	S	S	S	M	M	S	S	M
CO5	M	S	L	S	S	L	M	M	L	L

S-Strong: 33 M-Medium:12 L-Low: 05

Course	**CORECOURSEIV-PRACTICAL**
Title of the Course:	**BIOMOLECULES AND BIOCHEMICAL TECHNIQUES PRACTICAL**
COURSE CODE	**PCBIPC14**
Credits:	**4**
Pre-requisites	**Knowledgeonbasicprinciples,InstrumentationofBiochemicaltechniques and metabolicreactions**
Course Objectives	1. To instill skill in students enabling them to apprehend the widerknowledgeaboutprinciplesandtechniquestobeemployedforthebiomoleculesunderinvestigation. 2.To inculcate the knowledge of various isolation and purificationtechniques of macromolecules like DNA, RNA, Glycogen andStarch, 3. Toperformcolorimetricestimationstoquantifyimportantmetaboliteslike lactateandtryptophanandmineralslikecalciumandironfromvarioussources. 4. Toachievetraininginsubcellularfractionationandtoidentifythembymarkers. 5Toachievetraininginvariouschromatographictechniques. 6. Toperformtheisolationandidentificationoftheorganellesof acellusingdifferentialcentrifugation. 7. To perform phytochemical screening and quantification enablingthemtogiveaninsightonphytochemicalsthiswillbeusefulf orfutureresearch.
CourseOutcomes	**On successful completion of this course, students should be able to:** Aftercompletionofthecourse,thestudentsshouldbeableto: **CO1.**The student will be able to acquire knowledge and skill in thetechniquesusedintheisolation,purificationandestimationofdifferent biomolecules that are widely employed in research (K1, K2,K4) **CO2.**The students will get acquainted with Principle, Instrumentationand methodofPerformingUVabsorptionstudiesofDNA,Proteinandinterpreting the alteration occurred during the process of denaturation(K1,K2,K3,K4).

	CO3. The student will be fine-tune in handling the instrumentslikecolorimeter,spectrophotometerandwillbeabletoestimate thebiomoleculesandmineralsfromthegivensamples(K1,K2,K4,) **CO4.** The student, in addition to acquiring skill in performing variousbiochemicaltechniquescanalsolearntodetectpresenceofphytoche micals and quantify them in the plant sample. (K1,K2,K3,K4&K6) **CO5.**Thestudentswilldevelopskillinanalyticaltechniqueslikesubcellula rfractionation,Paper,ColumnandThinlayerChromatography and the group experiments will enable them to buildlearningskillsliketeamwork,Problemsolving,Communicationabilit y.(K1,K2,K3,K4&K6)
Units	
I	Biochemical studies and estimation of macromolecules 1. Isolation and estimation of glycogen from liver. 2. Isolation and estimation of DNA fromanimal tissue. 3. Isolation and estimation of RNAf rom yeast.
II	UV absorption 1. DenaturationofDNAandabsorptionstudiesat260nm. 2. DenaturationofProteinandabsorptionstudiesat280nm.
III	Colorimetric estimations 1. Estimation of Pyruvate 2. Estimation of tryptophan.
IV	Estimation of minerals 1. Estimation of calcium 2. Estimation of iron
V	Plant Biochemistry 1. Qualitative analysisPhytochemicalscreening2.EstimationofFlavonoids-Quantitativeanalysis
VI	GroupExperiments 1. Separation of identificationof lipids by thinlayerchromatography..2.Separationofplant pigmentsfromleavesbycolumn chromatography 3. Identification ofSugars by Paper Chromatography4.IdentificationofAminoacidsbyPaperChromatogr aphy
Reading List(Print and Online)	1.https://www.researchgate.net/publication/313745155_Practical_Biochemistry_A_Student_Companion 2.https://doi.org/10.1186/s13020-018-0177-x3.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5368116/4.https://www.life.illinois.edu/biochem/455/Lab%20exercises/2Photometry/spectrophotometry.pdf 5. https://ijpsr.com/bft-article/determination-of-total-flavonoid-and-phenol-content-in-mimusops-elengi-linn/?view=fulltext 6. https://skyfox.co/wp-content/uploads/2020/12/Practical-Manual-of-Biochemistry.pdf

Self-Study	1. LaboratorySafetyRules,RequirementsandRegulations. 2. Preparationofstandardsolutionsandreagent
Books Recommended	1. DavidPlummer(2001)AnIntroductiontoPracticalBiochemistry(3rded)McGrawHill Education(India)PrivateLtd 2. Jayaraman,J(2011),laboratoryManualinBiochemistry,Newagepub lishers 3. Varley H (2006) Practical Clinical Biochemistry (6th ed) ,CBSPublishers 4. O.DebiyiandF.A.Sofowora,(1978)"Phytochemicalscreeningofmedi calplants,"Iloyidia,vol.3,pp.234–246, 5. Prof.SarinA.Chavhan,Prof.SushilkumarA.Shinde(2019)AGuid etoChromatographyTechniquesEdition:1 6. AnalyticaltechniquesinBiochemistryandMolecularBiology; Katoch,Rajan.Springer(2011)

MethodofEvaluation:

TestI	TestII	End Semester Examination	Total	Grade
20	20	40	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-
MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.
Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.

Analyse (K4)-Problem-solvingquestions,Finish aprocedure inmanysteps, Differentiatebetweenvariousideas
Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosand cons.

Create(K6)-Checkknowledgeinspecificoroffbeat situations,Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	S	L	S	M	S
CO2	S	S	S	S	M	S	L	S	M	S
CO3	S	S	S	S	M	S	M	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S-Strong:41 M-Medium: 07 L-Low:02

Course	Discipline Centric-ELECTIVEI
Title of the Course:	**MICROBIOLOGY & IMMUNOLOGY**
COURSE CODE	**PCBITE11**
Credits:	**2**
Pre-equisites,ifany:	The student should possess basic knowledge about microorganisms,types and their general characteristics. The students are also expected topossess basic understanding about the processofinfection,immunologicaldefenceandpathological outcomes,ifany.
Course Objectives	1. To appreciate the classification of microorganisms based on their structure,size and shape with aninsightin to the ancient scriptures about microbes. 2. Tounderstandtheroleofmicroorganismsinenvironmentandalsotolearnt heculturecondition s. 3. To recognize the possible contamination of foods bymicroorganisms,tolearnaboutcounteractingpreservativemeasures andtoknowabout probioticnatureofmicroorganisms. 4. Togainknowledgeonpathogenicmediationbymicroorganismsandpreven tivemeasuresaswell. 5. To comprehend the features of antimicrobial agents, theirmechanismofactionalongwiththesideeffectsandalsotoexplorenatu ralremedialmeasuresagainstmicrobes. 6. Tobeabletoexploitthevariousfeaturesofmicroorganisms for the beneficialindustrialproduction.
Course Outcomes	Aftercompletionofthecourse,thestudentsshouldbeableto: **CO1.** To classify (by both ancient and modern modes) different typesof microorganisms and explain life cycle of the microbes (K1, K2 &K5) **CO2.** To recognize the microorganisms involved in decay of foodsandwillbeabletoapplyvariouscounteractingmeasures.Thestudents also will be able to relate the role of certain beneficial microbes inday-to-day'sfoodconsumption.(K1,K2&K4) **CO3.** To understand the common pathogenic bacterial and fungi thatcause toxic effects and also will be able to employ curative measures.(K1&K2) **CO4.** To analyse various features of wide variety of antimicrobialagents along with their mode of action, in addition, being able toapprehend the valuable potentials of traditional and easily availableherbs.(K2,K5&K6) **CO5.** To apply knowledge gained in production of industriallyimportantproducts as both pharmaceutical and nutraceutical. (K2, K4&K5)

Units	
I	Taxonomicalclassification-bacteria,viruses(DNA,RNA),algae,fungi and protozoa. Distribution and role of microorganisms in soil,water and air.Charaka's classificationof microbes,lytic cycle andlysogeny.Typesofculturemedia,isolationofpureculture,growth curveandthemeasurementofmicrobialgrowth.
II	Antimicrobial chemotherapy, General characteristics of antimicrobialagents.Mechanismofaction–sulfonamides,sulphones andPAS.Penicillin, streptomycin- spectra of activity, mode of administration,modeof action,adverseeffects andsensitivity test.,Antiviralandantiretroviral agents, Antiviral RNA interference, natural intervention(NaturalimmunomodulatorsroutinelyusedinIndianmedical philosophy).
III	**Types of immunity** - innate and acquired; active and passive; humoral and cell-mediatedimmunity. **Primary and secondary organs of immune system -** Thymus, Bursa fabricus, bone marrow,spleen and lymph nodes. **Cells of immune system.** Identiification and function of B and T lymphocytes, null cells, monocytes, macrophages,neutrophils, basophils and eosinophils.
IV	**Immunoglobulin-** structure, types, distribution, biological and chemical properties - Theories ofantibody production- its regulation and diversity. Monoclonal and polyclonal antibodies.Complement system – mode of activation- Classical, Alternate and Lectin pathways, biologicalfunctions.
V	**Hypersensitivity** - types and mechanism of hypersensitive reaction. **Autoimmunity** -Mechanism of induction of organ specific (Hashimato' thyroiditis, autoimmune anemias, Good Pasteur syndrome, IDDM) and systemic (SLE, mutiple sclerosis, rheumatoid arthritis) autoimmune diseases. Transplantation immunology-types of graft, immunological basis of graft rejection, tissue typing, bone marrow and kidney transplantation.
ReadingList(Print andOnline)	https://www.ijam.co.in/index.php/ijam/article/view/1326(Krumi(Microorganisms)inAyurveda-acriticalreview) Virtual Lectures in Microbiology and Immunology, University ofRochesterhttps://www.frontiersin.org/articles/10.3389/fphar.2020.578970/full#h9 https://www.frontiersin.org/articles/10.3389/fmicb.2018.02151/full https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7559905/
Self-Study	*1.* Microbialinfectionsandgutmicrobiomewithrelevanceto*tridoshas* 2. MicrobialpopulationandpHvariationsindifferentdairyproducts.

Recommended Texts	1. MichaelJ.PelczarJr.(2001)Microbiology(5thed),McGrawHillEducation(India)PrivateLimited 2. Frazier WC , Westhoff DC, Vanitha NM (2010) Food Microbiology(5th ed), McGrawHill Education(India)PrivateLimited 3. WilleyJandSherwoodL(2011),Prescott'sMicrobiology(8th ed)McGrawHillEducation(India) 4. Ananthanarayanan,PanikerandArtiKapil(2013)TextbookofMicrobiology(9th ed)OrientBlackSwan 5. JudyOwen,JenniPuntKuby(2013),Immunology(Kindt,KubyImmunology)(7thed)W. H.Freeman&Co 6. BrooksGFandCarrollKC(2013)JawetzMelnick&AdelbergsMedical Microbiology,(26th ed)McGrawHillEducation 7. GreenwoodD(2012),MedicalMicrobiology,ElsevierHealth

MethodofEvaluation:

TestI	TestII	Assignment	End SemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.
Understand/Comprehend(K2)-MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.
Application(K3)-Suggestidea/conceptwithexamples,Observe,Explain.
Analyse(K4)-
Finishprocedureinstepwisemanner,Differentiationbetweenvariousideas,Mapknowledge

Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons.**Create (K6)**- Check knowledge in specific or offbeat situations, Discussion, Debating,Presentation

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	S	S	S	S	M	S	S	S
CO2	S	S	S	S	S	M	L	M	S	S
CO3	S	M	M	S	M	M	M	M	L	M
CO4	S	M	M	M	M	M	M	S	S	S
CO5	S	L	S	S	M	L	L	S	S	S

S-Strong:27 M-Medium:17 L-Low:06

Course	**Discipline Centric-ELECTIVEII**
Title of the Course:	**PLANTBIOCHEMISTRY**
COURSE CODE	**PCBITE12**
Credits:	**2**
Pre-requisites,ifany:	The student should possess basic knowledge Plants biochemistry andtheir general characteristics. The students are also expected to possessbasicunderstandingabouttheprocessofPhytosynthesis,primarymetabolitesandsecondarymetabolites,ifany.
Course Objectives	1. Todevelopbasicknowledgeonplantcellanditsphysiologicalfunctions. 2. ToConveytheknowledgeofphotosynthesis. 3. Outlinetheroleofdifferentbiosyntheticpathwaysinplantgrowth and development. 4. ToComparePlantdefensemechanismagainstpathogens 5. Detailthestructureandtypesofsecondarymetabolites. 6. Impartttheideaonvariousplanthormones. 7. Understandtheroleofmedicinalplantsintreatingdiseases.
Course Outcomes	Aftercompletionofthecourse,thestudentsshouldbeableto: **CO1.**ToLearnindetailaboutthestructure,functions,nutrientabsorptionandtranspirationofplants(K1,K2&K5) **CO2.**ToGainknowledgeonphotosyntheticapparatus,pigmentspresent, pathways, and significance of photosynthesis. (K1, K2 & K4)**CO3.** To Relate the respiration of plant in aerobic and anaerobic. (K1&K2) **CO4.** To illustrate the structure and functions of plant hormones. (K2,K5&K6) **CO5.**Toapplyknowledgegainedinplantdefensemechanismandprevention of disease and uses of secondary metabolites asphytomedicinal compounds.(K2, K4&K5)
Units	
I	Plantcell-StructureandFunctions,Plantcellwall,Plant-WaterRelations-WaterTransportProcesses-Diffusion,Osmosis,Transpiration-Types,MechanismandFactorsaffectingtranspiration, MechanismofWaterAbsorption-PassiveandActive.
II	Photosynthesis- Photosynthesis apparatus, pigments of photosynthesis,photochemical reaction, photosynthetic electron transport chain, pathof carbon in photosynthesis- Calvin cycle, Hatch – lack pathway (4ways)CAMpathway,significanceofphotosynthesis.

III	Respiration:ATP-thebiologicalenergycurrency,aerobicandanaerobicElectrontransportmechanism(chemiosmotictheory),pentosephosphatepathwayCyclesofElements-N2cycle,BiochemistryofsymbioticandnonsymbioticN2fixation.
IV	Plant growth regulators-Physiological effects of Auxins, Gibberellins,Cytokinins,ABAandEthylene.Secondarymetabolites:Structure,Types,Sources,Biosynthesisandfunctionofphenolics,tannins,lignins,terpenesandalkaloids.Medicinalpropertiesofsecondarymetabolite
V	Defensemechanisminplantsagainstpathogens– StructuralandBiochemical defense. Production of biotechnological products – SCP(Algae, Yeast, Mushroom). Biofertilizers, Biopesticides. Biochemistryof seed dormancy, seed germination, fruit ripening and Senescence,PrimaryandSecondary metabolitesinPlants-DefinitionandFunction.phytochemicalasantioxidants.
ReadingList(Print andOnline)	1. https://www.intechopen.com/books/secondary-metabolites-sourceand-applications/anintroductory-chapter-secondary-metabolites 2. https://www.toppr.com/guides/biology/plant-growth-anddevelopment/plantgrowth 3. https://www.pdfdrive.com/plant-biochemistry-d165189725.html 4. https://www.pdfdrive.com/plant-biochemistry-4pdf-e39618886.html 5. http://site.iugaza.edu.ps/wp-content/uploads/Heldt%20-%20Plant%20Biochemistry%203e.pdf 6. https://agrigyan.in/bioch-311fundamentals-of-plant-biochemistry-sknau-notes/ 7. https://www.helpforag.app/2018/02/plant-biochemistry.html
Self-Study	1. Plant Biology, Taylor & Francis, New York. Andrew Lack(2001) 2. P.J.LeaandR.C.Leegood(1999),2ndEdition,PlantBiochemistry and Molecular Biology, Wiley and Sons,NewYork. 3. SinghM.PandPanda.H2005.MedicinalHerbswiththeirformulations,Daya publishinghouse,Delhi 4. PlantPhysiology-DevlinN.RobertandFrancisH.Witham,CBSPublications 5. Molecularactivitiesofplantcell–AnIntroductiontoPlantBiochemistry.John.W. 6. AndersonandJohnBrardall,BlackwellScientificPublications,1994.
RecommendedTexts	1. Khan, I.AandKhanum.A2004.Role ofbiotechnologyinmedicinalandaromaticplants,Vol.1and Vol.10, Ukka2publications,Hyderabad. 2. Plant Biochemistry and Molecular Biology – HansWalterHeldt,OxfordUniversity,4thEdition,2010 3. Plantbiochemistry (2008), Carolinebowsher,Martinsteer,AlysonTobin,garlandscience. 4. Plantphysiologyanddevelopment(sixthedition)byLincoln Taiz ,Eduardo Zeiger , Ian Max Moller andAngusMurphypublisher;Oxforduniversitypress

MethodofEvaluation:

TestI	TestII	Assignment	End SemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.
Application(K3)-Suggestidea/conceptwithexamples,Observe,Explain.

Analyse(K4)-
Finishprocedureinstepwisemanner,Differentiationbetweenvariousideas,Mapknowledge

Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosand cons.

Create(K6)-
Checkknowledgeinspecificoroffbeatsituations,Discussion,Debating,Presentation

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**L**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**
CO2	**S**	**S**	**S**	**S**	**S**	**M**	**L**	**M**	**S**	**S**
CO3	**S**	**M**	**M**	**S**	**M**	**M**	**M**	**M**	**L**	**M**
CO4	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**S**
CO5	**S**	**L**	**S**	**S**	**M**	**L**	**L**	**S**	**S**	**S**

S-Strong:27 **M-Medium:17 L-Low:06**

Course	**GENERICELECTIVE/SOFTSKILL**
Title of the Course:	**FOOD PROCESSING AND TECHNOLOGY**
COURSE CODE	**PCBITE13**
Credits:	**2**
Pre-requisites	**Basic knowledge about Food types and function.**
CourseObjectives	1. To acquire knowledge of emerging / alternativetechnologiesappliedtofoodprocessing. 2. Toenableastudenttoknowtherelativeadvantages/disadvantagesoverexistingtechnologies. 3. Tounderstandtheeconomicsandcommercializationofnewertechnologies. 4. Tostudyaboutmicrobialsafetyoffoodsbyemergingmethods.
CourseOutcomes	**Onsuccessfulcompletionofthiscourse,studentsshouldbeable to:** **CO1:** Develop an appreciation about need of different emergingtechniques used in food processing and preservation (K1) **CO2:**Applytheirknowledgeonhighpressureprocessing,pulsed electric processing, irradiation and hurdle technology invariousfoodindustries.(K1,K2,K3,K4&K5) **CO3:** Understand the concepts related to membrane technology,supercriticalfluidextractionandqualityassessmentoffoodusingultrasonictechniques. (K1, K2,K3&K4) **CO4:**Getanoverviewonprinciples,mechanismandapplicationofnanotechnologyinfood.(K1, K2,K5,K6) **CO5:**Understandthestructureandcompositionofvariousanimalfoods(K1,K2&K3)
Units	
I	Cereals:Processing of rice,wheat,corn,barley,oatandits products.Feedforlivestock from wheat branandgerm. Beverages : Non-alcoholic beverages, Processing of tea, coffeeandcocoa,Tea-was teutilization as feed for live stock an dpoultry.

II	FishandMeat:Freshnesscriteriaandqualityassessmentoffish;Spoil ageoffish;MethodsofPreservationoffish:Canning,Freezing, Drying, Salting, smoking, curing, fermentation (fishsauce). : Fish byproducts, Production of non-food items fromfish processing wastes. Meat processing – curing and smoking; Fermented meat products (sausages and sauces); Frozen meat &Meat storage; Byproductsfrommeatindustriesandtheir utilization.
III	Poultry: Egg processing, By Product Utilisation-commercial processing of lecithin and other egg solids, Utilisation of egg-derived products as food ingredients;Fertiliserfromshells.
IV	Milk, Edible fat and oils : Processing of evaporated and dried milk products –Milk powder, SCM,etc.; Cream, butter, ghee, Ice-cream, Infant formulae, Stabilisers and emulsifiers as additives in milk products.Dairy processingby-products–Fermented, condensed and dried products from whey, Production of lactose and protein from whey. Processingofoils– Degumming, refining, bleaching, deodorization, fractionation; Pyrolysis of fats, toxicity of fryingoil.Plasticfat– Winterization,hydrogenation,esterification,interesterificationande mulsification;Applicationofplasticfat. By-productsoffat/oilprocessing.
V	Applicationofemergingtechniqueslikehighpressureprocessing, pulsed electricfocussing,nanotechnology etc., infoodprocessingandmarketing.
ReadingList (PrintandOnline)	
Self-Study	Food Processing:Principles andApplicationsby RamaswamyH.&MarcotteM.Taylor&Francis. 2. FoodSciencebyNormanNPotterandJosephH.Hotchkiss,CBS PublishersandDistributors. 3. NovelFoodProcessingTechnologiesbyBarbosa-Canovas, Tapia&CanoCRCPress,2004

RecommendedTexts	1. FruitandVegetablePreservationbySrivastavaandSanjeevKumar2017. 2. ProcessedMeats;PearsonAM&GillettTA;1996,CBSPublishers. 3. EggandpoultrymeatprocessingStadelmanWJ,OlsonVM,ShemwellGA&PaschS; 1988,ElliswoodLtd. 4. FishProcessingTechnology,Rogestein&Rogestein

MethodofEvaluation:

TestI	TestII	Assignment	End Semester Examination	Total	Grade
10	10	5	75	100	

Methodsofassessment:
Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.
Understand/Comprehend(K2)-
MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.
Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.
Analyse (K4)-Problem-solvingquestions,Finish aprocedure inmanysteps, Differentiatebetweenvariousideas
Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosand cons.
Create(K6)-Checkknowledgeinspecificoroffbeat situations,Discussion.
MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**M**	**S**	**L**	**M**	**S**	**L**	**S**	**S**	**M**
CO2	**S**	**S**	**S**	**S**	**M**	**M**	**L**	**S**	**S**	**S**
CO3	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**S**	**S**	**S**
CO4	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**S**	**S**	**S**
CO5	**S**	**S**	**S**	**S**	**M**	**L**	**M**	**S**	**S**	**S**

S-Strong:33 M-Medium : 13 L-Low:04

Course I	**GENERIC ELECTIVE/SOFTSKILL**
Title of the Course:	**DEVELOPMENTAL BIOLOGY**
Course code	**PCBITE14**
Credits:	**2**
Pre-requisites, ifany:	ComprehensiveKnowledgeofCellBiology
CourseObjectives	Thecandidatesundertakingthiscoursewillunderstandtheconceptsofdevelopmentalbiology. 1. Tounderstandthebackgroundofdevelopmentalbiology 2. Togainin-depthknowledgeofvariousmodelorganisms 3. Togaininsightintoaspectsofstemcelltechnology 4. Togaininsightsintomorphogenesisandoranogenesis 5. To acquire in-depth understanding of cell death mechanisms andcellfatedecision
CourseOutcomes	**CO1**.Graspknowledgeaboutthebackgroundofdevelopmentalbiology **CO2**.Gain abundant knowledge about model oraganisms andgametogenesis **CO3**.Gain knowledge about stem cells and their applications inregenerativetherapy **CO4**.Goodknowledgeaboutorganogenesis **CO5**.Learnthebasicsofcelldeathmechanismsandcellfatedecision.
Units	
I	Overview of Developmental biology: Background of Developmental biology - Principles of developmental biology –Potency, commitment, specification, induction, competence, determination and differentiation;morphogeneticgradients;cellfateandcelllineages;stemcells;genomicequivalenceandthecytoplasmicdeterminants;imprinting;mutantsand Transgenicsin analysis of development.
II	Modelorganisms Gametogenesis–productionofgametes,Formationofzygote,fertilization and early development: molecules in sperm-egg recognitioninanimals;embryosacdevelopmentanddoublefertilizationinplants;cleavage, blastula formation, embryonic fields, gastrulation andformation of germ layers in animals; embryogenesis, establishment ofsymmetryinplants; seedformationandgermination.

III	Regeneration Developmental Biology Stem cells – Definition, Classification, Embryonic and adult stem cells,properties,identification,Cultureofstemcells,Differentiationanddedifferentiation, Stem cell markers, techniques and their applications inmodernclinicalsciences.Three-dimensionalcultureandtransplantationofengineeredcells.Tissueengineering-skin,boneandneuronal tissues.
IV	Morphogenesis &Organogenesis:Cell aggregation and differentiation in Dictyostelium; axes and pattern formation in Drosophila, amphibia andchick; organogenesis – vulva formation in Caenorhabditis elegans, eyelensformation,limbdevelopmentandregenerationinvertebrates;differentiationofneurons,postembryonicdevelopment-larvalformation,metamorphosis;environmentalregulationofnormal Development ;sex determination.
V	CellularsenescenceandCell fatedecision Cellular senescence – concepts & Frizzled receptor in Development anddisease. Diabetes and developmental biology, Cell death pathways indevelopments.Markersofimportantdiseases.
ReadingList(Print andOnline)	DevelopmentalBiology–GilbertScott http://bgc.org.in/pdf/study-material/developmental-biology-7th-ed-sf-gilbert.pdf
Recommended Texts	Developmentalbiology:VIIIedition,**Gilbert,S**F;SinauerAssociates,Inc

MethodofEvaluation:

TestI	TestII	Assignment	End SemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-
MCQ,True/False,Shortessays,Conceptexplanations,Shortsummaryoroverview.

Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.

Analyse(K4)–Problem-savingquestions,Finishaprocedureinmanysteps,Differentiatebetweenvariousideas.

Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons

Create(K6)–Checkknowledgeinspecificoroffbeatsituations.Discussion.

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	L	S	S	M
CO2	M	M	M	M	M	S	M	S	M	M
CO3	M	M	L	M	M	S	L	S	L	L
CO4	S	M	L	S	S	M	S	S	M	M
CO5	S	S	M	S	L	M	M	S	M	M

S-Strong:18 M-Medium:25 L-Low:07

SEMESTER II

Course	**CORECOURSE IV**
Titleofthe Course:	**ENZYMOLOGY**
Course Code	**PCBITC21**
Credits:	**5**
Pre-requisites	**Basicknowledgeaboutcatalysis,kineticsandchemicalreactionmechanisms.**
CourseObjectives	1. Students will be introduced to the theory and practiceofenzymology. 2. Mechanismsofcatalysisandfactorsaffectingcatalysiswillbeunderstood 3. The kineticsofenzymecatalyzedre actionsintheabsence and presence of inhibitors will be studied and the options for applying enzymes and the irinhibitors in medicine will be analyzed. 4. Students will learn about the applications of enzymes in research,medicine,andindustry,whichwillpreparethemforcareersinindustrialand biomedicalresearch. 5. The control of metabolic pathways and cellular responses through enzymeregulation will be emphasized.

CourseOutcomes	**Onsuccessfulcompletionofthiscourse,studentsshouldbeableto:** **CO1:**Describethecatalyticmechanismsemployedbyenzymes(K1,K2& K5) **CO2:**Chooseandusetheappropriatemethodstoisolateandpurifyenzymes and check the purity of the enzyme .(K1,K2 , K3,K4 & K5)**CO3:**Analyzeenzymekineticdatagraphically,calculatekineticparameters, determine the mechanism of inhibition by a drug/chemicalandanalyzeoptionsforapplyingenzymesandtheirinhibitorsinmedicine(K1,K2,K3&K4) **CO4:**Explainallosterismandcooperativityanddifferentiate Michaelis-Mentenkineticsfromsigmoidalkinetics.Theroleplayedbyenzymesintheregulationofvitalcellularprocesseswillbeappreciated.(K1,K2,K5,K6) **CO5:** Highlight the use of enzymes in industries and biomedicine(K1,K2&K3)
Units	
I	Introduction to enzymes and features of catalysis:A short history of the discovery of enzymes and how they became powerful biochemical tools. Holoenzyme, apoenzyme, cofactors, coenzyme, prosthetic groups, Classification and Nomenclature, Specificity of enzymeaction-group specificity, absolute specificity, substrate specificity,stereochemicalspecificity.Activesite,Identificationofaminoacidsatthe active site-trapping of ES complex, identification using chemical modification of amino acid side chains and by site-directed mutagenesis. Mechanisms of enzyme catalysis: acid-base catalysis, covalentcatalysis,electrostaticcatalysis,metalioncatalysis,proximityandorientation effects, Low barrier H-bonds, Structural flexibility Mechanism of action of chymotrypsin
II	Enzymetechniques:Isolationandpurificationofenzymes-Importance ofenzyme purification, methods of purification- choice ofsource,extraction,fractionationmethods-basedonsizeormass(centrifugation,gelfiltration);basedonpolarity(ion-exchangechromatography,electrophoresis,isoelectricfocusing,hydrophobicinteractionchromatography);basedonsolubility(changeinpH,change in ionic strength); basedonspecific bindingsites (affinitychromatography) ,choice of methods, Criteria of purity of enzymes.Enzymeunits-Katal,IU.Measurementofenzymeactivity-discontinuous, continuous, coupled assays;Isoenzymesandtheirseparationbyelectrophoresis withspecialreferencetoLDH

III	EnzymekineticsI:Thermodynamicsofenzymeaction,Activationenergy, transition-state theory, steady-state kinetics & pre-steady-statekinetics.Singlesubstrateenzymecatalyzedreactions-assumptions,Michaelis-Menten and Briggs-Haldane kinetics, derivation of Michaelis-Mentenequation.Doublereciprocal(Lineweaver-Burk).Analysis of kinetic data- determination of Km, Vmax, kcat, and theirphysiological significance, Importance of kcat/Km. Enzyme inhibition:Irreversibleinhibition.Reversibleinhibition-Competitive,uncompetitive ,noncompetitive,mixedandsubstrate inhibition. Michaelis - Mentenequationinthepresenceofcompetitive,uncompetitiveandnon-competitiveinhibitors. Therapeutic use of enzyme inhibitors-Aspirin,statins(irreversibleinhibitors),Methotrexate(competitiveinhibitor),Etoposide(non-competitiveinhibitor),camptothecin(uncompetitiveinhibitor).
IV	Enzyme kinetics II: Allosteric enzymes: Cooperativity, MWC and KNFmodels of allosteric enzymes, Sigmoidal kinetics taking ATCase as anexample. Regulation ofglycogen synthase and glycogen phosphorylase. Feedback inhibition-sequential,concerted,cumulative,enzyme-multiplicitywithexamples. Bi - Substrate reactions: Single Displacement reactions (SDR) (Orderedand Random bi bi mechanisms), Double Displacement reactions (DDR)(Pingpongmechanism),Examples,Cleland'srepresentationofbisubstratereactions,Graphicalanalysis(diagnosticplots)to differentiateSDRfromDDR.
V	Enzymetechnology:Immobilizationofenzymes–methods-Reversible immobilization (Adsorption, Affinity binding), Irreversibleimmobilization(Covalentcoupling,EntrapmentandMicroencapsulation, Crosslinking, Advantages and Disadvantages ofeach method, Properties of immobilized enzymes,. Designer enzymes-ribozymesanddeoxyribozymes,abzymes,synzymes.Enzymesastherapeutic agents-therapeutic use of asparaginase and streptokinase.Applicationofenzymesinindustry-Industrialapplicationofrennin, lipases,lactases,invertase,pectinases,papain.

Reading List(PrintandOnline)	**Enzymes** | MIT OpenCourseWare | Free Online Course Materialshttps://ocw.mit.edu/high-school/biology/exam-prep/chemistry-of-life/enzymes/ **Enzymology**https://onlinecourses.swayam2.ac.in/cec20_bt20/previewhttps://mooc.es/course/enzymology/ **The active site of enzymes**https://dth.ac.in/medical/courses/biochemistry/block-1/1/index.php**Enzymes and Enzyme Kinetics**https://www.lecturio.com/medical-courses/enzymes-and-enzymekinetics.course#/ Mechanisticenzymologyindrugdiscovery:afreshperspectivehttps://www.nature.com/articles/nrd.2017.219 EnzymeBiosensorsforBiomedicalApplications:Strategiesfor SafeguardingAnalyticalPerformancesin BiologicalFluidshttps://www.ncbi.nlm.nih.gov/pmc/articles/PMC4934206/
Self-Study	1. Mechanisticenzymologyindrugdiscovery 2. EnzymeBiosensorsforBiomedicalApplications
Recommended Texts	1. Enzymes:Biochemistry,BiotechnologyandClinicalchemistry,2ndeditio n, 2007, Palmer T and Bonner P; Affiliated- East West pressprivateLtd,NewDelhi 2. Fundamentals of Enzymology, 3rd edition, 2003, Price NC andStevensL;OxfordUniversityPress, NewYork 3. Voet'sBiochemistry,Adapteded,2011,Voet,DandVoetJG;Wiley,India 4. LehningerPrinciplesof Biochemistry, 8thedition, 2021, .NelsonDLandCoxMM;WHFreeman&Co,NewYork 5. Biochemistry,BergJM,StryerL,Gatto,G,8thed,2015;WHFreeman&Co.,NewYork. 6. Enzyme KineticsandMechanism;CookPF,ClelandW,;2007; GarlandScience, London

MethodofEvaluation:

TestI	TestII	Assignment	EndSemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.

Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.

Analyse (K4)-Problem-solvingquestions,Finish aprocedure inmanysteps, Differentiate between various ideas

Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons.
Create(K6)-Checkknowledgeinspecificoroffbeat situations,Discussion.
MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	M	S	L	S	S	M
CO2	S	S	S	S	M	M	L	S	S	S
CO3	S	S	S	S	M	M	M	S	S	S
CO4	S	S	S	S	M	M	M	S	S	S
CO5	S	S	S	S	M	L	M	S	S	S

S-Strong:33 M-Medium:13 L-Low:04

Course	**CORE COURSE V**
TitleoftheCourse:	**CELLULAR METABOLISM**
Course Code	**PCBITC22**
Credits:	**5**
Pre-requisites	**Basicknowledgeonbiochemicalreactionssuchasaddition,deletion,rearrangement,transferandbreakingofbonds**
CourseObjectives	1. Familiarizeonbloodglucosehomeostasis 2. Provide an insight into the metabolic path way of glycogen,glycoprotein, mucopolysaccharide and peptidoglycan withclinical correlationwhereverrequired 3. Inculcateknowledgeonnucleotidemetabolismanddisordersassociatedwithit 4. Provide a platform to understand the versatile role of PLP inaminoaciddegradation,formationofspecializedproductsanddisordersassociatedwithammoniadetoxification 5. Educateonhemeandsulphur metabolismwithassociatedclinicalmanifestation
CourseOutcomes	**Onsuccessfulcompletionofthiscourse,studentsshouldbeableto:** **CO1.** Appreciate the modes of synthesis and degradation of glucoseand will be able to justify the pros and cons of maintain the bloodsugarlevel(**K1,K2,K5**) **CO2.** Gain knowledge on polysaccharide metabolism and glycogenstoragedisease**(K1,K2,K5)** **CO3.**Acquaintwiththemakingandbrakingofnucleotides **(K1,K2,K4)** **CO4.**Differentiatethediversereactionaparticularaminoacidcanexperience**(K1,K2,K3)** **CO5.**Correlatethedisturbanceofmetabolicreactionstoclinicalmanifestationswithreferencetohemeandsulphurmetabolism(**K1,** 6. **K2,K4,K5)**
Units	

I	Glycolysis–aerobic and anaerobic,inhibitors, and regulation.Feederpathway-entryofhexosesintoglycolysis,Pyruvatedehydrogenase complex-mechanism and regulation. Glyoxalate cycle and its regulation. Gluconeogenesis- source, key enzymes, reaction sequence and its regulation. Blood glucose homeostasis and the roleofhormones.Pentosephosphatepathway-significanceanditsregulation. Metabolism of glycogen and its regulation.
II	Oxidation of fatty acids-oxidation of saturated and unsaturated fatty acids (α, β& ω oxidation) Oxidation of fatty acids with odd and even numbered carbonatoms. Regulation of βoxidation. Ketogenesis and its regulation. Biosynthesis of fatty acid–saturatedandunsaturated,chainelongation,regulation.Biosynthesisofprostaglandins and thromboxanes. Biosynthesis and degradation ofphosphatidylinositol,Sphingolipid-sphingomyelin,cerebrosides,sulfatides,andgangliosides.Cholesterol biosynthesis and its regulation. Lipoprotein metabolism-chylomicrons,VLDL,HDLandLDL.
III	Metabolism of nucleotides- *De novo* synthesis and salvage pathwaysof purine and pyrimidine nucleotides. Regulation and inhibitors ofnucleotidebiosynthesis.Roleofribonucleotidereductaseandits regulation.Degradationofpurineandpyrimidinenucleotides.
IV	Biosynthesisof non- essential amino acids.- Role and biologicalsignificance of glutamate dehydrogenase, glutamine and asparaginesynthetase,lysine,prolineandphenylalaninehydroxylase.Interconversion of amino acids - proline to glutamate, methionine tocysteine, serine to glycine. Degradation of amino acids – glucogenicand ketogenic amino acids. Formation of acetate from leucine andaromatic amino acid, pyruvate from cysteine, threonine and hydroxyproline, α-keto glutarate from histidine and proline, succinate frommethionine,threonine,valineandisoleucine,Oxaloacetatefrom aspartate,glycineandserine.
V	Biosynthesisanddegradationofheme.Jaundice-classification,pathologyandDifferentialdiagnosisOxidationandreductionofinorganicsulphurcompoundsbymicrobesandplants.Mucopolysaccharidoses- Huntersyndrome,SanfilipposyndromeandMaroteaux-Lamysyndrome.Oxidationofcysteinetosulphate andinterconversionofsulphurcompounds
Reading List(PrintandOnline)	1. https://www.embopress.org/doi/full/10.1038/msb.2013.19 2. https://people.wou.edu/~guralnl/450Glycogen%20metabolism.pdf 3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3243375/ 4. https://www.researchgate.net/publication/334458898_Urea_Cycle5. https://www.researchgate.net/publication/51233381_Heme_biosynthesis_and_its_regulation_Towards_understanding_and_improvement_of_heme_biosynthesis_in_filamentous_fungi6.https://www.researchgate.net/publication/349746691_Microbial_Sulfur_Metabolism_and_Environmental_Implications

Self-study	1. Cori'sCycleandGlucose-AlanineCycle 2. CoenzymesinvolvedinMethanogenesis
BooksRecommended	1. DavidL.NelsonandMichaelM.Cox(2012)LehningerPrinciplesofBiochemistry(6thed),W.H.Freeman 2. Voet.D and Voet. J.G (2010) Biochemistry , (4th ed),JohnWiley&Sons,Inc. 3. MetzlerD.E(2003).Thechemicalreactionsoflivingcells(2nded),AcademicPress. 4. ZubayG.L(1999)Biochemistry,(4thed),McGrew-Hill. 5. TextbookofBiochemistrywithClinicalCorrelations,7thEdition,ThomasM. Devlin(Editor), Wiley 6. HumanBiochemistry–JamesM.Orten&Otto.W.Neuhan-10th edn-TheC.V.MosbyCompany

MethodofEvaluation:

TestI	TestII	Assignment	EndSemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-
MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.

Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.

Analyse (K4)-Problem-solvingquestions,Finish aprocedure inmanysteps, Differentiatebetweenvariousideas

Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons.

Create(K6)-Checkknowledgeinspecificoroffbeat situations,Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**S**	**M**
CO2	**S**	**M**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**M**
CO3	**S**	**M**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**
CO4	**S**	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**S**	**M**
CO5	**S**	**M**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**

S-Strong:35 M-Medium:15 L-Low:00

Course	**CORECOURSEVI**
Title of the Course:	**INDUSTRIAL MICROBIOLOGY**
Course Code	**PCBITSE2**
Credits:	**4**
Pre-requisites,if any:	Basic KnowledgeofMicrobiologyandmicrobialtechniques
CourseObjectives	1. Togainknowledgeofthestructure,classificationanduseofmicroorganismsin variousindustries. 2. Toknowvariousfermenterdesigns,culturesystemsandtheapplicationoffermentationprocessinindustry. 3. Tounderstandtheproductionandpurificationoffermentedproductsandtheirindustrialapplications. 4. Understand the basic concepts of food and agriculturalmicrobiology.
CourseOutcomes	**CO1**.Studentswillbeabletounderstandthestructureandclassificationofmicroorganisms(K2,K4) **CO2**.Gainknowledgeoftheusesofmicroorganisms invarious industrialapplications(K3,K4) **CO3**.Understandtheconceptsoffermentationprocess,harvestandrecovery.(K1,K5) **CO4**.Studentswillknowthetypesofmicrobialfermentationprocessesandtheirapplicationsinpharmaceutical industry.(K2, K3) **CO5**.Studentswilllearnabouttheuse ofmicroorganismsinbeverages,diaryandfood industries.(K3 ,K6)
	Units
I	Structureofbacteria,fungiandvirusesandtheirclassification.Typesandcharacteristicsofmicroorganismsusedin Industry (a)FoodIndustry (b)ChemicalIndustry(c)PharmaceuticalIndustry
II	Fundamentalsandprinciplesofmicrobialfermentationtechniques– application in industry and pharmaceutical Biochemistry. Fermentation – types, techniques, design and operation of fermenters including addition of medium. Types and characteristics of microorganisms, environmental conditions required for the growth and metabolism of industrially andpharmaceuticallyimportantmicrobes.Sterilizationmethodsinfermentation techniques, air, gas, culture medium sterilization. Steam-filtrationandchemicals.Typesandconstituentsoffermentativeculture Medium and conditions offermentations,Antifoamingdevices.

III	Recovery and estimation of products offer mentation-Productionofethanol,aceticacid,glycerol,acetone,butanolandcitricacidbyfermentation.ProductionofEnzymes-amylase,protease,lipase,Productionofpharmaceuticalsbyfermentation–penicillin,streptomycin, tetracycline,riboflavin,vitaminB12.Beverages-wine,beer And malt beverages.
IV	FoodMicrobiology:Production of dairyproducts-bread,cheeseandyoghurt (preparation and their types). Food borne diseases- Bacterial andNon-Bacterial.Foodpreservation-Principles–Physicalmethods:temperature(low,high,canning,drying),irradiation,hydrostaticpressure,highvoltagepulse,microwaveprocessingandasepticpackaging,Chemical methods-salt,sugar,organicacids,SO_2,nitriteand nitrates,ethyleneoxide,antibioticsandbacteriocins.
V	AgriculturalMicrobiology:General Properties of soil,microorganismsinsoil – decomposition of organic matter in soil. Biogeochemical cycles, nitrogen fixation, Production of bio fertilizers and its field applications –Rhizobium, azotobacter, blue green algae, mycorrhizae, azospirilium,Productionofbiofuels(biogas-methane),soilinoculants.
Self-Study	● Micro-organismsinfoodprocessingandpharmaindustries ● UpstreamandDownstreamprocessesinBiopharma
Reading List(Print andOnline)	Industrialbiotechnology:https://nptel.ac.in/courses/102/105/102105058/Bioreactors:https://nptel.ac.in/courses/102/106/102106053/Food Microbiology:https://nptel.ac.in/courses/126/103/126103017/Agriculture Microbiology:https://www.youtube.com/watch?v=f7UXyVImZ_c
RecommendedTexts	1. FoodMicrobiology:AnIntroduction:4th edition,**MatthewsKR, Kniel KE, Montville TJ;** American Society forMicrobiology 2. Food,Fermentation andMicro-Organisms,2nd edition,**Charles,BW;**BlackwellScienceLtd 3. Microbiology.5thedition,**PelczarMJ,ChanECSandKriegNR**;McGrawHillBookCompany. 4. Textbookof Microbiology:11th edition,**Ananthanarayanan RandPanikerCKJ;**UniversitiesPress(India)Pvt.Ltd. 5. FoodMicrobiology,3rd edition, **Frazier WC andWesthoffDC;**TataMcGrawHill Publishing Company Ltd, NewDelhi 6. New Methods of Food Preservation:1st edition, **Gould GW**;SpringerManualofIndustrialMicrobiologyandBiotechnology**:**3rd edition,**Baltz**

Method of Evaluation:

TestI	TestII	Assignment	End SemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-
MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.
Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.
Analyse (K4)-Problem-solvingquestions,Finish aprocedure inmanysteps, Differentiatebetweenvariousideas
Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosand cons.

Create(K6)-Checkknowledgeinspecificoroffbeat situations,Discussion.

MappingwithProgrammeOutcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	M	S	S	M	S	S	M	M	M
CO3	S	M	L	S	M	M	S	S	M	S
CO4	M	S	S	S	L	M	S	M	S	M
CO5	S	S	M	S	S	M	M	S	S	S

S-Strong:29 **M-Medium:19** **L-Low:02**

Course	DISCIPLINECENTRICELECTIVEIV
Title of the Course:	ENERGYAND DRUG METABOLISM
Course Code	PCBITE21
Credits:	3
Pre-requisites	Basic knowledgeonbiochemicalreactionssuch as addition, deletion,rearrangement,transferandbreakingofbonds
CourseObjectives	1. Familiarize onconcepts of enthalpy, entropy, free energy, redoxsystem,biologicaloxidationandhighenergycompounds 2. Provide an insight into the relationship between electron flow andphosphorylation 3. Inculcate knowledge onprocesses involved inconverting lightenergytochemicalenergyandassociatedfoodproductionbyautotrophs 4. Provide a platform to understand the versatile role of Krebs cycle,transportofNADHacrossmitochondrialmembraneandenergetics 5. Educateonthevariousphasesxenobioticmetabolism
CourseOutcomes	**Onsuccessfulcompletionofthiscourse,studentsshouldbeableto:** Aftercompletionofthecourse,thestudentsshouldbeableto: **CO1.**Appreciatetherelationshipbetweenfreeenergyandredoxpotential and will be able to justify the role of biological oxidation andenergy rich compounds in maintaining the energylevel of the system(**K1,K2,K3,K4**) **CO2.** Gain knowledge on role of mitochondria in the production ofenergycurrency ofthecell**(K1,K2,K5,K6)** **CO3.**Acquaintwiththeprocessofphotosynthesis**(K1,K2,K5)** **CO4.** Comprehend on thediverserole of TCA cycle and the energyobtainedoncompleteoxidationofglucoseandfattyacid**(K1,K2,K4,K5)** **CO5.**Correlatetheavenuesavailabletometabolizethexenobiotics(**K1,K2,K4,K5)**
Units	
I	Thermodynamic- principles in biology- Concept of entropy, enthalpyandfreeenergychange.Redoxsystems.Redoxpotentialandcalculationoffreeenergy.Biologicaloxidation–Oxidases,dehydrogenases,hydroperoxidases,oxygenases.Energyrichcompounds–phosphorylatedandnon-phosphorylated.
II	Electron transport chain-various complexes of ETC, Q-cycle. Inhibitorsof ETC. Oxidative phosphorylation-P/O ratio, chemiosmotic theory.Mechanism of ATP synthesis - role of F0-F1 ATPase, ATP-ADP cycle.Inhibitorsofoxidativephosphorylationionophores,protonophores.Regulationofoxidativephosphorylation

III	Light reaction-Hills reaction, absorption of light, photochemical event.Photo ETC-cyclic and non-cyclic electron flow. Photophosphorylation-role of CF0-CF1 ATPase. Dark reaction- Calvin cycle, control of C3pathway,andHatch-Slackpathway(C4 pathway),Photorespiration. Synthesisanddegradationofstarch
IV	Interconversion of major food stuffs. Energy sources of brain, muscle,liver,kidneyandadiposetissue.Amphibolic natureofCitricacidcycle.Anaplerotic reaction. Krebs cycle, Inhibitors and regulation of TCAcycle. Transport of extra mitochondrial NADH– Glycerophosphateshuttle,malateaspartateshuttle.Energeticsofmetabolic pathways– glycolysis,(aerobicandanaerobic),citricacidcycle,betaoxidation
V	Activation of sulphate ions – PAPS, APS, SAM and their biologicalrole. Metabolism of xenobiotics – Phase I reactions – hydroxylation,oxidationandreduction.PhaseIIreactions– glucuronidation,sulphation,glutathioneconjugation,acetylationandmeth ylation.Mode ofactionandfactorsaffectingtheactivitiesofxenobioticenzymes.
Reading List(PrintandOnli ne)	1. https://chemed.chem.purdue.edu/genchem/topicreview/bp/ch21/gibbs.php 2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7767752/#:~:text=The%20mitochondrial%20electron%20transport%20chain,cellular%20ATP%20through%20oxidative%20phosphorylation. 3. https://www.researchgate.net/figure/Oxidative-phosphorylation-in-mitochondrial-electron-transport-chain-ETC-and-proton_fig1_230798915 4. https://www.lyndhurstschools.net/userfiles/84/Classes/851/photosynthesis%20light%20&%20dark%20reactions%20ppt.pdf?id=560837 5. https://bajan.files.wordpress.com/2010/05/amphibolic-nature-of-krebs-cycle.pdf 6. https://www.sciencedirect.com/topics/medicine-and-dentistry/xenobiotic-metabolism#:~:text=Xenobiotic%20metabolism%20can%20be%20defined,more%20readily%20excreted%20hydrophilic%20metabolites
Self-Study	1. CalculationofKeqand G 2. Interrelationshipofcarbohydrate,protein,andfatmetabolism-roleofacetylCoA

Recommended Texts	1. DavidL.NelsonandMichaelM.Cox(2012)LehningerPrinciplesofBiochemistry(6thed),W.H.Freeman 2. RobertK.Murray,DarrylK.Granner,PeterA.Mayes,andVictor W.Rodwell(2012),Harper'sIllustratedBiochemistry,(29thed),Mc Graw-HillMedical 3. MetzlerD.E(2003).Thechemicalreactionsoflivingcells(2nded),AcademicPress. 4. ZubayG.L(1999)Biochemistry,(4thed),McGrew-Hill. 5. DevlinRM(1983)PlantPhysiology(4thed),PWSpublishers6.TaizL,ZeigerE(2010),PlantPhysiology(5thed),Sinauer Associates,Inc

MethodofEvaluation:

TestI	TestII	Assignment	End SemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.
Understand/Comprehend(K2)-
MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.
Application(K3)-
Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.Analyse (K4)-Problem-solving questions, Finish a procedure in many steps, Differentiatebetweenvariousideas
Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons.
Create(K6)-Checkknowledgeinspecificoroffbeat situations,Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	M	S	M	S	M	S	S	S	L
CO5	S	M	S	S	S	M	S	S	S	S

S-Strong:41 M-Medium:08 L-Low:01

Course	DISCIPLIN ECENTRIC ELECTIVEV
Titleofthe Course:	ECOLOGY,EVOLUTIONANDBIODIVERSITY
Course code	PCBITE22
Credits:	3
Pre-requisites	Basicknowledgeonecosystem,evolutionaryconcept,populationgenetics,anddiversityamongtheorganisms.
CourseObjectives	1. Tostudyaboutthefundamentalprocessesthatcauseorpreventadaptiveevolution,speciationandextinction. 2. Classifytheconceptsofspecies,populations,communities,ecosystemsand biomes 3. Tostudyabout theecosystemandrolesinanecosystem 4. Tostudyaboutenvironmentalissues,ecologicalbasis,ecological evolutionary&biodiversityconsequences.
CourseOutcomes	**Onsuccessfulcompletionofthiscourse,studentsshouldbeableto:** Abletoexplaintheecosystemandtheirroles–K1 Determinetheevolutionarytimescaletheories –K5 Discussthesignificanceofevolutioninprokaryotesandeukaryotesorganisms.-K6 Demonstrateecosystemsandenvironmentalissuesandbiodiversityconsequences–K2 Organizethetaxonomicalclassification.-K3
Units	
I	Ecology –Environment- atmosphere, hydrosphere, lithosphere, concept of ecosystem, biotic and abiotic components and function habitat,energyflow,foodchain,foodweb,ecologicalpyramids.Biogeochemical cycle Carbon, Nitrogen, Phosphorus. Structure and function of terrestrial - forest, grass land and aquatic ecosystem.Ecologicalsuccession:Types;mechanisms;changesinvolvedin succession.
II	Lamarckism, Darwinism–concepts of variation, adaptation, struggle, fitness and natural selection. Mendelism – spontaneity of mutation. The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale.extinctions,coextinctions.Evidence of evolution-fossil records and biogeography.
III	Concept of Oparin and Haldane. Evolution of prokaryotes – origin ofprokaryotes,unicellularbacterialevolution,originofEukaryotes,endosymbiosis,Margulisendosymbionttheoryofevolution,evolution ofmitosis,evolutionofmeiosis,evolutionofsexandfertilization.

IV	Population genetics – Population characteristics, population density,Natality, Mortality, dispersion, Gene pool, Gene frequency, migrationandrandomgeneticdrift.Speciesinteractions– Mutualism,Commensalism,Amensalism,Predator/Parasitehostinteractio n, competition.
V	Biodiversity – definition, levels and threats.Endemic and endangeredspeciesofIndia.Methodsoftaxonomy-Conceptsofspeciesandhierarchicaltaxa,biologicalnomenclature,classical &quantitativemethods of taxonomy of plants, animals and microorganisms. Outlineclassificationofplants,animals&microorganisms-Importantcriteria usedforclassificationineachtaxon.
Reading List(PrintandOnli ne)	1. **https://sangu.ge/images/EssentialsofEcology.pdf** 2. **https://ncert.nic.in/textbook/pdf/lebo115.pdf** 3. **https://ncert.nic.in/textbook/pdf/lebo107.pdf** 4. **https://www.austincc.edu/sziser/Biol%201413/LectureNotes/lnexaml/taxonomyClassification.pdf** 5. **https://uomustansiriyah.edu.iq/media/lectures/6/6_2021_04_03!09_45_19_PM.pdf**
Self-Study	1.The Ecology Book: Big Ideas Simply Explained, Tony Juniper 2019.2.An introductionof BiodiversityPrithipalsingh,Ane's Studentedition,2007. 3.EssentialenvironmentalstudiesbyS.P.MishraS.N.PanueyAnebooksPvt Ltd2011. 4.Fundamentals of Ecology by Eugene Odum, Gary Barrett, 5th Edition,Brooks/Cole.2004 5. Cellbiology,genetics,ecology,evolution– P.S.Verma&V.K.Agarwal–S. ChandPublication.Edition: 2021,2021
Recommended Texts	1WildlifeBiodiversityConservation:MultidisciplinaryandForensicApproac hes,SusanC.Underkoffler,2021 2.BiodiversityofMicrobialLife–StaleyReysenbach. 3.Evolution,adaption andEthology,Sanjibchattopadhyay,Books andAlliedPvtLtd. 4.TextbookofEnvironmentalStudiesA.JosephThatheyus,Norasa publications,2011.

MethodofEvaluation:

TestI	TestII	Assignment	End SemesterExa mination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-MCQ,True/False,Shortessays,Conceptexplanations,Shortsummary oroverview.
Application(K3)-Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.Analyse (K4)- Problem-solving questions, Finish a procedure in many steps, Differentiatebetweenvariousideas
Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosand cons.
Create(K6)-Checkknowledgeinspecificoroffbeat situations,Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**S**	**M**
CO2	**M**	**M**	**M**	**M**	**S**	**S**	**S**	**M**	**S**	**S**
CO3	**M**	**L**	**M**	**L**	**S**	**S**	**S**	**S**	**S**	**S**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**L**
CO5	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**S**	**S**

S-Strong:30 M-Medium:17 L-Low:03

Course	**GenericElective-VI**
Title of the Course:	**NUTRITIONAL BIOCHEMISTRY**
Course Code	**PCBITE23**
Credits:	**3**
Pre-requisites,if any:	**BASICKNOWLEDGEONFOOD,NUTRITION&DIETETICS,AND METABOLISMOFNUTRIENTS.**
CourseObjectives	1. To understandbasicconceptsinvolvedingrowth,health,nutrition,physiology and metabolism 2. Todiscusstheconceptsandapplicationsofnutritionincorrelationwithbiochemistry 3.Todefinenutritionalneedsinhealthyindividualsandmodificationofdiet during illness.
CourseOutcomes	Aftercompletionofthecourse,thestudentsshouldbeableto: **CO1.** Plan a balanced diet based on an individual's energyrequirement,Assess nutritionalstatus of an individual(K3,K4,K5)**CO2.** Describe the biochemical , physiological and nutritionalfunctions of macronutrients and their integrated role. Understand theroleplayedbyantinutritionalfactors(k!toK6) **CO3.**Evaluatethefunctionsofvitaminsandminerals,andfluidsandelectrolyte balance in different physiological states and in sportspersons(K1to K6) **CO4.**Identifynutritionaldeficiencyconditions,itspreventionanddietary management((K3,K4) **CO5.**Acquireknowledgeabouttheimportanceofbalanceddietanddietther apy (k5,K6)
Units	
I	Basic concepts - Nutrition - Food groups and balanced diet. Novel Foods. Calorific value of foods: Direct and indirect calorimetry. Empty calories. Basal metabolic rate: Factors affecting BMR. SDAandphysicalactivity.Calculationofday'senergyrequirement.Assessment of nutritional status. Lactose intolerance. Nutritionalrequirementandbiochemicalchangesindifferentphysiological states -infancy, childhood, pregnancy, lactation, and ageing. Sportsnutrition.

II	Elementsofnutrition-Plantandanimalsourcesofsimpleandcomplexcarbohydrates,fats and proteins and their requirement. Biological significance, deficiency and toxicity of macronutrients andmicronutrients.Roleofdietaryfibre.Proteinsparingactionofcarbohydrates and fats. Essential amino acids. Essential fatty acids. Effects of naturally occurring food toxins, preservatives, additives, alcohol and tobacco on health.
III	Vitamins and Minerals- Dietary sources, classification, biochemicalfunctions,requirements,absorption,metabolism and excretion.Vitamin B complex as coenzyme. Nutritional significance of dietarycalcium,phosphorus,magnesium,iron,iodine,zincandcopper.
IV	Malnutrition - Diseases arising due to Protein - Calorie Malnutritionandundernutrition(KwashiorkorandMarasmus),Preventionofmalnutrition.DeficiencydiseasesassociatedwithvitaminBcomplex, vitamin C and A, D, E & K vitamins - Mineral deficiency diseases -aetiology,signandsymptomsanddietarysupplementation.Enrichment andfortification(vitaminsandminerals)
V	Nutrition in diseases - Aetiology, signs and symptoms , treatment anddietarymanagementduringfever(TyphoidandMalaria)andinfectiousdiseases(COVID-19),Jaundice,hyperacidity(Ulcer),Atherosclerosis,Hypertension,kidneydiseasesanddiabetesinadults.StarvationandObesity.Inter-relationshipofnutrition,infection,immunityand poverty
Reading List(PrintandOnline)	1. https://www.jmedscindmc.com/article.asp?issn=1011-4564;year=2014;volume=34;issue=5;spage=211;epage=213;aulast=Shrivastava 2. https://www.researchgate.net/figure/Relationship-between-malnutrition-infection-and-immunity-Malnutrition-is-considered-the_fig1_280722727 3. https://en.wikipedia.org/wiki/Novel_food 4. https://www.chemicalsafetyfacts.org/preservatives/ 5. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/food-enrichment
Self-Study	1. Antabusedrugsandfood 2. Selectionoffoodsandmarketvisit,readingandunderstandingthefood labels

RecommendedTexts	1. Srilakshmi. E.(2016)NutritionScience, NewAge InternationalPublishers. 2. Mahan,KathleenL.(2004)Krause'sFood,NutritionandDietTherapy,W.B.Saunder's11thEdition 3. AndreasM.Papas(1998).AntioxidantStatus,Diet,Nutrition,andHealth(1sted)CRCPress. 4. M.Swaminathan(1995)PrinciplesofNutritionandDietetics.Bappco 5. MargaretMcWilliams(2012).FoodFundamentals(10thed)PrenticeHall 6. TomBrody(1998)NutritionalBiochemistry(2nded).Academic Press,USA

MethodofEvaluation:

TestI	TestII	Assignment	End SemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-MCQ,True/False,Shortessays,Conceptexplanations,Shortsummaryoroverview.

Application(K3)-

Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.Analyse (K4) – Problem-saving questions, Finish a procedure in many steps, Differentiatebetweenvariousideas.

Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons

Create(K6)–Checkknowledgeinspecificoroffbeatsituations.Discussion.

MappingwithProgrammeOutcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**
CO2	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**
CO3	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**L**
CO5	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**

S-Strong:40 M-Medium:09 L-Low:01

Course	**GenericElective-VII**
Title of the Course:	**MOLECULAR ENDOCRINOLOGY**
Course Code	**PCBITE24**
Credits:	**3**
Pre-requisites, ifany:	**BasicKnowledgeonEndocrineglandsandtheirsecretionandfunctions.**
CourseObjectives	1. Toprovidebasicunderstandingoforganization,physiology and regulation of endocrineglandsal ongwiththebiologicalfunctions. 2.Study the molecular mechanisms of ormoneand growth factorsaction. 3. Toimpartknowledgeonmolecularandcellularmechanismsinendocrinology. 4. Toexplaintheconsequencesofunderandoverproductionofhormones.
CourseOutcomes	Aftercompletionofthecourse,thestudentsshouldbeableto: **CO1:**Identifytheorgansinvolvedinendocrinefunction,major hormonesandtheirphysiological effect.(**K1,K4)** **CO2:** Explainhormone receptors andchemicalsignalingpathways;Role of messenger; Receptor mediated gene regulation byhormones**.(K2)** **CO3:** Demostrate the function of pituitary and hypothalamushormonesandtheirdisorders**.(K2)** **CO4:** Illustrate thyroidhormone,pancreatic, andgastrointestinal(GI)tract hormones their physiological and their biochemicalactions(**K3,K4)** **CO5:**Illustrate the adrenalhormones andsexhormones theirphysiologicalandtheirbiochemicalactions(**K3,K4)**
Units	
I	**Basics of Endocrine system:** Definition and scope of Endocrinology- Historical and anatomical aspects of mammalian endocrine system. Definition of ahormone-chemicalnature of mammalian hormones-types of hormonereceptors secondary messenger system general mechanism of peptide and non-peptidehormones action. Feed-backregulation of Endocrine System

II	**Endocrines of Hypothalamus and Thyroid gland:** The EndocrinesofHypothalamus-Hypo-Physiotropichormones-Neurovascularhypothesis.Pituitaryglandhormones-chemistryandbiochemicalfunctions. Pineal gland hormones-chemistry- biochemical functions-mechanismofaction.Thyroidglandhormones-chemistry-biochemicalfunctions-mechanismofaction.Parathyroidglands-biochemicalfunctions.
III	**Hormones of adrenal and Pancreas:** Adrenal gland: Hormones ofadrenalgland-chemistry-mechanismofactionbiochemicalfunctions.Pancreas-Insulin/glucagon:chemistry-biochemicalfunctions-mechanism of action. Somatostatin. Hormones involvingincalciummetabolism-chemistry-mechanismofaction.Neuro-hormones-thebrain-reninangiotensin, Urotensin-neuropeptides.
IV	**Hormones of female and male reproductive system:** Hormones offemaleandmalereproductivesystem:Ovarian steroidhormoneschemistry-biosynthesisandtransport;Synthesis,chemistryandmetabolism of androgens- dynamics of steroid hormone productionandmetabolismmechanismsofactionofsexsteroidhormones. Testicularandovariandeterminginggenes–Mullerian-inhibitingsubstancegenes-molecularbasisofmaleandfemalecontraception.
V	**Endocrinopathies:**Endocrinopathies:Hypo-physeal,Thyroid,parathyroid, adrenal and pancreas. Disorders of pituitary hormoneaxis-thyrotoxicosis-hypothyroidism-Hashimoto'sthyroiditis-metabolicbonediseases-Cushingsyndrome-Addison'sdiseasesDiabetesmellitus-androgendeficiencysyndromes-Testicular neoplasm: Klinefelter's syndrome and Turner's syndrome.Clinical evaluationofendocrinefunctions-overview.
Reading List(PrintandOnline)	1.http://www.merckmanuals.com/professional/endocrine_and_metabolic_disorders.html2.http://www.emedicine.com/endocrinology/index.shtml3.http://www.cals.ncsu.edu/course/zo250/materials.htm4.http://www.endotext.org/ 5.www.ncbi.nlm.nih.gov › NCBI › Literature › Bookshelf6.http://www.springer.com/medicine/internal/journal/120207. http://www.homone.org 8.http://medlineplus.gov9.http://www.mun.ca>/biology/desmid/brain/biol2060/biol/2060-14/cb14.html

Self-Study	1. UnderstandingEnzymes:AnIntroductoryTextbyDr.AdityaArya,Dr. Amit Kumar, JayantiJha,, 2018th edition. 2018 , Drawing PinPublishing. 2. TextbookofBiochemistry(withclinicalcorrelation)byThomasM.Devlin,JohnWiley&sons,7thedition2010. 3.3. Willaim'sTextbookofEndocrinologybyWilsonandFoster,13theditionW.B.SaundersCo publications2016. 4. Henry M. Kronenberg, ShlomoMelmed, Kenneth S. Polonsky, P.Reed Larsen. William Textbook of Endocrinology, 13th ed. SaundersElsevier2016 5. Bolander,F.F.MolecularEndocrinology,KindleEdition.Academic Press,2012.
RecommendedTexts	1. BiochemistrybyU.Satyanarayana,6thedition.2021,PublisherElsevier. 2. LippincottIllustratedReviews:Biochemistry,7thedition.2016,NorthAmerican,Publisher 3. LippincottWilliamsandWilkins. 4. LehningerPrinciplesofBiochemistry,7thedition.2017PublisherWHFreeman 5. LubertStryer– Biochemistry,9thEdition.2019PublisherWHFreeman 6. Voet'sBiochemistry,Adapteded2021 7. ManualofEndocrinologyandMetabolism,8thEdition.20188.clinicalendocrinology.2017 9.PrinciplesofEndocrinologyandHormoneAction,2018

MethodofEvaluation:

TestI	TestII	Assignment	End SemesterExamination	Total	Grade
10	10	5	75	100	

Methodsofassessment:

Recall(K1)-Simpledefinitions,MCQ,Recallsteps,Conceptdefinitions.

Understand/Comprehend(K2)-MCQ,True/False,Shortessays,Conceptexplanations,Shortsummaryoroverview.

Application(K3)-

Suggestidea/conceptwithexamples,Solveproblems,Observe,Explain.Analyse (K4) – Problem-saving questions, Finish a procedure in many steps, Differentiatebetweenvariousideas.

Evaluate(K5)-Longeressay/Evaluationessay,Critiqueorjustifywithprosandcons

Create(K6)–Checkknowledgeinspecificoroffbeatsituations.Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	M	M
CO2	S	S	S	S	M	M	M	S	M	M
CO3	S	S	S	S	M	M	M	S	M	M
CO4	S	S	S	S	S	S	S	S	M	L
CO5	S	S	S	S	S	S	S	S	M	M

S-Strong:34 M-Medium:15 L-Low:01

Course	**SKILL ENHANCEMENT COURSE-1(NME-1)**
Title of the Course:	**LAB COURSE INENZYMOLOGY, MICROBIOLOGY AND CELLBIOLOGY**
Course Code	**PCBIPC23**
Credits:	**2**
Pre-requisites	Knowledgeonbasicprinciples,InstrumentationofBiochemicaltechniquesand metabolicreactions
CourseObjectives	1. Toinculcate skillinstudentsenablingthemtoapprehendthe widerknowledge about principles and techniques to be employed for theassayofenzymesunderinvestigation. 2. Toinculcatetheknowledgeofisolationandpurificationtechniquesofen zymesusingalkalinephosphataseasanexample 3. Toperformexperimentstostudythefactorsaffectingenzymeactivity 4. Toachievetraininginassayofenzymes 5. To achieve training in basic microbiological techniques – preparationofculture, sterilizationandstainingmethods. 6. Toperformthebloodgroupingtestandtoprepareabloodsmeartostudydif ferenttypesofbloodcells 7. To learn molecular biology techniques like Gel electrophoresis andBlottingtechniques 8. Tointroduceindustrial visitsothatstudentsmaybeawareofactualneedoftheindustryandvario usopportunitiesavailable

CourseOutcomes	**Onsuccessfulcompletionofthiscourse,studentsshouldbeableto:** Aftercompletionofthecourse,thestudentsshouldbeableto: **CO1.**The student will be able to employ the relevant techniques forisolationandpurificationofenzymes andgainskillinkineticstudieswhichisessentialforresearchactivity(K1, K2,K4) **CO2.** Student will acquire ability in performing enzyme assay, andexplicate the methods that form the basis of enzyme characterization.(K1,K2,K4) **CO3.**LearntheBasicconceptsinmicrobiologyandcellbiologywhich will be helpful for interdisciplinary research work. (K1,K3,K4)**CO4.**Studentswillbetrainedinseparationtechniquesusedinmolecular Biologywhichwillbesupportiveintheirfutureresearch(K1,K3,K4 &K6) **CO5.** Industrial visits will provide the students with an opportunity tolearnpracticallythroughinteraction,workingmethodsandemployment practices. Students will have an exposure to Industrialstandardandcurrent workpractices(K1,K2,K3,K4&K6)
Units	
I	Enzymology Alkaline Phosphatase a. Isolation of Alkaline Phophatase fromgoat kidney. b.. Determination of optimum pH and temperature of alkaline phosphatase. c. Determination of specific activity and Kmofalk aline phosphatase. d.Effectofactivatorsandinhibitorsontheactivityofalkalinephosphatase. Assay of enzymes a. Salivary Amylase b. Acid Phosphatase
II	Microbiology a. Safety measures and Good Laboratory Practices in microbiology laboratory b. Sterilization, Culture and in oculum preparation c. Staining of bacteria–GramStaining d. Antimicrobial activity – plant extract
III	Physiology&CellBiology a. Testfor blood grouping(Haemagglutination). b. Peripheral Bloodsmear–StainingandInterpretation
IV	Group Experiments a. Separation of proteins base donmolecular weightbySDSPAGE b. Ag arosegele lectrophoresis of genomic DNA
V	Industrial visit can be organised to students through Academia –Industry collaborative Program

Reading List(PrintandOnline)	1.https://www.researchgate.net/publication/337146254_Kinetic_studies_with_alkaline_phosphatase2.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4846332/3.https://www.ijsr.net/archive/v3i8/MDIwMTU0MDk=.pdf4.https://www.researchgate.net/publication/349318898_ABC_of_Periheral_smear5.https://ncdc.gov.in/WriteReadData/l892s/File608.pdf6.https://www.ncbi.nlm.nih.gov/books/NBK562156/
Self-Study	1. Preparation of Buffers and pH measurement 2. Michaelis-Menten equation and Line weaver Burk plot
BooksRecommended	1. DavidPlummer(2001)AnIntroductiontoPracticalBiochemistry(3rded)McGrawHill Education(India) Private Ltd 2. Jayaraman,J(2011),laboratoryManualinBiochemistry,Newagepublishers 3. FundamentalsofEnzymology;3rd Edn. Nicholas C. Price and Lewis Stevens,OxfordUniversity Press(2012). 4. Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis; Robert A. Copeland, Wiley-VCH Publishers(2000). 5. Cappuccino JG & Sherman N (2005).Microbiology-A Laboratory Manual,PearsonEducation Inc 6. Practical Enzymology, Second Revised Edtion: Hans Bisswanger, Wiley–Blackwell;2 edition(2011)

MethodofEvaluation:

TestI	TestII	Assignment	End Semester Examination	Total	Grade
10	10	5	75	100	

Methods of assessment:
Recall (K1)-Simple definitions, MCQ, Recall steps, Concept definitions.
Understand/Comprehend (K2)-MCQ, True/False, Shortessays, Concept explanations,Short summary or overview.
Application (K3) - Suggest idea/concept with examples, Solve problems, Observe, Explain.
Analyse (K4)- Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas
Evaluate (K5)-Longeressay/Evaluationessay, Critiqueorjustifywithprosand cons.
Create (K6)-Checkknowledgeinspecificoroffbeatsituations,Discussion.

MappingwithProgrammeOutcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**S**	**S**	**S**	**M**	**S**	**L**	**S**	**M**	**S**
CO2	**S**	**S**	**S**	**S**	**M**	**S**	**L**	**S**	**M**	**S**
CO3	**S**	**S**	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**S**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
CO5	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**

S-Strong:41 M-Medium:07 L-Low:02

CHOICE BASED CREDIT SYSTEM AND LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK - B.Sc. Biotechnology	
Programme:	**B.Sc.** Biotechnology
Programme Code:	
Duration:	**3 Years (UG)**
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team **PO8: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9: Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10 Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a

	multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability toembrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
Programme Specific Outcomes:	**Upon completion of the B.Sc Biotechnology programme, the students will be able to:** **PSO1:** Acquire sound and solid base in local as well as national languages and on the fundamental principles and the scientific theories related to various spheres of Biotechnology with technological applications. **PSO2:** Apply biotechnology skills with global competencies in core and allied fields. **PSO3:** Integrate technologies through inter-disciplinary concepts and suggest better solutions to solve issues of the underprivileged. **PSO4:** Utilize ICT for learning and experimenting in pursuance of modern technology and concepts. **PSO5:** Developing a variety of communication skills such as reading, listening, speaking, etc. helps to express ideas clearly and effectively. **PSO6**: Conceive the concepts and research approaches to pursue higher studies/attain a higher career in industry, medicine and other relevant fields of biotechnology both locally and nationally and develop their scientific tempo. **PSO7**: Become entrepreneurs and technologists with strong ethics and technical skills. **PSO8:** Find out the biosolutions for cross-cutting issues in a global, economic, environmental, and societal context.

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Programme Specific Outcomes (PSOs)	**Programme Outcomes (PO)**									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PSO1	√	√	√	√			√			
PSO2	√	√	√		√	√	√	√		
PSO3	√	√	√	√	√	√		√	√	√

PSO4	√		√		√	√			√	
PSO5	√	√				√			√	
PSO6	√	√	√	√	√	√	√	√	√	√
PSO7		√	√	√						√
PSO8	√	√		√	√		√	√		√
Number of matches = 51, Correlation : High										

MAPPING CORRELATION BENCHMARK

Mapping	**1-25%**	**26-50%**	**51-75%**	**76-100%**
Matches	**1-20**	**21-40**	**41-60**	**61-80**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

FIRST YEAR - SEMESTER – I
CORE COURSR- I: CELL AND MOLECULAR DEVELOPMENTAL BIOLOGY

Subject Code	**L**	**T**	**P**	**S**	**Credits**	**Instructional Hours**	**Marks**		
							CIA	**External**	**Total**
UCBTTC11	**5**	**1**			**4**	**6**	**25**	**75**	**100**

Course Learning Objectives: On successful completion of the course, students will be able to

CLO1	Have an insight of the cell as the fundamental unit of life and to compare the structure of the Eukaryotic cell with the primitive prokaryotic cell.
CLO2	Analyze the structure and obtain a strong foundation about the functional aspects of cell organelles and cell membrane.
CLO3	Study the structure and functions of Nucleic acid and discuss the molecular mechanism of Replication, Transcription and Translation and post translational modifications of proteins.
CLO4	Predict the response of cells to the intra and extracellular environment by studying about the intracellular signaling pathways.
CLO5	Understand the principles and molecular mechanisms involved in cellular differentiation, morphogenesis, growth and Potency of the cell.

UNIT	**Contents**	**Hours**
I	Discovery and diversity of cells - Cell theory - Structure of prokaryotic (bacteria) and eukaryotic cells (plant and animal cells).	10
II	Biomacromolecules and Biomicromolecules (Primary functions in the cell). Structure and Functions of Cell Organelles: Cell wall - Cell membrane - Cytoplasm - Nucleus - chromosomes -Endoplasmic reticulum - Ribosomes - Golgi bodies - Plastids - Vacuoles - Lysosomes - Mitochondria - Microbodies - Flagella - Cilia - Centrosome and Centrioles - Cytoskeleton.	25
III	Structure and functions of DNA and RNA -Central Dogma of the cell. DNA - Replication in prokaryotes - Transcription in Prokaryotes and Eukaryotes - RNA Processing - Genetic code- Translation - Similarities and differences in prokaryotic and eukaryotic translation - Post Translational Modifications.	25
IV	Cell cycle - Cell cycle checkpoints - Cell division - Mitosis and Meiosis - Cellular differentiation - Cell junctions - Cell Adhesion – ExtraCellular Matrix - Cell to cell communications - Signal transduction - G - Protein Coupled Receptors Signal transduction pathways.	15
V	Gametogenesis - Spermatogenesis and Oogenesis in mammals. Fertilization- Types of cleavage, blastula formation, embryonic fields, gastrulation and formation of germ	15

	layers in animals- Organogenesis.	
	Total	**90**

Text Books	
1	T. Devasena (2012), Cell Biology, Oxford University Press.
2	Gupta, Renu & Makhija, Seema & Toteja, Ravi. (2018). Cell Biology: Practical Manual.
3	Gilbert, S.F. 2016. Developmental Biology, 11th edition. Sinauer Associates Inc. Publishers, MA. USA.
4	Bruce Alberts, 6th Edition (2014). Molecular Biology of the cell, W. W. Norton & Company.
5	James D. Watson (2001), The Double Helix: A personal account of the Discovery of the Structure of DNA, Touchstone Publishers.
Reference Books	
1	Karp's Cell and Molecular Biology: Concepts and Experiments. 8th Edition (2015). Wiley Publications.
2	James D. Watson, 7th Edition (2014), Molecular Biology of the Gene, Pearson Publications.
3	Geoffrey M. Cooper, 7th Edition (2015). The Cell: A Molecular Approach, Sinauer Associates, Qxford University Press.
4	Lodish Harwey, 6th Edition (2016), Molecular Cell Biology, W. H. Freeman Publications.
5	Wolpert L, Tickle C, 2015. Principles of Development, 5th edition, Oxford University Press.
Web Resources	
1	http://www.cellbiol.com/education.php
2	https://global.oup.com/uk/orc/biosciences/cellbiology/wang/student/weblinks/ch16/
3	https://dnalc.cshl.edu/websites/
4	https://www.cellsignal.com/contents/science/cst-pathways/science-pathways
5	https://nptel.ac.in/courses/102/106/102106025/11.

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES AND COURSE LEARNING OUTCOME

	PO 1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	2	1	3	-	3	3	2	3
CLO2	3	3	3	3	-	3	3	2	3
CLO3	3	3	3	2	-	3	3	2	2
CLO4	3	2	3	2	-	3	3	2	3
CLO5	3	3	2	2	-	3	3	2	3

TOTAL	**15**	**14**	**12**	**12**	**0**	**15**	**15**	**10**	**15**
AVERAGE	**3**	**2.8**	**2.4**	**2.4**	**0**	**3**	**3**	**2**	**3**

CORE COURSE II
CELL AND MOLECULAR DEVELOPMENTAL BIOLOGY - PRACTICAL

Course Code	**L**	**T**	**P**	**S**	**Credits**	**Instructional Hours**	**Marks**		
							CIA	**External**	**Total**
UCBTPC12			**3**		**3**	**3**	**25**	**75**	**100**

Course Learning Objective

CLO1	Demonstrate the operation of Light Microscope
CLO2	Identify blood cells and its components
CLO3	Isolate and identify plant, and animal cells.
CLO4	Summarizes the concept of gametes
CLO5	Develop skill to perform cell fractionations.

UNIT	**Contents**	**Hours**
I	Components of a Compound / Light Microscope.	9
II	Blood smear preparation and Identification of Blood cells Buccal smear preparation and Identification of squamous epithelial cells.	9
III	Isolation and Identification of plant cells.	6
IV	Observation of sperm & Egg Mounting of chick Embryo - 24 hrs, 48 hrs, 72 hrs, 96 hrs. Types of placenta in mammals.	15
V	Cell fractionation and Identification of cell organelles (Demo)	6
	Total	**45**

Text Books

1	K.V. Chaitanya, (2013), *Cell and molecular biology*: Lab manual, PHI publishers,. ISBN 978-81-203-800-4

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES AND COURSE LEARNING OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	2	3	3	2	2
CLO2	3	3	3	3	3	3	3	2	2
CLO3	3	3	3	3	3	3	3	3	3
CLO4	3	2	3	3	3	3	3	3	3
CLO5	3	3	2	3	2	2	2	3	3
TOTAL	**15**	**14**	**14**	**15**	**13**	**14**	**14**	**13**	**13**
AVERAGE	**3**	**2.8**	**2.8**	**3**	**2,6**	**2.8**	**2.8**	**2.6**	**2.6**

GENERIC ELECTIVE I
Allied: BIOLOGICAL CHEMISTRY

Course Code	L	T	P	S	Credits	Instructional Hours	
UCBTTA11	**3**	**1**			**4**	**4**	

Learning Objective		
LO1	Comprehend the importance of Chemistry and Biochemistry through the concept of acids and bases, and chemical bonding.	
LO2	Demonstrates the formation of different types of solutions, concentrations of solution sand preparation of buffer solutions	
LO3	Recall the Structure, Classification, Chemistry and Properties of Carbohydrates and Explain Various Biochemical Cycles involved in Carbohydrate Metabolism.	
LO4	Recall the Structure, Classification, Chemistry and Properties of Lipids, Nucleic acid and Explain Various Biochemical Cycles involved in Fatty acid and Nucleic acid Metabolism.	
LO5	Understand the Structure, Classification, Chemistry and Properties of proteins amino acids and Identify and explain nutrients in foods and the specific functions in maintaining health.	
UNIT	**Contents**	**Hours**

1	Atomic theory, formation of molecules, electronic configuration of atoms- s & p shapes of atomic orbitals. Periodic table, periodic classification, valency. Types of chemical bonds. Classification of organic compounds -. Hybridization in methane, ethane, acetylene, and benzene. Definition with examples- electrophiles, nucleophiles and free radicals.	12
II	Acids & Bases properties and differences, Concepts of acids and bases- Arrhenius, Lowry-Bronsted and Lewis. Concentration of solution, ways of expressing concentrations of solutions – per cent by weight, normality, molarity, molality, mole fraction. pH of solution, pH scale, measurement of pH. Buffer solutions, properties of buffers, Henderson-Hasselbalch equation, mechanism of buffer action of acidic buffer and basic buffer.	12
III	Importance to Biochemistry-the chemical foundation of life. Water: its unique properties, ionization of water, buffering action in biological system, properties and characteristics of water. Classification of carbohydrates. Properties of carbohydrates. Ring structure of sugars and conformations of sugars. Metabolism of Carbohydrates – Glycogenesis, Glycogenolysis, Cori's cycle, Glycolysis, TCA cycle, bioenergetics of carbohydrate metabolism. ATP production. Oxidative phosphorylation, Electron transport chain, Photosynthesis and Photophosphorylation.	12
IV	Classification of Lipids. Characteristics, Properties and Biological importance of lipids. Metabolism of Fatty acids, cholesterol. B-oxidation of fatty acids. Classification of nucleic acids. Purine and Pyrimidine bases. Classification of DNA & RNA. Metabolism of Nucleic acids, Salvage pathway.	12
V	Classification and structure of amino acids. Structural conformation of proteins. Classification of proteins. Properties and biological importance of amino acids and proteins. Degradation of Amino acids and Urea Cycle. Vitamins. Role of hormones in metabolism.	12
Total		**60**
Text Books		
1	P.L. Soni , A Text-book of Inorganic Chemistry, 11th Edition, S. Chand & Sons publications	
2	Abhilasha Shourie, Shilpa S, Chapadgoankar & Anamika Singh (2020) Textbook of Biochemistry 1st Edition	
3	J.L. Jain, 2016, Fundamentals of Biochemistry, S. Chand publication, 7th edition.	
4	A.C. Deb, 2016, Fundamentals of Biochemistry, New central book agencies, 7th edition.	
5	Satyanarayana .U, 2016, Biochemistry, MJ publishers 3rd edition (2006).	
Reference Books		
1	Lehninger (2013) Principles of Biochemistry 4th edition WH Freeman and Company NY	
2	Murray *et al.*, (2003) Harper's biochemistry 26th edition Appleton and Lange Publishers Florida USA	
3	Geoffrey L. Zubay, William W. Parson, Dennis E. Vance, 1995, Principles of Biochemistry, W.C. Brown Publishers, 1995, 3rd edition.	
4	Lubert Stryer (2007) Biochemistry –Stanford University 5th Edition-W H Freemann and company San Francisco	
5	Bahl Arun, Bahl B. S. (2016), A Textbook of Organic Chemistry, 22nd Edition, S. Chand & Sons publications	
Web Resources		

1	http/dwb4.unl.edu/chem869p/chem869plinks/s
2	www.longwood.edu/staff/buckalewdw/C3%20Biomolecules.pp
3	https://www.britannica.com › science › biochemistry
4	https://]ww.sciencedirect.com › topics › agricultural-and-biological-sciences
5	https://biochemistry.org › education › careers › becoming-a-bioscientist › w

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	1	3	2	2	3	3	3
CLO2	3	2	1	3	2	2	3	3	3
CLO3	3	1	2	3	2	2	3	3	3
CLO4	3	2	3	3	2	1	3	3	3
CLO5	3	2	3	2	2	2	3	2	3
TOTAL	**15**	**10**	**10**	**14**	**10**	**9**	**15**	**14**	**15**
AVERAGE	**3**	**2**	**2**	**2.8**	**2**	**1.8**	**3**	**2.8**	**3**

GENERIC ELECTIVE I
BIOLOGICAL CHEMISTRY

Course Code	T	P	S	Credits	Instructional Hours	Marks		
						CIA	External	Total
UCBTPS12		**3**		**2**	**3**	**25**	**75**	**100**
Learning Objective								
LO1	Perform and estimate the amount of chemical substance present in a solution qualitatively. To analyze and detect the nature of various organic class of compounds qualitatively.							
LO2	Qualitatively analyze the carbohydrates and amino acids and report the type of carbohydrate based on specific tests. Differentiate the carbohydrates based microscopic examination of the crystal.							
LO3	Understand the methods of acidimetry, alkalimetry and permanganometry.							
LO4	Quantify Ascorbic acid in lemon by Dichlorophenol indo phenol dye method, Glycine by sorensons formal titration method.							
LO5	Estimate Glucose, Cholesterol and Proteins.							

UNIT	Contents	No. of Hours
1	**Systematic analysis of Organic compounds** Functional group tests (Carboxylic acid (Benzoic acid, phthalic acid), Phenol, Urea, Benzaldehyde, Aniline (Aniline not to be given for exam) Distinguish between aliphatic and aromatic compounds. Distinguish between Saturated and unsaturated compounds	10
II	**Qualitative Analysis** Qualitative analysis of carbohydrates - Glucose, Fructose, Lactose, maltose, sucrose, starch & glycogen. Qualitative analysis of amino acids - Tyrosine, Tryptophan, Arginine, Proline and Cysteine. Qualitative analysis of antioxidants (DPPH assay)	10
III	**Volumetric Analysis**: 1. Estimation of Glycine- Formal Titration. 2. Determination of Ascorbic acid – DCPIP method. 3. Estimation of Ferrous sulphate using standard Mohr's salt	10
IV	Colorimetric Analysis 1. Estimation of glucose 2. Estimation of Cholesterol- Zak's method 3.Estimation of proteins – Bradford's method	15
	Total	**45**

	Text Books
1	J. Jayaraman, Laboratory Manual in Biochemistry, New Age International Pvt Ltd Publishers, 2011.
2	S. K. Sawhney Randhir, Singh, Introductory Practical Biochemistry, Alpha Science International Ltd, 2nd edition, 2005.
3	Irwin H. Segel, Biochemical calculations, Liss, Newyork,1991.
	Reference Books
1	Dr. O P Panday, D N Bajpai, Dr. S Giri, PRACTICAL CHEMISTRY, S Chand, Revised edition 2016.
2	Hands Thacher Clarke, A hand book of Oraganic: Qualitative and quantitative Analysis, 2007.
3	N.S. Gnanapragasam and G. Ramamurthy, Organic chemistry Lab manual, S.Viswanathan Co. Pvt. Ltd., 1998.

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CLO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CLO3	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**
CLO4	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**2**

CLO5	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**
TOTAL	**15**	**15**	**14**	**14**	**14**	**14**	**15**	**14**	**14**
AVERAGE	**3**	**3**	**2.8**	**2.8**	**2.8**	**2.8**	**3**	**2.8**	**2.8**

SKILL ENHANCEMENT COURSE I
BASICS OF BIOTECHNOLOGY

Course Code	L	T	P	S	Credits	Instructional Hours	Marks		
							CIA	External	Total
UCBTTF11	**2**				**2**	**2**	**25**	**75**	**100**

Learning Objectives:	
LO1	The student can understand the basics of biotechnology.
LO2	Able to explain the basic concept of biotechnology.
LO3	Can differentiate various types of biotechnology.
LO4	Can outline various biotech based products used in day to day life.
LO5	Apply the concepts of biotechnology in various fields.

Unit I: Introduction to Biotechnology – Definition – History of Biotechnology – Scope of Biotechnology –Advantages and Disadvantages of Biotechnology. **6 hrs**

Unit II: Basic concept of biotechnology (r – DNA technology) - Isolation of the DNA from the donor organism - DNA fragmentation using the restriction endonucleases - Ligation of the desired DNA fragment into the vector- Transfer of Recombinant DNA to the host - Culture of transformed cells in a nutrient medium - Extraction of the desired product. **6 hrs**

Unit III: Types of Biotechnology: Blue Biotechnology – Green Biotechnology – Red Biotechnology – White Biotechnology – Grey Biotechnology – Yellow Biotechnology – Gold Biotechnology – Black Biotechnology. **6 hrs**

Unit IV: Biotechnology in daily life – Dairy Products – Bakery Products –Beverages – Cosmetics – Detergents – Genetically Modified Crops – Antibiotics – Vaccines – Biofuels. **6 hrs**

Unit V: Applications of Biotechnology – Plant Biotechnology – Animal Biotechnology – Industrial Biotechnology – Medical Biotechnology – Herbal Biotechnology – Marine Biotechnology – Enzyme Technology. **6 hrs**

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	2	1	1	-	-	-	3	3	2
CLO2	2	1	1	-	-	-	2	2	2
CLO3	2	2	2	1	-	-	2	3	2
CLO4	1	1	1	-	-	-	2	3	3
CLO5	3	2	2	2	-	-	3	3	3
TOTAL	**10**	**7**	**7**	**3**	**0**	**0**	**12**	**14**	**12**
AVERAGE	**2**	**1.4**	**1.4**	**0.6**	**0**	**0**	**2.4**	**2.8**	**2.4**

FIRST YEAR - SEMESTER – II
CORE COURSE III
GENETICS

Course Code	L	T	P	S	Credits	Instructional Hours	Marks		
							CIA	External	Total
UCBTPC21	**5**	**1**			**5**	**6**	**25**	**75**	**100**

Course Learning Objective	
CLO1	Learn about the classical genetics and transmission of characters from one generation to the next.
CLO2	Obtain a strong foundation for the advanced genetics.
CLO3	Explain the properties of genetic materials and storage and processing of genetic information.
CLO4	Acquire knowledge about the Mutagens, Mutations, DNA Repairs and Genetic disorders in human.
CLO5	Categories Eugenics, Euphenics and Euthenics and indepth Knowledge on population Genetics.

UNIT	**Contents**	**No. of Hours**

1	Mendel's experiments, Monohybrid cross, Dihybrid cross, Backcross or Testcross, Mendel's laws. Incomplete dominance. Interaction of Genes- Epistasis -lethal genes. Multiple alleles – In Drosophila, Rabbit and Blood group inheritance in man.	18
II	Linkage - linkage in Drosophila- Morgan's experiments, factors affecting linkage. Crossing over- types, mechanism, significance of crossing over. Mapping of Chromosomes, interference and coincidence. Cytoplasmic inheritance -Carbon dioxide sensitivity in Drosophila and milk factor in mice. Sex –Linked Inheritance and Sex- Determination in Man.	18
III	Fine structure of the gene and gene concept, Operon Concept. Identification of the DNA as the genetic material- Griffith experiments, Avery, McLeod, McCarty and Hershey Chase experiment. Microbial Genetics- bacterial recombination, Conjugation, Transformation, Transduction and sex duction	18
IV	Mutation – types of mutation, mutagens, DNA damage and Repair Mechanism. Chromosomal aberrations- Numerical and Structural, Pedigree Analysis- Mendelian inheritance in human. (Cystic Fibrosis, Muscular Dystrophy)	18
V	Population Genetics– Hardy Weinberg principle, gene frequency, genotype frequency and factors affecting gene frequency. Eugenics, Euphenics and Euthenics.	18
	Total	**90**

Text Books	
1	Dr. Veer BalaRastogi, 2020, Elements of Genetics, 11 th Revised & Enlarged Edition, KedarNath Ram
2	Nath Publications, Meerut, 250001. www.knrnpublications.com, ISBN-978-81-907011-2-9
3	Verma, P.S. and Agarwal, V.K., 1995. Genetics, 8th edition, S.Chand& Co., New Delhi – 10055.
4	Verma, P.S., and Agarwal, V.K., 1995. Cell and Molecular Biology, 8th edition, S.Chand and Co., New Delhi, 110055.
Reference Books	
1	Gardener E.J. Simmons M.J. Slustad D. P. 2006. Principles of Genetics
2	Lewis, R.2001. Human Genetics- Concepts and application. 4th edition. McGraw Hill.
3	Griffiths, Miller, J.H., An Introduction to Genetic Analysis W.H.Freeman. New York.
4	Winter, P.C., Hickey, G.J. and Fletcher, H.L.2000. Instant notes in Genetics. Viva books, Ltd
5	Good enough U. 1985. Genetics. Hold Saunders international.

Web Resources	
1	https://nptel.ac.in/courses/102/106/102106025/
2	http://www.ocw.mit.edu
3	http://enjoy.m.wikipedia.org
4	https://www.acpsd.net

MAPPING WITH PROGRAMME SPECIFIC OUTCOME AND COURSE OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	3	3	3	3	2	3	3	2	2
CLO2	3	3	3	3	3	3	3	2	2
CLO3	3	3	3	3	3	3	3	3	3
CLO4	3	2	3	3	3	3	3	3	3
CLO5	3	3	2	3	2	2	2	3	3
TOTAL	15	14	14	15	13	14	14	13	13
AVERAGE	3	2.8	2.8	3	2.6	2.8	2,8	2.6	2.6

CORE COURSE IV
GENETICS - PRACTICAL

Course Code	L	T	P	S	Credits	Instructional Hours	Marks		
							CIA	External	Total
UCBTPC22			3		3	3	25	75	100

Course Learning Objective	
CLO1	Demonstrate the basic principles of important techniques in Molecular biology and Genetics.
CLO2	Analyze the Polytene chromosome of the organisms

CLO3	Identify Barr bodies from Buccal smear
CLO4	Demonstrate the Preparations and maintenance of culture medium
CLO5	Demonstrate Human karyotyping

UNIT	Contents	No. of Hours
1	Mitotic stages of onion (*Allium cepa*) root tip Meiotic stages of cockroach testes/ Flower bud	9
II	Giant chromosomes from Chironomus larvae/ Drosophila salivary glands	9
III	Identification of Barr bodies from Buccal smear	6
IV	Preparations of culture medium and culture of Drosophila – methods of maintenance Identifications of mutants of Drosophila	12
V	Verification of Monohybrid and Dihybrid ratio (Beads / coin toss) Observation of Human karyotyping (Demo)	9
	Total	**45**

Text Books

1	Practical Manual on "Fundamentals of Genetics" (PBG-121). 2019, Edition: First Publisher: Odisha University of Agriculture & Technology. Editor: Kaushik Kumar Panigrahi

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CLO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CLO3	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**
CLO4	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**2**
CLO5	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**
TOTAL	**15**	**15**	**14**	**14**	**14**	**14**	**15**	**14**	**14**

AVERAGE	**3**	**3**	**2.8**	**2.8**	**2.8**	**2.8**	**3**	**2.8**	**2.8**

GENERIC ELECTIVE II
ALLIED - FUNDAMENTALS OF MICROBIOLOGY

Course Code	**L**	**T**	**P**	**S**	**Credits**	**Instructional Hours**	**Marks**		
							CIA	**External**	**Total**
UCBTTA21	**3**	**1**			**3**	**4**	**25**	**75**	**100**

Learning Objective	
LO1	Understand the classification of Microorganisms and structure of bacteria
LO2	Understand the various microbiological techniques, different types of media, and techniques involved in culturing microorganisms.
LO3	Categorize the methods of sterilization and identify the significance of culture media in the growth of different microbes.
LO4	Exhibit knowledge in analyzing the importance of Bio insecticides, Bio fertilizers prebiotics and probiotics.
LO5	Distinguish between normal flora and pathogens and describe the role of microbes in food intoxications.

UNIT	**Contents**	**No. of Hours**
I	History of Microbiology, Classification of bacteria, fungi, virus, protozoa and algae – classical and molecular approaches. Scope of microbiology – Role of microbes in biotechnology.	12
II	Structure of bacteria - Bacterial growth and measurement of growth, Media – types and preparation- plating methods - staining methods (Gram's, capsule, spore, LCB mount)- methods of preservation and storage of microbes. Culture of fungi, virus and algae.	12
III	Sterilization methods - physical and chemical methods- Mode of action – Antibiotic in clinical use - Resistance to antibacterial agents - MRSA, ESBL.	12
IV	Bioinsecticides - *Bacillus thuringiensis*, Baculoviruses- Biofertilizers - *Azospirillum* and blue green algae - single cell protein – prebiotics and probiotics - Dairy products (Cheese and Yoghurt).	12
V	Microbial Disease- host -pathogen interaction, clinical features, lab diagnosis and treatment of Airborne disease (Pneumonia, Chicken pox), food borne disease (Typhoid, Aspergillosis), Water borne disease (Cholera, Amoebiasis), Sexually transmitted disease (AIDS,	12

	Trichomoniasis), Vector borne disease (Dengue, Malaria).	
Total		**60**

Text Books	
1	Pelczar.M. J., Chan E.C.S. and Noel. R.K. (2007). Microbiology. 7th Edition.,McGraw –Hill, New York.
2	Dubey R.C. and Maheswari, S. (2003). A textbook of Microbiology, New Delhi: S. Chand & Co.
3	Ananthanarayanan, Paniker, Kapil, Textbook book of Microbiology, 9th edition, Orient BlackSwan, 2013.
4	Prescott, Harley, Klein, Microbiology, 10th Edition, McGraw – Hill, 2016.
5	Gerhardt, P., Murray, R.G., Wood, W.A. and Kreig, N.R. (Editions) (1994) Methods for General and Molecular Bacteriology. ASM Press, Washington, DC

Reference Books	
1	Madigan, Martinko, Bender, Buckley, Stahl, Brock Biology of Microorganisms, 14th edition, 2017.
2	Gillespie, Bamford, Medical Microbiology and Infection at a Glance, 4th edition, 2012.
3	Boyd, R.F. (1998). General Microbiology,2nd Edition., Times Mirror, Mosby CollegePublishing, St Louis.
4	Tortora, G.J., Funke, B.R., Case,C.L. (2013). Microbiology. An Introduction 11th Edition., A La Carte Pearson.
5	Salle. A.J (1992). Fundamental Principles of Bacteriology. 7th Edition., McGraw Hill Inc.New York.

Web Resources	
1	Horst W. Doelle (2004). Microbial Metabolism and Biotechnology. Proceedings of an E-seminar organized by the International organization for Biotechnology and Bioengineering (IOBB)
2	http://www ejb.org/content.
3	www. Biotech.kth.se Electronic Journal of biotechnology
4	https://www.cliffsnotes.com/study guides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology
5	https://bio.libretexts.org/@go/page/9188

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CLO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CLO3	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**
CLO4	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**2**
CLO5	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**
TOTAL	**15**	**15**	**14**	**14**	**14**	**14**	**15**	**14**	**14**
AVERAGE	**3**	**3**	**2.8**	**2.8**	**2.8**	**2.8**	**3**	**2.8**	**2.8**

GENERIC ELECTIVE II
FUNDAMENTALS OF MICROBIOLOGY – PRACTICAL

Course Code	L	T	P	S	Credits	Instructional Hours	Marks		
							CIA	External	Total
UCBTPS21			**3**		**2**	**3**	**25**	**75**	**100**

Learning Objective		
LO1	Describe the general Laboratory safety & Sterilization Techniques	
LO2	Develop Skills in Media Preparation, Isolation & Serial Dilution Techniques and Pure Culture Techniques	
LO3	Microscopically analyze the morphological features of Bacteria and fungi and define various Staining Techniques.	
LO4	Perform the Motility of organisms.	
LO5	Able to characterize and identify bacteria using Biochemical tests.	
UNIT	**Contents**	**No. of Hours**
I	Sterilization techniques – Preparation of Media, Culture cultivation and Preservation. (Stab / Slant / Glycerol Stock)	9

II	Inoculation techniques- Pour plate, spread plateand Streaking methods Isolation of bacteria from various sources and dilution techniques.	9
III	Staining techniques: Simple, Negative, Gram's, Capsule, Spores. Preparation of temporary mounts- Lacto phenol cotton blue staining.	9
IV	Motility tests: Hanging drop technique.	9
V	Biochemical characterization - catalase, oxidase, IMVIC test and TSI. Antibiotic sensitivity test (demonstration).	9
	Total	**45**

Text Books	
1	James G Cappucino and N. Sherman MB(1996). A lab manual Benjamin Cummins, New York 1996.
2	Kannan. N (1996). Laboratory manual in General Microbiology. Palani Publications.
3	Sundararaj T (2005). Microbiology Lab Manual (1st edition) publications.
4	Gunasekaran, P. (1996). Laboratory manual in Microbiology. New Age International Ld., Publishers, New Delhi.
5	R C Dubey and D K Maheswari (2002). Practical Microbiology. S. Chand Publishing.
Reference Books	
1	Atlas.R (1997). Principles of Microbiology, 2nd Edition, Wm.C.Brown publishers.
2	Amita J, Jyotsna A and Vimala V (2018). Microbiology Practical Manual. (1st Edition). Elsevier India.
3	Talib VH (2019). Handbook Medical Laboratory Technology. (2nd Edition). CBS.
4	Wheelis M, (2010). Principles of Modern Microbiology, 1st Edition. Jones and Bartlett Publication.
5	Lim D. (1998). Microbiology, 2nd Edition, WCB McGraw Hill Publications.
Web Resources	
1	http://www.biologydiscussion.com/micro-biology/sterilisation-and-disinfection-methods-and-principles-microbiology/24403.
2	https://www.ebooks.cambridge.org/ebook.jsf?bid=CBO9781139170635
3	https://www.grsmu.by/files/file/university/cafedry//files/essential_microbiology.pdf
4	https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	**3**	**2**	**2**	**2**	**1**	**2**	**3**	**3**	**3**
CLO2	**3**	**2**	**2**	**2**	**1**	**1**	**3**	**3**	**3**
CLO3	**3**	**2**	**1**	**1**	**-**	**1**	**3**	**3**	**3**
CLO4	**3**	**2**	**1**	**2**	**3**	**2**	**3**	**3**	**2**
CLO5	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**2**	**3**
TOTAL	**15**	**11**	**8**	**10**	**8**	**8**	**15**	**14**	**14**
AVERAGE	**3**	**2.2**	**1.6**	**2**	**1.6**	**1.6**	**3**	**2.8**	**2.8**

SKILL ENHANCEMENT COURSE 2
VERMITECHNOLOGY

Subject Code	P	S	Credits	Instructional Hours	Marks		
					CIA	External	Total
UCBTTS22			**2**	**2**	**25**	**75**	**100**

Learning Objective		
LO1	Students will gain knowledge on types of the earthworm culture methods, vermicomposting and its economical benefits.	
LO2	Able to learn different method of cultivation and materials used for composting	
LO3	Able to gain knowledge in different small scale techniques for composting	
LO4	Knowledge in different large scale techniques for composting	
LO5	Apply the techniques of vermiwash and its advantages in commercial in employability concept.	
UNIT	**Contents**	**No. of Hours**

I	Types, Collection and Preservation of earthworms - Types and basic characteristics of species suitable for vermicomposting; Role of earth worms in soil fertility, Biology of *Lampitomaruitti*; Collection and Preservation of Earthworms; Flow sheet for vermi technology.	12
II	Culturing techniques of earthworms and composting materials General method; Pot method; Wooden box method; Propagation; Factor affecting culturing of earthworm; Vermicomposting materials; Preliminary treatment of composting materials	12
III	Small scale techniques of Vermicomposting - Indoor dual bin method; Bed method; Pit method; Heap method; Expandable worm tower assembly method; Hanging basket method; Physical, chemical and biological properties of vermicompost.	12
IV	Large scale techniques of Vermicomposting Outdoor dual bin; Raised cage; Dual pit; Commercial model; Trickling filter vermicomposting; Keep it simple and save plan.	12
V	Vermiwash and Economics - Chemical composition of vermiwash; Techniques of vermiwash production: Advantages of Vermicomposting; Prospects of vermi-culture as self employment venture.	12
Total		**60**
Text Books		
1	The Earthworm book,Ismail,S.A.,other India Press,Goa	
2	Somani, L.L. 2008. Vermicomposting and vermiwash. Agrotech Publishing Academy, Udaipur.	
3	Talashilkar and Dosani, 2005. Earthworm in Agriculture. Agrobios (India), Jodhpur.	
4	Ranganathan, L.S. 2006. Vermibiotechnology from soil health to human health – Agrobios, India.	

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CLO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CLO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CLO3	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**
CLO4	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**2**

CLO5	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**
TOTAL	**15**	**14**	**14**	**14**	**14**	**14**	**15**	**14**	**14**
AVERAGE	**3**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	**3**	**2.8**	**2.8**

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	**M.Sc. BIO-TECHNOLOGY**
Programme Code	
Duration	**PG – 2 YEARS**
Programme Outcomes (Pos)	**PO1: Problem Solving Skill** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. **PO2: Decision Making Skill** Foster analytical and critical thinking abilities for data-based decision-making. **PO3: Ethical Value** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities. **PO4: Communication Skill** Ability to develop communication, managerial and interpersonal skills. **PO5: Individual and Team Leadership Skill** Capability to lead themselves and the team to achieve organizational goals. **PO6: Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment. **PO7: Entrepreneurial Skill** Equip with skills and competencies to become an entrepreneur. **PO8: Contribution to Society** Succeed in career endeavors and contribute significantly to society. **PO 9 Multicultural competence** Possess knowledge of the values and beliefs of multiple cultures and a global perspective. **PO 10: Moral and ethical awareness/reasoning** Ability to embrace moral/ethical values in conducting one's life.
Programme Specific Outcomes (PSOs)	**Upon completion of the M.Sc Biotechnology programme, the students will be able to:** **PSO 1:** Evolve with recent innovations and scientific updates in various thrust areas of biotechnology in accordance with the best scientific temperament, and professional and research ethics throughout life.

	PSO 2: Apply broad multidisciplinary knowledge and transferable skills in biotechnology and related subjects suitable for employment in the pharmaceutical and biotechnology industry, government research institutes or other agencies. **PSO3:** Contribute to innovative thinking, scientific approach, and problem-solving skills for various health, environmental, cultural and social issues through scientific knowledge. **PSO 4**: Recognize ethical issues in connection with recombinant DNA technology, gene cloning, animal manipulation, IPR, biosecurity and the management of sensitive experiments. **PSO 5:** Discriminate data beautification and data manipulation / scientific misconduct. **PSO 6**: Make use of ICT to carry out and deliver the research works and assignments independently and with a team of students across disciplines. **PSO 7:** Practice research & professional ethics as well as the responsibility of SOPs. **PSO8:** Evolve with recent innovations and scientific updates in the technological era in accordance with the best scientific temperament, and professional and research ethics throughout life.

MAPPING OF PROGRAMME SPECIFIC OUTCOMES (M.Sc.) WITH PROGRAMME OUTCOMES

Programme Specific Outcomes (PSOs)	Programme Outcomes (PO)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PSO1	√	√	√		√	√	√	√	√	√
PSO2	√	√	√	√	√		√			
PSO3	√	√	√	√	√	√	√		√	√
PSO4	√	√		√		√		√	√	√
PSO5	√		√	√	√	√		√		
PSO6	√		√		√	√	√	√		
PSO7			√	√			√		√	√
PSO8	√	√			√		√		√	√
Number of matches = 54, Correlation: High										

MAPPING CORRELATION BENCHMARK

Mapping	**1-30%**	**31-60%**	**61-70%**	**71-100%**
Matches	**1-24**	**25-50**	**51-56**	**57-80**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER I
CORE COURSE -I
BIOCHEMISTRY

Title of the Course	**BIOCHEMISTRY**		**Course Code: PCBTTC11**	
Category of the Course	Year	Semester	Hours	Credits
Core course -I	1st	1st	6	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of all the Biochemical concepts, Metabolic reactions and its regulation. The student will get to understand the core concepts of metabolism and physiological processes of the body in both healthy and disease state.

Course outcomes:

At the end of the Course, the Student will be able to:

CO-1	To understand the basics of pH and related principles and carbohydrate metabolism.
CO-2	To provide basic knowledge about lipid metabolism and related significance.
CO-3	To enlighten the students on Bio-energetics and Biological oxidation pathways.
CO-4	To update the knowledge on Amino acids and Protein.
CO-5	To assess and appraise the role of Nucleic acids.

SYLLABUS | Core Course -I | BIOCHEMISTRY				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
I	pH, pK . acid, base .Buffers- Henderson- Haselbach equation, biological buffer system –Phosphate buffer system, protein buffer system, bicarbonate buffer system, amino acid buffer system and Hb buffer system. Water, Carbohydrates: Nomenclature, classification, structure, chemical and physical properties of carbohydrates. Metabolisms: glycogenesis, glycogenolysis, gluconeogenesis, pentose phosphate pathway	**18**	CO1	K1&k2
II	Lipids: Nomenclature, classification, structure, chemical and physical properties of fatty acids. Metabolisms: biosynthesis of fatty acids, triglycerols, phospholipids, glycol lipids. Cholesterol biosynthesis, bile acids and salt formation. Eicosanoids, sphingolipids and steroid hormones.	**16**	CO2	K1,K2 & K3
III	Bioenergetics – Concept of energy, Principle of thermodynamics, Relationship between standard free energy and Equilibrium constant, ATP ads universal unit of free energy in Biological systems. Biological oxidation: Electron transport chain, oxidative phosphorylation, glycolysis, citric acid cycle, cori.s cycle, glyoxalate pathway. Oxidation of fatty acids-mitochondrial and peroxisomal ß-oxidation, alpha and beta oxidation, oxidation of unsaturated and odd chain fatty acids, ketone bodies. Photosynthesis, urea cycle, hormonal regulation of fatty acids and carbohydrates metabolisms, Mineral metabolism	**25**	CO3	K1,K2 & K3
IV	Amino acids and Protein: Nomenclature, Classification, structure, chemical and physical properties of amino acids and proteins. Metabolisms: Biosynthesis of amino acids. Degradation of proteins, nitrogen metabolisms and carbon skeleton of amino	**13**	CO4	K1,K2 & K3

	acids. Over all in born error metabolisms			
V	Nucleic acids: Nomenclature, Classification, structure, chemical and physical properties of purine and pyrimidines. In de novo and salvage synthesis of purines, pyrimidine bases, nucleosides and nucleotides. Catabolisms of purines and pyrimidines bases. Synthetic analogues of nitrogenous bases	**18**	CO5	K1,K2 & K3

Reference books:

- Philip Kuchel, Simon Easterbrook-Smith, Vanessa Gysbers, Jacqui M. Matthews, 2011. Schaum.s Outline of Biochemistry, Third Edition (Schaum.s Outline Series), McGraw-Hill.
- Sathyanarayana.U and U.Chakrapani., 2011. Biochemistry. Books and Allied private limited, Kolkata.
- Jeremy M. Berg, John L. Tymoczko, LubertStryer, 2010. Biochemistry, Seventh Edition, W. H. Freeman.
- Albert Lehninger, David L. NelsonVoet Donald, Judith G.Voet and Charlotte W.Pratt., 2008. Principles of Biochemistry. John Wiley and sons, Inc., New Jersey.
- Michael M. Cox, 2008. Lehninger Principles of Biochemistry, Fifth Edition, W. H. Freeman publishers.

Useful web sites:

- mcdb-webarchive.mcdb.ucsb.edu/.../biochemistry/.../website-tourf.htm
- www.biochemweb.org/
- http://golgi.harvard.edu/biopages.html
- webarchive.mcdb.ucsb.edu/sears/biochemistry/info/website-

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√			√		√
CO2	√	√	√			√		√
CO3	√	√	√			√		√
CO4	√	√	√			√		√
CO5	√	√	√			√		√
Number of matches = 25, Correlation: High								

MAPPING CORRELATION BENCHMARK

Mapping	1-25%	26-50%	51-75%	76-100%
Matches	1-10	11 – 20	21 – 30	31 - 40
Correlation	Poor	Moderate	High	Very High

Core Course -II
MOLECULAR GENETICS

Title of the Course	MOLECULAR GENETICS		Course Code: PCBTTC12	
Category of the course	Year	Semester	Hours	Credits
Core course II	1st	1st	6	4

Learning outcome:

The paper imparts a thorough knowledge on the basics of all the Genetics concepts, molecules and its regulation. The student will get to understand the core concepts of molecules and genetics.

Course outcomes:

At the end of the Course, the Student will be able to:

CO-1	To acquire good knowledge about the molecular mechanisms of gene expression and understand the theories behind the organization and functions of genetic material in the living world.
CO-2	Identify and distinguish genetic regulatory mechanisms at different levels and explain the processes behind mutations and other genetic changes and study various chromosomal abnormalities.
CO-3-	Make the students understand different range of DNA damage and range of their tools for their detection an.
CO-4	Learn the concepts of the transposons and their applications.
CO-5	Detects the Allele frequencies and genotype frequencies in populations and describe the concepts behind the theory of evolution

SYLLABUS | Core Course - II | MOLECULAR GENETICS				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
I	Genes and chromosomes, Colinearity of Genes and Proteins, Genetic code, Identification of DNA as the genetic material. The complexity of eukaryotic genome (introns, exons, repetitive DNA sequence, gene duplication and pseudogenes). DNA markers -VNTR, STR, microsatellite, SNP and their detection techniques	15	CO1	K1,K2& K3
II	Replication of DNA, Gene expression and regulation in prokaryotes and eukaryotes. Mutation: Spontaneous and virus induced mutation, Radiation induced mutation. Ionizing radiation, UV radiation. Chromosomal Abnormalities and associated genetic diseases, Techniques in the study of chromosomes and their applications, Recombination – models	15	CO2	K1,K2&K3
III	DNA Damage and Repair-Internal and external agents causing DNA damages 3.2. DNA damages (Oxidative damages, Depurinations, Depyrimidinations, O6-methylguanines, Cytosine deamination, single and double strand breaks) 3.3. Mechanisms of DNA damage (transition, transversion, frameshift, nonsense mutations) 3.4. Repair mechanisms (Photo reactivation, excision repair, mismatch repair, post replication repair, SOS repair) 3.5. Discovery: Early experiments of McClintock in maize. Insertion	20	CO3	K1,K2&K3

	sequences in prokaryotes. Complex transposons (ex. Tn3, Tn5, Tn9 and Tn10). Mechanisms, control consequences and application of transposition by simple and complex elements			
IV	Allele frequencies and genotype frequencies, Random mating population, Hardy-Weinberg principle, complications of dominance, special cases of random mating – multiple alleles, different frequencies between sexes (autosomal and X-linked) inbreeding, genetics and evolution, random genetic drift, Karyotyping and usefulness of chromosomes in understanding Genetic variation, Genetics of eukaryotes gene linkage and chromosome mapping.	20	CO4	K1 &K2
V	Extrachromosomal heredity: Biology of Plasmids, their discovery, types and structure of F.RTH. *col* factors and Ti – Replication and partitioning, Incompatibility and copy number control-natural and artificial plasmid transfer and their applications- Human Genome Project, Genomics and Modern methodologies in understanding genome.	20	CO5	K1,K2& K3

References:

- Principles of Genetics- 8th Edition, Gardner, Simmons and Snustad, 2002.
- The Cell- A Molecular Approach. 3rd Edition. Geoffrey M. Cooper, Robert E. Hausman, 2003.
- Genetics- Kavitha B. Ahluwalia, New Age International Pvt Ltd and Publishers, New Delhi, 2010
- Genetics – P.S Verma and A.K Agarwal (Rack 3, Central Library)
- Robert Brooker.2011. Genetics- Analysis and Principles. 4th edition. McGraw Hill.
- Leland Hartwell,Leroy Hood, Michael Goldberg, Ann Reynolds, Lee Silver,2010.Genetics: From Genes to Genomes, 4th Edition, McGraw Hill.
- Rastogi Smita and Neelam Pathak.,2010. Genetic Engineering, Oxford University Press, New Delhi. (Rack 3, Central Library)
- Watson, Hopkins, Roberts, Steitz, Weiner, 2004. Molecular Biology of Genes, 4th Edition.
- DNA markers Protocols, applications and overviews Anolles G. C. &Gresshoff P. M. Wiley-Liss
- Molecular markers in Plant Genetics and Biotechnology Vienne De. D. Science Publishers
- Genetics of Population Hedrick P.W. Jones & Bartlett 4 Principle of Population Genetics Hartl D. L. and Clark A. G. Sinauer Associates

MAPPING OF PROGRAMME SPECIFIC OUTCOMES (M.Sc. Biotechnology) WITH COURSE OUTCOMES

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
COs 1	√	√	√	√		√	√	√
COs 2	√	√		√		√	√	√
COs 3	√			√				√
COs 4	√	√	√	√		√	√	√
COs 5	√	√	√	√		√	√	√
Number of matches = 30 Correlation: High								

MAPPING CORRELATION BENCHMARK

Mapping	**1-25%**	**26-50%**	**51-75%**	**76-100%**
Matches	**1-10**	**11-20**	**21-30**	**31-40**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

Core Course –III

Title of the Course	**MOLECULAR CELL BIOLOGY**		**Course code: PCBTTC13**	
Category of the course	Year	Semester	Hours	Credits
Core Course III	1st	1st	5	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of all the Cell biology concepts, molecules and its regulation. The student will get to understand the core concepts of molecules and cell biology.

Course outcomes:

CO-1	To understanding of the molecular machinery of living cells and the principles that govern the structures of macromolecules and their participation in molecular recognition.
CO-2	Identify the structures and purposes of basic components in prokaryotic and eukaryotic cells and their molecular mechanism
CO-3-	Demonstrate knowledge and understanding of the principles and basic mechanisms of nuclear envelope and its functions.
CO-4	Understand the metabolic pathways and the process of transmission of extracellular signals
CO-5	Demonstrate the operation of various microscopes and microtomy in the laboratory

SYLLABUS | Core Course - III | MOLECULAR CELL BIOLOGY				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
I	Introduction to cell Biology- Basic properties of cells-Cellular dimension-Size of cells and their composition-Cell origin and Evolution (Endosymbiotic theory)–Microscopy- Light Microscopy, Electron Microscopy, Application of Electron Microscopy in cell biology, Phase Contrast Microscopy, Fluorescence Microscopy, Flow Cytometry and FRET .Organelles of the eukaryotic cell and its functions; Biomembranes - structural organization, transport across membrane (Passive, Active and Bulk transport); Cell-Cell adhesion- Cell junctions (Tight junctions, gap junctions, desmosomes, adherens); Extra cellular matrix (ECM)- components and role of ECM in growth	15	CO1	K1,K2&K3
II	Structure of Nucleic acids, Genome organization in Eukaryotes, DNA Replication, Transcription, Translation and post translational Modification. Synthesis, sorting and trafficking of proteins: site of synthesis of organelle and membrane proteins – transport of secretary and membrane proteins across	18	CO2	K1,K2&K3

	ER – post-translational modification in RER – transport to mitochondria, nucleus, chloroplast and peroxisome - protein glycosylation – mechanism and regulation of vesicular transport – golgi and post-golgi sorting and processing – receptor mediated endocytosis; Synthesis of membrane lipids.			
III	Nucleus: Nuclear envelope – Nuclear pore complexes-nuclear matrix – organization of chromatin – supercoiling, linking number, twist - nucleosome and high order of folding and organization of chromosome(Solenoid and Zigzag model)-Global structure of chromosome –(Lamp brush and polytene chromosomes).	16	CO3	K1,K2&K3
IV	Molecular basis of eukaryotic cell cycle, Regulation and cell cycle check points; Programmed cell death (Apoptosis); Cell-Cell signaling-signaling molecules, types of signaling, signal transduction pathways (GPCR-cAMP, IP3 , RTK, MAP Kinase, JAK-STAT, Wnt Pathway).	13	CO4	K1, K2 & K3
V	Cancer Biology: Multistage cancer development Mitogens, carcinogens, oncogenes and proto-oncogenes, tumor suppressor genes-Rb,p 53, Apoptosis and significance of apoptosis.	10	CO5	K1,K2& K3

References

- Karp, G., 2009, Cell and Molecular Biology, Sixth edition, John Wiley & Sons, New York.
- David E.Sadva., 2009. Cell biology organelles structure and function, CBS publishers and distributors, New Delhi.
- Prakash S. Lohar , 2009. Cell and Molecular Biology.
- Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, 2007.,Molecular Biology of the Cell, Fifth edition. Garland Science.
- Lodish,H., Berk, A., Zipursky, S.L., Matsudaira, P., Kaiser, A., Krieger, Scott and Darnell, J. 2007. Molecular Cell Biology. Media Connected, sixth edition. W.H.Freeman and Company
- Geoffrey.M.Cooper, Robert.E.Hausman.2007.The Cell-A Molecular Approach, Fourth edition. Sinauer Associates. •
- Luiz Carlos Uchoa, Janqueira, Jose, Carneiro. 2005. Basic HistologyText and Atlas. McGraw-Hill Professional.
- Paul A, 2001, Text Book Of Cell And Molecular Biology 2edition Niyogi Books •
- T.Fleming. 2002. Cell interactions: A practical approach Second edition.
- Alberts B, Molecular Cell Biology. 8. Casimeris et al., Lewin's cells. Jones and Bartlett.
- Plopper, Principles of cell Biology. Jones and Bartlett.
- Gartner, Cell Biology and Histology. LWW.
- Pollard et al., Cell Biology. Sounders.
- Copper, The Cell a Molecular approach. Sinauer

MAPPING OF PROGRAMME SPECIFIC OUTCOMES (M.Sc. Biotechnology) WITH COURSE OUTCOMES

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
COs 1	√	√	√	√		√	√	√
COs 2	√	√	√	√		√	√	√
COs 3	√	√	√	√		√	√	√
COs 4	√	√	√	√		√	√	√
COs 5	√	√	√	√		√	√	√
Number of matches = 35, Correlation: Very High								

MAPPING CORRELATION BENCHMARK

Mapping	1-25%	26-50%	51-75%	76-100%
Matches	1-10	11-20	21-30	31-40
Correlation	Poor	Moderate	High	Very High

Core Course - IV
PRACTICAL-I
(BIOCHEMISTRY, MOLECULAR GENETICS AND MOLECULAR CELL BIOLOGY)

Title of the Course	PRACTICAL-I (Biochemistry, Molecular Genetics and Molecular Cell biology)		Course code: PCBTPC11	
Category of the course	Year	Semester	Hours	Credits
Core course IV	1st	1st	5	4

Learning Outcome:
The practical will establish a basic study skills on the subject and will improve the student's ability to calculate and improve their practical skill and knowledge.

Course outcomes:
On successful completion of the course the students will be able to

CO 1	(K2) Illustrate basic biochemistry procedures
CO 2	(K3) study the methods of estimation of biomolecules
CO 3	(K4) isolate & Analyze DNA, RNA & protein
CO 4	(K5) critically analyze the isolated biomolecules
CO 5	(K5) evaluate the quality and purity of DNA, RNA & Protein

SYLLABUS | Core Course - IV | PRACTICAL-I				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
A	**(A) Biochemistry - Practical** 1. Basic calculations in Biochemistry - Normality, Molarity, Molality percent solutions (v/v, w/v). 2. Preparation of biological buffer - phosphate buffer 3. Urea-SDS PAGE for separation of low molecular weight proteins 4. Estimation of Proteins by Lowry's method / Biuret method/ Bradford method 5. Estimation of RNA by orcinol method 6. Estimation of DNA by diphenylamine method 7. Estimation of Carbohydrate by Anthrone method 8. Purity check of DNA & RNA by UV Spectrophotometry - A260/280 9. Separation of amino acids by Thin layer chromatography 10. Separation of sugars by Thin layer chromatography 11. Thermal Denaturation of DNA and UV absorption studies **Demo Experiments** 1. Gel permeation chromatography, 2. Affinity chromatography, 3. Ion.exchange chromatography 4. Western blotting	25	CO1 CO2 CO3 CO4 CO5	K3 & K4
B	**(B) Molecular Genetics - Practical** 1. Isolation of DNA from bacteria 2. Isolation of DNA from plants 3. Isolation of DNA from animal tissue 4. Plasmid DNA isolation. 5. Transer of DNA from gel – Southern Blotting 6. Isolation of RNA 7. Formaldehyde denatured Agarose gel electrophoresis of RNA 8. Urea denatured Agarose gel electrophoresis of RNA 9. Restriction digestion of DNA 10. Radiation induced genetic damage assessment	25	CO1 CO2 CO3 CO4 CO5	K3,K4 &K5
C	**(C) Molecular Cell Biology -Practical** Histology: **(Demo only)** 1. Introduction to Microtome and types 2. Microtomy-Fixation of tissue 3. Microtomy –Embedding 4. Microtomy-Sectioning of tissue	25	CO1 CO2 CO3 CO4 CO5	K3,K4 & K5

	1. H&E Staining of tissues. 2. Histochemical staining to localize proteins. 3. Histochemical staining to localize carbohydrates. 4. Histochemical staining to localize lipids. 5. Subcellular fractionation and marker enzyme detection (mitochondria). 6. Giant chromosome studies in Chironomous larvae 7. Meiotic study in flower bud sand cockroach or grasshopper. 8. Preparation of tissue culture medium and membrane filtration. 9. Cell counting and cell viability.			

DISCIPLINE CENTRIC ELECTIVE I

BIOINSTRUMENTATION

Title of the course	**BIOINSTRUMENTATION**		**Course code: PCBTTE11**	
Category of the course	Year	Semester	Hours	Credits
Discipline Centric Elective I	1st	1st	4	2

Learning Outcome:

The paper imparts a thorough knowledge on the basics of all the instrumentation concepts, in biology. The student will get to understand the core concepts of biological instruments and their principles.

Course outcomes:

At the end of the Course, the Student will be able to:

CO-1	Introduction and various types of Microscopic techniques
CO-2	Impart understanding on centrifugation instruments and techniques
CO-3-	Separation of Biomolecules
CO-4	Analytical methods on Spectroscopic Analysis
CO-5	Understand the application and Detection on Bioinstrumentation

SYLLABUS | Discipline Centric Elective I | BIOINSTRUMENTATION				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
I	Microscopic Techniques: Principles and Applications: Compound, Light, Stereo, Phase Contrast, Fluorescent Microscopy, Scanning and Transmission Electron Microscopy, Scanning Electron Microscopy, Atomic Force Microscopy, Confocal Microscopy, FRET and Flow Cytometry.	12	CO1	K1 & K2
II	Centrifugation: pH meter, Principle and Applications of various types of centrifugation, Sedimentation Coefficient, Svedberg unit, RCF, Density Gradient Centrifugation. Chromatography Techniques: Principle and Application of Paper Chromatography, TLC, Gel Filtration Chromatography, Ion Exchange Chromatography, Affinity Chromatography, GC &	12	CO2	K1, K2,K3

	HPLC.			
III	Electrophoretic Techniques: Principle and Application of Agarose Gel Electrophoresis, 2D-gel Electrophoresis, PAGE- NATIVE & SDS PAGE, Iso-electric Focusing, High resolution Electrophoresis, Immuno Electrophoresis (Immunofixation EP,), ELISA, RIA, Southern, Northern and Western Blotting. Electro blotting, PCR and RT-PCR, Microarray (DNA, Proteins)	12	CO3	K1, K2 & K3
IV	Spectroscopic Techniques: Theory and Application of UV and Visible Spectroscopy, Fluorescence Spectroscopy, Mass Spectroscopy, IR Spectroscopy NMR, ESR, Atomic Absorption Spectroscopy, X- ray Spectroscopy, Laser Spectroscopy and Raman Spectroscopy	12	CO4	K1,K2& K3
V	Radio-isotopic Techniques: Introduction to Radioisotopes, Uses and their Biological Applications, Radioactive Decay – Types and Measurement , Principles and Applications of GM Counter, Solid and Liquid Scintillation Counter, Autoradiography, RIA, Radiation Dosimetry, Health effects of Radiations.	12	CO5	K1,K2& K3

Reference books

- M.H. Fulekar and Bhawana Pandey Bioinstrumentation, Wiley
- Keith Wilson, John Walker, 2010. Principles and Techniques of Biochemistry and Molecular Biology (7th Edition), Cambridge University Press •
- David L. Nelson, Michael M. Cox. Menninger (2008). Principles of Biochemistry, Fifth edition W. H. Freeman, New York. •
- Experiments in Biochemistry: A Hands-On Approach by Shawn O. Farrell, Ryan T. Ranallo, Paperback: 324 pages, Publisher: Brooks Cole. 20 •
- Metzler D.E. 2001, the chemical reactions of living cells –Academic Press. 2nd edition.
- Stryer L,1999, Biochemistry-W.H. Freeman & Company, New York. 1. • 4th edition
- L.Veerakumari (2006) Bioinstrumentation MJP Publisher Kindle edition
- Jefrey. M., Backer el al., 1996. Biotechnology- A Laboratory Course. Academic Press, New York.
- Holcapek, M., Byrdwell, Wm. C. 2017. Handbook of Advanced Chromatography /Mass Spectrometry Techniques, Elsevier

MAPPING OF PROGRAMME SPECIFIC OUTCOMES (M.Sc.) WITH COURSE OUTCOMES

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
COs 1	√	√	√	√		√	√	√
COs 2	√	√	√	√		√	√	√
COs 3	√	√	√	√		√	√	√
COs 4	√	√	√	√				√
COs 5	√	√	√	√		√	√	√

Number of matches = 33, Correlation: Very High

MAPPING CORRELATION BENCHMARK

Mapping	1-25%	26-50%	51-75%	76-100%
Matches	1-10	11-20	21-30	31-40
Correlation	Poor	Moderate	High	Very High

DISCIPLINE CENTRIC ELECTIVE I

Title of the course	HUMAN PHYSIOLOGY		Course Code:PCBTTE12	
Category of the course	Year	Semester	Hours	Credits
Discipline Centric Elective I	1st	1st	4	2

Course Objectives:

The paper imparts a thorough knowledge on the introduction and importance of general physiology, the anatomical structures and the physiological functions of body systems, the interrelations of the organ systems to each other and respiratory, digestive, cardiovascular and muscle physiology, of neurophysiology, reproductive and sense organs.

Course Outcomes (COs)

CO1: Understand the structure and function of various systems in human body.

CO2: Acquire knowledge on nervous and muscular system in human which gives a clear picture about respective disorder.

CO3: Compare anatomy and physiology of reproductive system, liver and metabolism of xenobiotics in humans etc.

CO4: Analyze hormones involved in disorders associated with them and treatments in both genders respectively.

CO5: Relate the anatomy and physiology of different human body systems and its implications in various industries.

Unit I	GENERAL PHYSIOLOGY, BLOOD AND BODY FLUIDS	15 Hours

Blood, blood volume, Blood corpuscles, Hemopoiesis and formed elements, plasma function, blood groups and Rh typing, Blood transfusion, Hemoglobin, immunity, Hemostasis Lymph and Lymphatic system, CSF, Synovial fluid, Amniotic fluid.

Unit II	RESPIRATORY AND DIGESTIVE SYESTEM	15 Hours

Physiological anatomy of respiratory tract. Comparison of respiration in different species, anatomical transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration. Anatomy of GI tract, Digestion and absorption of carbohydrates, protein, fat, energy balance, BMR.

Unit III	CARDIOVASCULAR AND MUSCLE PHYSIOLOGY	20 Hours

Comparative anatomy of heart structure, myogenic heart, ECG – its principle and significance, cardiac cycle, Pace maker, heart as a pump, blood pressure, neural and chemical regulation of all above, Pace maker. Classification of muscles. Muscle – types and their mechanism of action.

Unit IV	REPRODUCTIVE AND EXCRETORY SYSTEM	20 Hours

Reproductive organ - Hormonal regulation of testicular and ovarian function. Spermatogenesis and Oogenesis. Puberty, pregnancy and lactation. Contraceptive methods. Physiology of excretion, kidney, urine formation, urine concentration, waste elimination, Diuretics, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.

Unit V	NERVOUS SYSTEMAND SENSE ORGANS	20 Hours

Introduction to nervous system. Neurons, action potential, gross neuro-anatomy of the brain and

spinal cord, central and peripheral nervous system, neural control of muscle tone and posture. Nerve impulse, conduction of nerve impulse, synapse, synaptic transmission, neuro macular junction, reflex action. Physiology of vision: Structure of eye, image formation and defects of the eye, Receptor mechanism of the eye, photo pigments, Visual cycle.
Sense organs – structure of ear, defect of hearing and tactile response.

Books for study:

1. C.C.Chatterjee ,Human Physiology 11th Coloured Edition (Volume I and Volume II) by 1 December 2017.
2. Dee UnglaubSilverthorn, Human Physiology: An Integrated Approach 5th Edition by 2010.
3. Guyton &Hall,Text Book of Medical physiology –2015.
4. N. Arumugam, Human Physiology – Dr., Saras publications.
5. William. F. Ganong, Review of Medical Physiology, 25th Edition (Lange Medical Book) Paperback – 16 November 2015

Books for References:

1. Barbara Janson Cohen, Jasan J Taylor, Memmler's, Human Body in health and Diseases, 10th edition, Lippincott Willaims&Wilkuns publications.
2. William. F. Ganong, Review of Medical Physiology McGraw-Hill Medical; 22 edition 2005.
3. Guyton MD, Arthur C, Human Physiology & Mechanism of Disease 6th edition.
4. Widmaler, E.P, Raff.H, Strang, K.T, Vander's Human Physiology 11th edition, McGraw Hill International Publications 2008.
5. Human Physiology 7th edition Fox, S.I. McGraw Hill Publications 2002.
6. K. Saradhasubramanyam, A Hand Book of Basic Human physiology- S. Chand & Co., Ltd.

MAPPING OF PROGRAMME SPECIFIC OUTCOMES (M.Sc.) WITH COURSE OUTCOMES

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
COs 1	√	√	√	√		√	√	√
COs 2	√	√	√	√		√	√	√
COs 3	√	√	√	√		√	√	√
COs 4	√	√	√	√		√	√	√
COs 5	√	√	√	√		√	√	√
Number of matches = 35, Correlation: Very High								

MAPPING CORRELATION BENCHMARK

Mapping	1-25%	26-50%	51-75%	76-100%
Matches	1-10	11-20	21-30	31-40
Correlation	Poor	Moderate	High	Very High

GENERIC ELECTIVE II

Title of the course	ENZYMOLOGY		Course code: PCBTTE13	
Category of the course	Year	Semester	Hours	Credits
Generic Elective II	1st	1st	**4**	**2**

Learning Outcome:

The subject imparts knowledge on the fundamentals of enzyme structure and its kinetics. The student will be provided with a basic knowledge and understanding about the functions of enzyme as well as the industrial application of enzymes.

Course outcomes:

CO-1	(K2) Explain the basics of enzyme nomenclature and properties
CO-2	(K3) Classify and Cognize the native and immobilized enzyme
CO-3	(K4) Examine the equations of steady state kinetics
CO-4	(K5) Assess extraction and downstream processing of enzymes
CO-5	(K6) Compile the uses of enzymes and design enzymes for Industrial and Clinical application

SYLLABUS | Generic Elective II | ENZYMOLOGY				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
I	Introduction to enzymes, Classification, nomenclature and general properties like effects of pH, substrate and temperature on enzyme catalysed reactions. Extraction Isolation and purification of enzymes by precipitation, centrifugation, chromatography and electrophoresis and liquid-liquid extraction methods	12	CO1 CO5	K3 & K5
II	Kinetics of catalysed reaction : Single substrate reactions, bisubstrate reactions, concept of Michaelis - Menten, Briggs Haldane relationship, Determination and significance of kinetic constants, Limitations of Michaelis-Menten Kinetics, line weaver burk plot, Hanes wolf equation, Eadie hoofstee equation ,Inhibition of enzyme activity	12	CO1 CO2 CO5	K3 & K5
III	Enzyme catalysis: enzyme specificity and the concept of active site, determination of active site. Stereospecificity of enzymes. 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	12	CO1 CO3	K3 & K4
IV	Theories on mechanism of catalysis.-Mechanism of enzymes action: mechanism of action of lysozyme, chymotrypsin, carboxypeptidase and DNA polymerase. Multienzymes system, Mechanism of action and regulation of pyruvate dehydrogenase and fatty acid synthetase complex	12	CO1 CO4	K3, K4 & K6
V	Coenzyme action. Enzyme regulation: General mechanisms of enzyme regulation, Allosteric enzymes, sigmoidal kinetics and their physiological significance, Symmetric and sequential modes for action of allosteric enzymes.	12	CO1 CO5	K3,K4, K5 & K6

	Reversible and irreversible covalent modification of enzymes, Immobilized enzymes and their industrial applications.Clinical and industrial applications of enzymes, Enzyme Engineering			

Reference Books

- Nicholas C.Price and Lewis Stevens., 2010. Fundamentals of Enzymology. Oxford University Press, New Delhi
- Lehninger, Nelson and Cox, 2005, Principles of Biochemistry - 4th edition, WH Freeman and Company, New York, USA
- Principles of Biochemistry with human focus - Garrett and Grisham, 2002, Harcourt College Publishers, Orlando, Florida, USA.
- Geoffrey L, Zubay, Biochemistry -, 1998, 4th edition. 23
- Donald Voet, Judith Voet and Pratt, 1995, Fundamentals of Biochemistry, 2nd edition.
- Harper.s Biochemistry - Murray et al, 2000, 25th edition, Appleton and Lange Publishers.
- Enzymes – Trevor Palmer 2002.

Useful Websites

- www.lsbu.ac.uk/biology/enztech/
- www. lsbu.ac.uk/biology/enzyme/
- http://www.aetlted.com/tech/applications.html

Course Outcomes (POs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√	√		√		√
CO2	√	√	√	√		√		√
CO3		√				√		√
CO4	√	√	√	√		√	√	√
CO5	√	√	√	√	√	√	√	√
Number of matches = 30, Correlation: High								

MAPPING CORRELATION BENCHMARK

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-10	11-20	21-30	31-40
Correlation	Poor	Moderate	High	Very High

GENERIC ELECTIVE II

Title of the course	CANCER BIOLOGY		Course Code: PCBTTE14	
Category of the Course	Year	Semester	Hours	Credits
Generic Elective II	1st	1st	**4**	**2**

Course Objectives:

The subject imparts knowledge on various types of cancer and its detection method, the carcinogens and its effect, molecular tools in the treatment of cancer and treatment of cancer with advanced methodology**.**

Course Outcomes:

CO1 – Understand the various types of Cancer and carcinogens.

CO2 – Learn the various molecular tools used in the treatment of cancer.

CO3 – Understand the major significance of cancer and its effect.
CO4 – Understand the major significance of cancer and its effect.
CO5 – Know about the different types of therapy used for the treatment of Cancer.

Unit I	Fundamentals of Cancer Biology	12 Hours

Introduction to Cancer- History of Cancer- Causes of Cancer - different forms of cancer – detection of Cancer, early screening method – detection using biochemical assay – Tools for detection of cancer – Tumor markers – molecular tools for early diagnosis of cancer – Hereditary cancers.

Unit II	Carcinogenesis	12 Hours

Carcinogenesis definition – stages and types of carcinogenesis- carcinogen and its effect – theory of carcinogenesis - Physical & Chemical carcinogens and its effect, major classes of chemical carcinogens - mechanism of various types of radiation carcinogenesis – mutagens and mutation.

Unit III	Molecular Biology for Cancer	12 Hours

Role of molecular biology in the treatment of cancer – Discovery of oncogenes, types of oncogenes – detection & identification of oncogenes - Role & mechanism of oncogenes activation - Molecular tools for identification of cancer genes - Tumor suppressor genes, Role of Telomerases in cancer, single nucleotide polymorphism (SNP) in cancer.

Unit IV	Principle of Cancer Metastasis	12 Hours

Metastasis definition- Stages and Mechanism of metastasis - Angiogenesis, Role of angiogenesis in cancer, Invasion- classification and significance of metastasis - Protease and tumor cell invasion – basement membrane, development & progression of carcinomas.

Unit V	Cancer Therapy	12 Hours

Clinical diagnosis of cancer – different forms of therapy - chemotherapy, History and advantages - – Radiotherapy – gene therapy, types and risks of gene therapy – advancement in the treatment of cancer - signals target towards cancer therapy, Advanced treatment of cancer - CRISPR, artificial intelligence, nanotechnology and telehealth.

Books for study:

1. Xlibris, Cancer Biology, a Study of Cancer Pathogenesis.Publisher: November 23rd, 2011
Pages: 152
2.Pradeep Kumar, The Textbook of Cancer Biology, Paperback,Publisher: Prachi Digital. 2022
3.Pearson Lewis J Kleinsmith, Principles of Cancer Biology.**1st Edition**

Books for References:

1. Raymond W. Ruddon – Michigan, Cancer Biology – Fourth edition –
2. Edwin Wang, Cancer System Biology –- CRC Press -UK
3. HeskethRobin,Introduction to Cancer Biology, Cambridge University Press, February 2013
4. Pearson, Cancer Biology – Third Edition, Education (US) - 2006-05-11

Course Outcomes (COs)
By the End the Course, the Students will be able to

MAPPING WITH COURSE OUTCOME (CO) and PROGRAMME SPECIFIC OUTCOMES (PSO)

Course Outcomes (CO)	Programme Specific outcomes (PSO)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓	✓	✓	✓				✓
CO2	✓	✓		✓				✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓

CO4	✓	✓						✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches : 28					**Relationship: High**			

Mapping	1-29%	30-59%	60-69%	70-100%
Matches	1-10	11-25	26-30	31-40
Correlation	Poor	Moderate	High	Very High

SEMESTER II
CORE COURSE V
MICROBIOLOGY

Title of the course	**MICROBIOLOGY**		**Course Code: PCBTTC21**	
Category of the Course	Year	Semester	Hours	Credits
Core Course V	1st	2nd	6	5

Learning Outcome:

To provide a comprehensive knowledge on taxonomy and microbial diversity, growth, their harmful effects and beneficial role of microorganisms in agriculture and environment

Course outcomes:

CO-1	To understand the major discoveries of microbiology and describe microbial diversity, Microbial growth and metabolism.
CO-2	To provide basic knowledge about microbial culture, identification of microbes, principle and working of microscopes and sterilization techniques
CO-3	To enlighten the students on host microbe interaction and Epidemiology of microbial disease
CO-4	To update the knowledge on epidemic and pandemic diseases.
CO-5	To assess and appraise the role of novel microbes in environment and integrate them in specific innovative approaches.

SYLLABUS | Core Course - V | MICROBIOLOGY				
Unit	**Content**	**Hours**	**Cos**	**Cognitive level**
I	History and microbial taxonomy: Major discoveries related to the field of microbiology: Antony Von Leeuwenhoek, Louis Pasteur, Robert Koch and Edward Jenner. Microbial taxonomy: Bacteria, viruses, fungi, algae and protozoa, Microbial diversity: Biovars, Serovars and Prions, Microbial growth and metabolism: Microbial growth: Growth curve, factors affecting growth, Microbial metabolism- Methanogenesis, acetogenesis and auxotrophs	18	CO1 CO2	K1,K2 &K3
II	Microbial culture, identification, and control: Nutritional requirements for growth - Growth media and types, Pure culture techniques: Serial dilution and plating methods, Staining methods - Principles and types of staining (simple and differential), Identification of bacteria – Biochemical – IMViC, 16s rRNA sequencing. Microscopy: principles and	18	CO2 CO3 CO5	K2,K3,K5

	applications of Bright field, florescent and Scanning electron microscopes, Microbial growth control: Physical Methods – Heat, Filtration, Low Temperatures, High Pressure, Desiccation, Osmotic Pressure, Radiation; Chemical Methods			
III	Host microbe interaction and Epidemiology: Human microbiome; Skin, Gastrointestinal tract, Oral cavity, Lung. Symbiotic relationship of microbes: Symbiosis, Mutualism, Parasitism, Commensalism and endophyte. Epidemiology of microbes: causes, types and transmission of epidemic, endemic and pandemic diseases	18	CO1 CO3 CO4	K1,K2,K3
IV	Microbial Diseases: Microbial diseases - General characteristics, pathogenesis, laboratory diagnosis and control measures of Pandemic and Epidemic diseases: Tuberculosis, Leprosy, Cholera, Typhoid, COVID-19, Yellow Fever, Flu, AIDS, Ebola, Zika Virus, Small Pox, Dengue, Chickungunya, Malaria, filariasis, Candidiasis, superficial mycosis	18	CO4 CO5	K4 &K5
V	Agricultural and Environmental Microbiology: Biological nitrogen fixation, free living, symbiotic nitrogen fixation, mechanism of Nitrogen, Biofertilizers- types and applications; Rhizosphere effect. Biogeochemical cycles- Carbon, Nitrogen, Sulphur and Phosphorous; Methanogenic bacteria Extremphiles- Thermophiles Acidophiles, Halophiles and alkalophiles; Biotechnological application of extremophiles	18	CO1 CO2 CO3	K4 & K5

References

- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, (2017). Prescott's Microbiology, (10th edition), McGraw-Hill Education, ISBN: 978-1259281594.
- Maheshwari D K, Dubey R C 2013. A Textbook of Microbiology.4th Edn S Chand Publishing India.
- Ananthanarayan and Paniker's (2017) Textbook of Microbiology, (10th edition), The Orient Blackswan, ISBN: 978-9386235251.
- Benson HJ. (1999). Microbiological Applications: A Laboratory manual in General Microbiology, 7th Edition, McGraw Hill. 5
- Managing epidemics- Key facts about major deadly diseases, World Health Organization (WHO) 2018. 9. O'Flaherty, Vincent & Collins, Gavin & Mahony, Thérèse. (2010). Environmental Microbiology, Second Edition. 10.1002/9780470495117.ch11.
- Agriculture Microbiology, 2016. E-Course Developed By TNAU (ICAR)

Web Sources

- https://www.who.int/emergencies/diseases/managing-epidemics-interactive.pdf ISBN 978-92-4-156553-0. https://doi.org/10.3389/fmicb.2020.631736
- https://www.agrimoon.com/wp-content/uploads/AGRICULTURAL-Microbiology.pdf.

Course Outcomes (POs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√		√	√	√	√
CO2	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√
CO5	√	√	√	√	√	√	√	√
Number of matches = 33, Correlation: High								

MAPPING CORRELATION BENCHMARK

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

CORE COURSE VI
PLANT AND ANIMAL BIOTECHNOLOGY

Title of the Course	PLANT AND ANIMAL BIOTECHNOLOGY		Course code: PCBTTC22	
Category of the course	Year	Semester	Hours	Credits
Core Course VI	1st	2nd	6	5

Learning Outcome:
The paper imparts a thorough knowledge on the basics of all the biotechnological application on plant and animals. The student will get to understand the core concepts of biotechnology.

Course outcomes:

CO-1	To impart theoretical knowledge on various techniques of plant biotechnology like tissue culture, plant genetic transformation and their application in industries.
CO-2	Importance of secondary metabolites and production in plants.
CO-3	To develop concepts, principles and processes in animal biotechnology.
CO-4	Concept and different types in Animal Cell Culture and animal cell lines.
CO-5	Use of molecular biology techniques genetically engineer the animals to improve sustainability, productivity and suitability for pharmaceutical and industrial applications.

SYLLABUS | Core Course VI | PLANT AND ANIMAL BIOTECHNOLOGY				
Unit	Content	Hours	COs	Cognitive level
I	Introduction of plant tissue culture, composition of media, Micropropagation, organogenesis, somatic embryogenesis, haploid and triploid production, protoplast isolation and fusion, hybrid and cybrid, synthetic seed production. Secondary metabolites in plants - Phytochemicals- Glycosides and Flavonoids; Anthocyanins and Coumarins - Lignans, Terpenes,	18	CO1 CO5	K1,K2 &K3

	Volatile oils and Saponins; Carotenoids and Alkaloids: biogenesis, therapeutic applications			
II	Plant Transformation Direct transformation by electroporation and particle gun bombardment. Agrobacterium, Ti plasmid vector. Theory and techniques for the development of new genetic traits, conferring resistance to biotic and abiotic. Plant engineering towards the development of enriched food products, plant growth regulators; Molecular Marker aided breeding: RFLP maps, Linkage analysis, RAPD markers, STS Mirco satellite, SCAR, SSCP, QTL, Map based cloning and Molecular marker assisted selection.	18	CO1 CO2 CO5	K1,K2 & K5
III	Animal health disease diagnosis, hybridoma technique, monoclonal antibodies, application of probes for disease diagnosis of existing and emerging animal diseases. Prophylaxis - Vaccines, Oral vaccines DNA Vaccines in animal disease. Cell culture: primary and established culture; organ culture; tissue culture	18	CO1 CO3 CO5	K4 & K5
IV	Disaggregation of tissue and primary culture; cell separation, Slide and coverslip cultures, flask culture, test tube culture techniques, cell synchronization, cryo preservation. Scaling up of animal cell culture, cell line and cloning micromanipulation and cloning, somatic cell cloning. Karyotyping; measuring parameters for growth, measurement of cell death, apoptosis and its determination, cytotoxicity assays	18	CO4 CO5	K2,K3,K4 & K5
V	Nuclear magnetic resonance methods of monitoring cell metabolism culturing animal cells in fluidised bed reactors. Application of animal cell culture for in vitro testing of drugs, in production of human and animal viral vaccines and pharmaceutical proteins. Culture Scale up and mass production of biologically important compounds. Harvesting of products, purification and assays. Transgenic animals: Production and application; transgenic animals in livestock improvement, transgenic animals as model for human diseases; Stem Cells- Properties, Types, Therapy, Prospects and Ethics in stem cell research.	18	CO5	K3,K4 & K6

Reference Books

- Razdan. M. K., 2011. Plant tissue culture. Oxford and IBH publishing Company Pvt. Ltd, New Delhi.
- Chawla. H. S., 2010. Introduction to plant biotechnology. Oxford and IBH publishing company pvt. Ltd, New delhi.
- Ian Freshney, 2010. Culture of animal cells. 6th edition, Wiley-Blackwell publishers.
- Slater, 2008. Plant Biotechnology: The Genetic manipulation of plants, Second Edition, Oxford University Press, USA.
- J.D.Watson, Gillman, J.Witknowski and M.Zoller, 2006. Recombinant DNA. 3rd ed.
- W.H.Freeman. 26 K. Dass. 2005, Text book of Biotechnology, Second Edition, Wiley Dreamtech, India (P) Ltd.

- H.Kreuzer&A.Massey. 2001. Recombinant DNA and Biotechnology: A guide for teachers Second Edition. ASM press, Washington.
- M.Sudhir. 2000. Applied Biotechnology & Plant Genetics. Dominant publishers & Distributors.
- Genetic Engineering of Animals by (Ed) A.Puhler, VCH Publishers, Weinheim, FRG, 1993.
- Animal Cell culture Practical approach. Ed. John R.W.Masters, Oxford.2004.
- Concepts in Biotechnology D. Balasubramaniam, Bryce, Dharmalingam, Green, Jayaraman Univ. Press, 1996

MAPPING WITH COURSE OUTCOME (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓	✓	✓	✓		✓		✓
CO2	✓	✓	✓	✓		✓		✓
CO3	✓	✓	✓	✓			✓	✓
CO4	✓	✓	✓	✓		✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓
Number of Matches = 32, Relationship:= Very High								

Note:

Mapping	Mapping	1-29%	30-59%	60-69%	70-100%
Matches	Matches	1-10	11-25	26-30	31-40
Correlation	**Relationship**	**Poor**	**Moderate**	**High**	**Very High**

CORE COURSE VII
GENETIC ENGINEERING

Title of the Course	GENETIC ENGINEERING		Course Code: PCBTTC23	
Category of the course	Year	Semester	Hour	Credits
Core Course VII	1st	2nd	6	4

Learning Outcome:

The paper imparts a thorough knowledge on the basics of all the biotechnological application on plant and animals. The student will get to understand the core concepts of biotechnology.

Course outcomes:

CO-1	Understanding the basic steps of gene cloning and the role of enzymes and vectors responsible for gene manipulation, transformation and genetic engineering.
CO-2	Getting detailed knowledge of gene transfer methods and identifying suitable hosts for cloning.
CO-3	Acquiring theoretical knowledge in the techniques, tools, and application and safety measures of genetic engineering.
CO-4	Describes the genome mapping and sequencing and methods for gene therapy.
CO-5	Elucidate different techniques involved in genetic engineering

SYLLABUS | Core Course VII | GENETIC ENGINEERING

Unit	Content	Hours	COs	Cognitive level
I	Gene cloning. Genetic engineering tools. Nucleic acid manipulating enzymes. Promoters, Selectable markers and reporters used in rDNA technology. Restriction digestion, Ligation, Transformation, Selection of Recombinants. Construction of gene libraries	18	CO1	K1,K2, K5
II	E.Coli vectors - pBR322 and its derivatives; Cloning vectors for gram negative bacteria - ColE1, p15A, R1, IncPa, pSC101; Lambda bacteriophage vectors, filamentous phages, Cosmids, Phasmids, Phagemids. Cloning in gram-positive bacteria (Bacillus subtilis)	18	CO2	K2,K3, K4
III	Cloning in yeast *Saccharomyces cerevisae*. Life cycle and types of vectors; Eukaryotic vectors. SV40 (molecular genetics and expression); Specialized cloning vector for cDNA; Synthesis of specific RNA in vitro; Vectors for cloning promoters and terminators; vectors with adjustable copy number	18	CO4	K3,K4 &K6
IV	Nucleic acid hybridization techniques; Molecular probes (Types of probes and its construction); probe labeling. Nick translation, End labeling and Random primer labeling. Polymerase chain reaction and its variants; DNA fingerprinting; DNA sequencing first generation sequencing methods (Maxam and Gilbert sequencing, Sangers Dideoxy sequencing, Pyrosequencing, PCR based sequencing and hybridization sequencing).Second generation sequencing methods	18	CO4	K3,K4,K5 & K6
V	Site directed mutagenesis; DNA microarray; chromosome walking and jumping.Molecular techniques in prenatal diagnosis gene therapy, Transgenic animals (knockout mice) and plants (Flavr savr tomato), Pharmaceutical products (Vaccine, Humulin, etc), Crop improvement. Pesticide resistance, herbicide resistance, transgenic animals and GM foods; Modern Concepts in Genetic Analysis.	18	CO5	K3,K4,K5 & K6

Reference Books:

- T.A. Brown, 2010. Gene cloning and DNA analysis: An introduction, 6th edition, Wiley-Blackwell.
- Sandy B.Primrose and Richard Twyman, 2006. Principles of Gene Manipulation and genomics, 7th edition, Wiley-Blackwell.
- Lewin, 2009. Genes X, 10th edition, Jones & Barlett Publishers
- Raymond Rodriguez and David T.Denhart 2003.Vectors, A survey of molecular cloning vectors and their uses
- Errst-L. Winnacker 1987.From genes to clones. Introduction to Gene Technology,
- Ed. David V. Geoddel 2002.Gene Expression technologies. Methods in enzymology (Vol.185)
- William Wu, Michael J.Welsh, Peter B.Kaufrmar, Helen H.Zhang 2001. Methods in Gene Biotechnology

CORE COURSE VII
PRACTICAL II

Title of the course	**Practical II Microbiology, Plant & Animal Biotechnology and Genetic Engineering**		**Course code: PCBTPC22**	
Category of the course	Year	Semester	Hours	Credits
Core Course VII	1st	2nd	6	4

Learning Outcome:
The practical will establish a basic study skill on the subject and will improve the student's ability to have a hands on experience on the above core subjects.

Course outcomes:

CO-1	(K2) Isolate and identify microbes from various sources.
CO-2	(K3) Characterize microbes.
CO-3	(K4) Examine Plant and Animal cells and their functions
CO-4	(K5) Assess extracted DNA, RNA and protein for rDNA technology
CO-5	(K6) to study cloning tools

SYLLABUS | Core Course VII | PRACTICAL-II

Unit	Content	Hours	COs	Cognitive level
A	**(A) Microbiology-Practical** 1. Isolation and Enumeration of microbes from soil, Water and Air 2. Isolation of microbes from plant surface. 3. Isolation of pure culture of E.coli, 4. Isolation of pure culture of Aspergillus niger, 5. Isolation of pure culture of Streptomyces. 6. Gram staining and morphological characterization of microbes. 7. Determination of growth curve of bacteria – E.coli 8. IMViC test of enteric bacteria **Demonstration** 16srRNA sequencing	30	CO1 CO2 CO3 CO4 CO5	K,.K2,K3,K4,K5 &K6
B	**(B) Plant and Animal Biotechnology - Practical:** 1. Plant tissue culture media preparation 2. Surface sterilization of explant – Leaf and Seed. 3. Generation of Callus from any two explants (leaf/ root/ bud/ shoot apex). 4. Maintenance of callus culture. 5. Cell suspension culture 6. Anther culture 7. Pollen culture 8. Embryo culture. 9. Culture of plant protoplast.	30	CO1 CO2 CO3 CO4 CO5	K3,K4 & K5

	10. Protoplast viability test. 11. Mass culture of Chlorella /Spirulina 12. Preparation of tissue culture media 13. Trypsinization of established cell culture. 14. Cell counting and viability - staining of cells (a) Vital Staining (Trypan blue, Erythrosin (b) Giemsa staining. 15. MTT Assay			
C	**(C) Genetic Engineering - Practical** 1. Preparation of plasmid DNA by alkaline lysis method. 2. Silver staining of gels 3. Methylene blue DNA staining 4. Ligation. 5. Competent cell preparation 6. Cloning of fragments in PBR322 7. RAPD 8. RFLP 9. Amplification of DNA - PCR 10. Determination of molecular weight of DNA **Demonstration:** RT-PCR for COVID-19	30	CO1 CO2 CO3 CO4 CO5	K3,K4 &K5

DISCIPLINE CENTRIC ELECTIVE III
REGULATORY AFFAIRS AND INDUSTRIAL STANDARDS

Title of the Course	**REGULATORY AFFAIRS AND INDUSTRIAL STANDARDS**		**Course Code: PCBTTE21**	
Category of the course	Year	Semester	Hours	Credits
Discipline Centric Elective III	1st	2nd	4	3

Learning Outcome:

The subject imparts knowledge on the fundamentals of regulatory requirement in industries. The student will be provided with a basic knowledge and understanding about the regulatory affairs based on biotechnological industry requirements.

Course outcomes:

CO-1	Elucidate the basic requirements of establish laboratory for testing samples as per the regulatory body's requirements
CO-2	Describe the Scientific, technical knowledge about various food preservation techniques
CO-3	Describe the basic concepts of packing of food materials, various parameters observed during packaging
CO-4	Describe the testing of food materials and identifying of microbial food contaminant
CO-5	Explain the basic of food safety management system, good manufacturing practice and good hygienic practices

SYLLABUS | Discipline Centric Elective III | REGULATORY AFFAIRS AND INDUSTRIAL STANDARDS				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
I	**Planning, Organisation and setting of Food testing laboratory and laboratory safety** Understand the requirements for setting up a laboratory for the legal defensibility of analytical data. The ideal structure design, environment, layout for microbiological testing and Air handling etc., Introduction about accreditation, Different accreditation bodies (NABL, APLAC, ILAC), Requirements for ISO/IEC 17025:2017, documentation, pre-requisites for accreditation, management requirements, technical requirements, measurement of traceability, Laboratory safety: Personnel and laboratory hygiene, emergency planning, general hazards in a food laboratory, safety equipment, storage of chemicals, acids, flammables etc, handling and biological spills and waste disposal.	12	CO1	K2,K3,K4
II	**Principles of Food Preservation technology** Heat: Principles of Heat transfer, Blanching, Pasteurization, Heat sterilization, thermal extrusion, cooking. Water Removal: Forms of Water in Foods, Sorption of water in foods, Water activity, drying and evaporation technology.Temperature reduction: Chilling, Freezing,Radiation: Ionizing Radiation, Microwave,Use of chemicals: Class-I & Class-II preservatives, smoke other chemical additives,New non-thermal methods: High hydrostatic pressure, modified atmosphere, high intensity pulsed electric fields, intense pulsed light, oscillating magnetic fields, hurdle technology, ultrasonic and ohmic heating etc.	12	CO2	K2 & K3
III	**Principles of Food Packaging technology** Effect of environment on food stability: light, oxygen, water, temperature, sensitivity to mechanical damage and attack by biological agents, Different packaging materials used for food packaging and their properties including barrier properties, strength properties, optical properties: Glass, metals, paper, plastics, biodegradable and edible films and coatings aseptic packaging and combinations, Selection of packaging material and design for various food commodities including fresh produce (Fruits and vegetables), milk and milk products (dairy), cereal, pulses, oil, meat, fish, poultry, water and processed foods, Evaluation of quality and safety of packaging materials-different testing procedures, Function of packaging: Protective packaging and active packaging smart and intelligent packaging, Newer packaging technologies-CAP/MAP packaging aseptic processing and packaging, irradiated packaging, retort pouch and microwaveable	12	CO3	K2,K3 & K4

	packaging.			
IV	**Food Microbiology and testing** Introduction of Food microbiology: Classification and nomenclature of microorganisms. Morphology and structure of microorganisms in foods (yeast and Molds, Bacterial cells viruses), Important genera of mold, yeast, bacteria (Gram positive and Gram negative, facultative aerobic and anaerobic, endospore forming bacteria and non-sporulating bacteria), Bacterial groups (lactic acid, acetic acid, butyric acid etc.,) and microbiological quality of foods, Microbial growth characteristics: Reproduction and growth (fission, generation time optimum growth, growth curve etc). Microbial growth in foods: intrinsic (pH, Moisture content, oxidation-reduction potential, nutrient content, antimicrobial constituents and extrinsic parameters (temperature of storage, relative humidity of environment, presence and concentration of gases in the environment, Thermal destruction of microorganisms: Thermal death time, Microbial food spoilage and food borne diseases, food pathogens, bacillus *cereus and other bacillus species*, *fungi*, *virus etc*., Methods for the Microbiological examination of foods: Sampling activity and sampling plan, pure culture isolation: streaking, serial dilution and plating, cultivation, maintenance and preservation/stocking of pure culture, Observation of Indicator organisms: Direct examination, enumeration methods, plate count, MPN, biochemical test, Rapid methods detection of specific organisms.	12	CO4	K2,K3,K4
V	**HACCP and Food safety management systems:** ISO 22000: Importance of implementing a HACCP system and how it can be applied to various products. Prerequisite programs, HACCP principles, some limitation of HACCP food safety objective (FSO). Food safety audits: Management review, audit certification and importance. Good manufacturing practices (GMP), Good hygienic practices (GHP), Food safety plan, food safety management risk analysis. Traceability food products recall and sanitation.	12	CO5	K2,K3 & K6

References:

- ISO 9001, Quality management systems – Requirements
- ISO 17034 General requirements for the competence of reference material producers
- ISO/IEC 17043 Conformity assessment – General requirements for proficiency testing.
- Food safety standards authority regulation 2011.

MAPPING WITH COURSE OUTCOMES AND PROGRAMME SPECIFIC OUTCOME

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓	✓	✓		✓
CO4	✓	✓		✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓

DISCIPLINE CENTRIC ELECTIVE III
PHARMACEUTICAL BIOTECHNOLOGY

Title of the Course	**PHARMACEUTICAL BIOTECHNOLOGY**		**Course code: PCBTTE22**	
Category of the course	**Year**	**Semester**	**Hours**	**Credits**
Discipline Centric Elective III	**1st**	**2nd**	**4**	**3**

Learning Outcome:

The subject imparts knowledge on the fundamentals of pharmaceutical biotechnology. The student will be provided with a basic knowledge and understanding about the pharmaceutical products produced based on biotechnological methods and its biomedical applications.

Course outcomes:

CO-1	Explain the basic components of pharmaceutical and biotechnology industry and methods and applications of biosensor
CO-2	Describe the Scientific, technical and economic aspects of vaccine & rDNA technology
CO-3	Describe the basic concepts of protein Engineering, therapeutic proteins and enzyme immobilization techniques
CO-4	Describe the concepts of hybridoma technology, microbial biotransformation and microbial bio-transformed products
CO-5	Explain the basic components of somatic gene therapy, Xeno-transplantation and fermenter and bio safety methods

SYLLABUS | Discipline Centric Elective III | PHARMACEUTICAL BIOTECHNOLOGY				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
I	Introduction to concepts and technologies in pharmaceutical biotechnology and industrial applications, Biosensors- Working and applications of biosensors in pharmaceutical Industries; Pharmacology and Ethnopharmacology: Scope, applications and Importance.	8	CO1	K1
II	Scientific, technical and economic aspects of vaccine research and development, Preparation of bacterial vaccines, toxoids, viral vaccine and antitoxins, Storage conditions and stability of vaccines, Recombinant DNA technology, Application of rDNA technology and genetic engineering in the production of: (i) Interferon (ii) Vaccines - hepatitis- B (iii) Hormones – Insulin, Brief introduction to Protein Engineering, Therapeutic proteins, Production of Enzymes- General consideration – Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase, Methods of enzyme immobilization and applications	16	CO2	K3 & K4
III	Hybridoma technology - Production, Purification and Applications, Formulation of biotech products - Rituximab, Introduction to Microbial biotransformation and applications, Study of the production of – penicillins, citric acid, Vitamin B12, Glutamic acid and Griseofulvin Somatic gene therapy, Xenotransplantation in pharmaceutical biotechnology, Large scale production fermenter design and its various controls, Bio safety in pharmaceutical industry	12	CO3	K2
IV	Pharmacological activity of Plant drugs, Plant Chemicals in modern pharmacology; biochemistry and pharmacology of atropine, caffeine, ephedrine, opioids, taxol, vinca alkaloids, synthetic substitutes for therapeutically active plant constituents; drug improvement by structure modification and bio-transformation. Criteria for pharmacological evaluation of drugs.	12	CO4	K2 & K4
V	Clinical Pharmacology, Drug therapy, therapeutic situation, benefits and risk of use of drugs, Mechanism of drug action, Therapeutic efficacy, Therapeutic index, tolerance, dosage forms and routes of drug action , factors affecting drug action; Adverse Drug reactions and drug poisoning-classification and causes of ADR; principle clinical manifestations and treatment of ADR, General principles of management of drug poiosoning;	12	CO5	K1,K2 &K5

	antidotes, classisfication of drugs.			

Reference Books:

- Harbans lal, 2011. Pharmaceuticals biochemistry. CBS Publishers and distributors Pvt. Ltd, Chennai.
- Carlos A. Guzmán and Giora Z. Feuerstein, 2009. Pharmaceutical Biotechnology, 1st edition, Springer.
- Daniel Figeys (Ed.). 2005. Industrial Proteomics: Applications for Biotechnology and Pharmaceuticals. Wiley, John & Sons, Incorporated.
- Kayser, O and Muller R.H.. 2004. Pharmaceutical Biotechnology Drug Discovery and Clinical Applications. WILEY-VCH
- Stefania Spada, Garywalsh. 2004. Directory of approved biopharmaceutical
- Gary Walsh. 2003. Biopharmaceutical, Biochemistry & Biotechnology.
- Heinrich Klefenz. 2002. Industrial pharmaceutical biotechnology.
- Thomas Lengauer (Ed.). 2002. Bioinformatics – from Genomes to Drugs. Volume I& II. Wiley-VCH.
- John F. Corpenter (editor), Mark C. Manning. 2002. Rational Design of stable formulation Theory and Practice (Pharmaceutical Biotechnology). Plenum, US. Ist edition.
- D.I.A. Crommelin, et al., 2002. Pharmaceutical Biology. Amazon prime publications.
- Werner Kalow, Urs A Meyer and Rachel F. Tyndale. 2001.

Useful Websites:

- https://tugasakhirsttifbogor.files.wordpress.com/2018/08/pharmaceutical-biotechnology.pdf
- http://library.nuft.edu.ua/ebook/file/Gad2007.pdf
- https://oasis.iik.ac.id:9443/library/repository/a932eb462c49885a2c72755977036b81.pdf

Course Outcomes (POs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√	√	√	√		√
CO2	√	√	√	√	√	√		√
CO3	√	√		√		√		√
CO4	√	√	√	√		√		√
CO5	√	√	√	√		√		√
Number of matches = 31, Correlation: Very High								

MAPPING CORRELATION BENCHMARK

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-10	11-20	21-30	31-40
Correlation	Poor	Moderate	High	Very High

GENERIC ELECTIVE IV
ENVIRONMENTAL BIOTECHNOLOGY

Title of the Course	ENVIRONMENTAL BIOTECHNOLOGY		Course code: PCBTTE23	
Category of the course	**Year**	**Semester**	**Hours**	**Credits**
Generic Elective IV	**1st**	**2nd**	**4**	**3**

Learning Outcome:
The subject imparts knowledge on the fundamentals of ecology and pollution. The student will be provided with a basic knowledge and understanding about the functions of ecosystem and reduction of pollution by biotechnological tools.

Course outcomes:
On successful completion of the course the students will be able to

CO-1	(K2) explain various waste management methods
CO-2	(K3) classify potential methods of biodegrading organic pollutants.
CO-3	(K4) examine the techniques involved in remediation of polluted environments
CO-4	(K5) assess types of pollution & its control
CO-5	(K6) compile biotechnological approaches to degrade xenobiotic compounds

SYLLABUS | Generic Elective IV | ENVIRONMENTAL BIOTECHNOLOGY				
Unit	**Content**	**Hours**	**COs**	**Cognitive level**
I	Environment: Basic concepts and issues; Environmental management and Conservation, Environmental Laws & Agencies involved in conservation. Environmental Pollution: Types of pollution & its control strategies -Air pollution, Soil pollution, Water pollution, Oil pollution & Radioactive pollution	15	CO1 CO5	K2
II	Biofilm Kinetics: Completely mixed biofilm reactor- Soluble microbial products and inert biomass-Special-case biofilm solution. Reactor types:- batch reactor - continuous-flow stirred-tank reactor- Plug-flow reactor. Engineering design of reactors- Reactors in series	12	CO1 CO2 CO5	K3
III	Waste water management, source of waste water, Waste water treatment- physical, chemical and biological treatment. Microbiology of Waste water; Aerobic and anaerobic process, BOD and COD.	12	CO3	K4
IV	Toxicity: Types and Test for evaluating Toxicity. Biosensors, Biomonitoring of toxic materials .Biomagnification, Biomining and Biofuels	9	CO4	K5
V	Bioremediation; *In-situ and Ex-situ* Bioremediation of contaminated soils and waste land; Microbiology of degradation of Xenobiotics in environment; Pesticides, Surfactants, Degradative plasmids. Solid waste: Composting, Vermiculture and methane production.	12	CO5	K6

Reference Books:

- Gareth M. Evans, Gareth G. Evans, Judy Furlong 2011

- Environmental biotechnology: theory and application John Wiley & Sons, Ltd. West Sussex, UK
- M. Moo-Young, W.A. Anderson, A.M. Chakrabarty, 2010. Environmental Biotechnology: Principles and Applications. Springer.
- M. H. Fulekar, 2010 Environmental Biotechnology, by Science Publishers Department of Life Sciences, University of Mumbai, India,
- Stanley E. Manahan, 2009. Environmental Chemistry, Ninth Edition, CRC Press.
- Environmental chemistry 5th edition by A.K.De. 1997.
- Bruce E. Rittmann and Perry L. McCarty. 2001. Environmental Biotechnology :Principles and applications. McGraw Hill, Newyork.
- Ahmed N, Qureshi, F.M. and Khan, O.Y. 2001.Industrial and Environmental Biotechnology. Horizon Press.
- Ahmed N, Qureshi, F.M. and Khan, O.Y. 2001.Industrial and Environmental Biotechnology. Horizon Press.

Useful Websites:

- lbewww.epfl.ch/LBE/Default_E.htm
- http://lbe.epfl.ch

Course Outcomes (POs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√		√	√	√	√
CO2	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√
CO5	√	√	√	√	√	√	√	√
Number of matches = 36, Correlation: High								

MAPPING CORRELATION BENCHMARK

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

GENERIC ELECTIVE IV
MEDICAL BIOTECHNOLOGY

Title of the Course	MEDICAL BIOTECHNOLOGY		Course code: PCBTTE24	
Category of the course	Year	Semester	Hours	Credits
Generic Elective IV	1st	2nd	4	3

Course Objectives:
The subject imparts knowledge on the diagnosis in infectious, and genetic diseases, different diagnostic and treatment approaches and Monoclonal antibody and Vaccine production.

Course outcomes:
CO1: Differentiate the state of a healthy human from diseased conditions
CO2I: Apply molecular concepts to investigate biological samples through different diagnostic approaches
CO3: Describe the various approaches for gene therapy
CO 4: Illustrate the methods involved in vaccine production
CO 5: Describe the technology assisted in treating reproductive related problems in animals and humans.

Unit I	DISEASE DIAGNOSIS	18 Hours

Diagnosis of infectious diseases – Tuberculosis, Malaria, AIDS, Chaga's disease, Lyme disease and Human papilloma virus, COVID-19. Diagnosis of genetic diseases - Cystic fibrosis, Alzheimer's, Sickle cell Anemia, Cancer, Diabetes, Obesity, Hutchington's disease, Fragile X syndrome, Amyotrophic lateral sclerosis.

Unit II	MOLECULAR DIAGNOSIS	18 Hours

DNA assay – Nucleic acid Hybridization, DNA probes, Microarray. Gene Banks, DNA profiling – RFLP, VNTRs, SNPs. ELISA, VDRL, Widal, Pregnancy, Blood Glucose Level, C – Reactive protein, RT-PCR for Covid-19. Karyotyping. Applications of NGS in Molecular diagnosis.

Unit III	GENE THERAPY	18 Hours

Approaches for gene therapy, types of gene therapy (*ex vivo* &*in vivo*). Vectors used in gene therapy - retroviruses, adenoviruses &adeno-associated viruses. Types of gene delivery – Gene delivery by virus, non-viral system. Antigen and antisense therapy and its applications.

Unit IV	MONOCLONAL ANTIBODY AND VACCINES PRODUCTION	18 Hours

Hybridoma technology – Monoclonal antibodies Production. Advantages and limitations of monoclonal antibody production. Methods involved in the production of Recombinant vaccines – vaccines for hepatitis B, polio virus, small pox virus, malaria vaccines, Tuberculosis and AIDS.

Unit V	REPRODUCTIVE TECHNOLOGY AND TISSUE ENGINEERING	18 Hours

Manipulation of reproduction in animals – Artificial insemination, Embryo transfer, In vitro fertilization and embryo cloning. Manipulation of reproduction in Humans – Intrauterine insemination, IVF and Embryo transfer – methodology. Tissue engineering - Skin, liver, pancreas.

Books for study:

1. A text book of biotechnology by Satyanarayana U 2017. 12th Edition.
2. Medical biotechnology- S.N Jogdand, Himalaya publishing house, 2005.
3. Trends in Biotechnology, Ramasamy, P.2002. University of Madras, Pearl press.

Books for References:

1. Medical Microbiology by Mims Play fair Roitt, wekelin Williams 2009.
2. Medical Bacteriology, N.C. Dey, and T. K. Dey, Allied Agency, Calcutta, 17th Edition, 1988.
3. Textbook of Medical Laboratory Technology by P. B. Godkar and D. P. GodkarVol 1 and 2 Bhalani Publishing, 2005.
4. Text book of Biotechnology by R. C. Dubey 2008.

E-Resources:

1. https://india.oup.com/productPage/5591038/7421214/9780195699609
2. http://biotka.mol.uj.edu.pl/zbm/handouts/2015/JD/01_Medical_biotechnology_2015.pdf
3. https://www.academia.edu/44807315/Basics_of_Medical_Biotechnology
4. https://archive.unu.edu/unupress/sample-chapters/medicalbiotechnology.pdf
5. https://www.youtube.com/watch?v=QKWXrk3DNDk
6. https://www.youtube.com/watch?v=nEevNMyMg3Y
7. https://www.youtube.com/watch?v=ll98FOlNI3I

MAPPING WITH COURSE OUTCOME (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓	✓	✓					✓
CO2	✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓				✓	✓
CO4	✓	✓	✓	✓				✓
CO5	✓	✓	✓		✓		✓	✓
Number of Matches = 26, Relationship:= High								

Note:

Mapping	Mapping	1-29%	30-59%	60-69%	70-100%
Matches	Matches	1-10	11-25	26-30	31-40
Correlation	Relationship	Poor	Moderate	High	Very High

SKILL ENHANCEMENT COURSE I [NME I]
TISSUE ENGINEERING

Title of the Course	TISSUE ENGINEERING		Course code: PCBTTSE2	
Category of the course	Year	Semester	Hours	Credits
Skill Enhancement Course I [NME I]	2nd	3rd	4	2

Learning Outcome:
The subject imparts knowledge on the fundamentals of tissue and its function. The student will be provided with a basic knowledge and understanding about the functions of tissue and its biomedical applications.

Course Outcome:

CO-1	Understand the basics of Basics of Tissue Engineering
CO-2	Apply the knowledge to create tissue culture methods
CO-3	Acquire adequate knowledge in the use of tissue in medical application
CO-4	Evaluate the benefits of Tissue Engineering & Pharmaceutical Products
CO-5	Analyze the importance of applications of tissue engineering

SYLLABUS | SKILL ENHANCEMENT COURSE I [NME I] | TISSUE ENGINEERING

Unit	Content	Hours	Cos	Cognitive level
I	Basic biology of tissue engineering: The basis of growth and differentiation-morphogenesis and tissue engineering	12	CO1	K4 & K5
II	In vitro control of tissue development-Growth factors-Tissue engineering bioreactors- In vitro synthesis of Tissue and organs- Organotypic and histotypic engineered tissues. 3D cell culture-Tissue assembly in microgravity	12	CO2	K3 & K5
III	Biomaterials in tissue engineering-Scaffolds, extracellular matrix, polymers and nanocomposites. Approaches to transplanting engineered cells	12	CO3	K1,K2,K3 & K4
IV	Bioartificialpancrease, Hepatassist liver support system, Artificial Womb, Heamatopoietic system: Red blood cell substitutes, Renal replacement devices	12	CO4	K2,K3,K4,K5
V	Structural tissue engineering-Bone regeneration through cellular engineering, Skin tissue engineering, Brain implants-Neural stem cells, Periodontal applications	12	CO5	K2,K3,K4 & K6

Reference Books:

- Sylvia, S. Mader, 2011, Human Biology, Twelfth edition, Mc Graw Hill, USA.
- Robert P. Lanaza, Robert Langer and Joseph Vacanti, 2007. Principles of Tissue Engineering. Third edition Academic Press.
- Micklem.H.S.,LoutitJohn.F., 2004, Tissue grafting and radiation, Academic Press, New York..

- Penso.G., Balducci.D., 2004.Tissue cultures in biological research,Elsevier, Amsterdam
- Cecie Starr, 1996, Biology, Third edition , Wordsworth, America.

Useful Websites:

- www.nuigalway.ie/anatomy/tissue_engineering.htm

Course Code	Course Title	L	T	C
UCCCTC11	Python Programming	5		4

Course Objectives

- To understand the fundamentals of Python Programming
- To apply Python Programming Constructs for solving real life problems in the domain of engineering , business, health care, and other social applications.

Course outcomes:

CO1: To summarize the fundamentals of Python Programming Constructs for problem solving.
CO2: To make use of Control flow and Functions for solving problems
CO3: To utilize List, Modules and Packages to develop solutions for real life problems.
CO4: To build solutions of real life use cases using Files, Modules and Packages throughdata processing and analysis.
CO5: To analyze , visualize and perform predictive modeling of data using Python .

Unit-I	Basics of Python Programming	15 Hours

History of Python-Features of Python-Literal-Constants-Variables-Identifiers–Keywords-Built-in Data Types-Output Statements–InputStatements-Comments–Indentation-Operators-Expressions-Type conversions.

Python Arrays: DefiningandProcessingArrays–Arraymethods.

Unit-II	Control Statements	15 Hours

Selection/ConditionalBranching statements:if, if-else, nested if andif-elsestatements.IterativeStatements:while loop, for loop, else suite in loop and nested loops.

Jump Statements: break, continue and pass statements**.**

Unit-III	Functions and Python Strings, Modules	15 Hours

FunctionDefinition–FunctionCall–VariableScopeanditsLifetime – ReturnStatement.**FunctionArguments**:RequiredArguments,KeywordArguments, Default Arguments and Variable LengthArguments-Recursion.

PythonStrings: Stringoperations-ImmutableStrings-Built-inStringMethodsand Functions-StringComparison.

Modules:importstatement-ThePythonmodule –dir()function – Modules and packages: Namespace–Definingourownmodule- Numpy for Calculations and Pandas Dataframe.

Unit-IV	Lists and Dictionaries	15 Hours

Lists: Creatingalist-Accessvaluesin List- Updating values in Lists-Nestedlists-Basiclistoperations-ListMethods.

Tuples: Creating,Accessing,UpdatingandDeletingElementsinatuple–Nestedtuples–Differencebetweenlistsandtuples.

Dictionaries: Creating,Accessing,UpdatingandDeletingElementsinaDictionary–DictionaryFunctionsAndMethods-DifferencebetweenListsandDictionaries.

Unit-V	Python File Handling	15 Hours

PythonFileHandling: TypesoffilesinPython-OpeningandClosingfiles-ReadingandWritingfiles:write()andwritelines()methods-append()method–read()andreadlines()methods–withkeyword–Splittingwords–Filemethods-FilePositions-Renamingand deleting files.

Books for Study:

1. ReemaThareja,–Python Programming using problem solving approach, First Edition, 2017,OxfordUniversity Press.
2. Dr.R.NageswaraRao,–CorePythonProgramming‖,FirstEdition,2017,DreamtechPublishers.

Books for Reference:

1. VamsiKurama,–Python Programming: A Modern Approach,Pearson Education.
2. Mark Lutz,Learning Python, Orielly.
3. Adam Stewarts,–Python Programming, Online.
4. Fabio Nelli–Python Data Analytics,APress.
5. Kenneth A. Lambert,–Fundamentals of Python–First Programs, CENGAGE Publication.

MAPPING WITH COURSE OUTCOME (COs) and PROGRAMME SPECIFIC OUTCOMES (PSOs)

Course Outcomes (COs)	Programme Specific outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓	✓	✓	✓		✓		✓
CO2	✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓		✓	✓	✓
CO5	✓	✓	✓	✓		✓	✓	✓
Number of Matches = 34, Relationship:= Very High								

Note:

Mapping	Mapping	1-29%	30-59%	60-69%	70-100%
Matches	Matches	1-10	11-25	26-30	31-40
Correlation	**Relationship**	**Poor**	**Moderate**	**High**	**Very High**

1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	2	3
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	3
CO5	3	2	2	3	3	3
Weightage of course contributed to each PSO	15	10	10	15	13	14

S-Strong-3 M-Medium-2L-Low-1

SEMESTER I				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCCPC12	**Core Course 2**	**PYTHON PROGRAMMING LAB**	**3**	**3**

Learning Objectives

Familiarize with writing of algorithms, fundamentals of Python and philosophy of problem solving
Implement different programming constructs and decomposition of problems into functions.
Define and use of arrays with simple applications

Course Objectives

1. Be able to design and program Python applications.
2. Be able to create loops and decision statements in Python.
3. Be able to work with functions and pass arguments in Python.
4. Be able to build and package Python modules for reusability.
5. BeabletoreadandwritefilesinPython.

1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Modules.
11. Program using Lists.
12. Program using Tuples.
13. Program using Dictionaries.
14. Program for File Handling.
15. Packages (Numpy for Calculations for B.Sc CS & BCA) and (Matplotlib (basic graphs like column chart, Bar chart etc& Pandas Dataframe for DS)

Books for study:

1. Department lab Manual

Books for Reference:

E-Resources:

Course Outcomes	
Oncompletionofthiscourse,students will be able to	
CO1	Demonstratetheunderstandingofsyntaxandsemantics
CO2	IdentifytheproblemandsolveusingPYTHONprogrammingtechniques.
CO3	Identifysuitableprogrammingconstructsforproblemsolving.
CO4	AnalyzeveriousconceptsofPYTHONlanguagetosolvetheprobleminanefficient way.
CO5	DevelopaPYTHONprogramforagivenproblemandtestforitscorrectness.

SEMESTER II				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCCPS22		**OFFICE AUTOMATION LAB**	**2**	

Course Objectives

1.

a) Word Processing

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.& Spell check
4. Drawing - flow Chart

b) Spread Sheet

5. Chart - Line, XY, Bar and Pie.
6. Data Manipulation
7. Macros – Recording / Editing / VBA procedures /functions
8. Sorting and Import / Export features.

c) Power Point

9) Basic / Animated presentations.
10) Organizational chart / Themes
11) Adding Links / Sound Effects / Movie to slides
12) Inserting tables/ charts / work sheets

d) Access

13) Creation of table / primary key /
14) Query / Parameter Query / Relations
15) Design of forms / Reports / Modules

Books for study: Department Lab Manual

SEMESTER I				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCDSTF11		**PROBLEM SOLVING TECHNIQUE LAB**	**2**	**2**

Learning Objectives

Familiarizewith writing ofalgorithms,fundamentals ofC and philosophyofproblem solving.
Implementdifferentprogrammingconstructsanddecompositionofproblems intofunctions.
Usedata flow diagram,Pseudo code toimplementsolutions.
Defineanduseofarrayswith simpleapplications
Defineanduseofarrayswith simpleapplications
Understandaboutoperatingsystemand theiruses

Course Objectives

2.

Flow Chart and Algorithms
Input and Output Calculations
1. a) find sum and average of three numbers.
b) to find the sum of individual digits of a given positive integer

2. a) to generate the first n terms of the Fibonacci sequence b) to generate prime numbers between 1 to n. c) to check if the given number is Armstrong or not 3. a)to check whether the given number is perfect or not b) to check whether the given number is strong or not 4. a) to find the roots of a quadratic equation. b) to arithmetic operations using switch statement 5. a) to find factorial of a given integer using non-recursive function b) to find factorial of a given integer using recursive function 6. a) to find GCD of two integers by using recursive function. b) to find GCD of two integers by using non-recursive function 7. a) to find the largest and smallest number in a list of integers. b) toSort the Array in an Ascending Order. c) to find whether the given matrix is symmetric or not
Books for Study: 1. **How to solve it by Computer, By R. G Dromey**
Books for Reference:Lab Manual
E-Resources:

SEMESTER II				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCCTC21		**DATA STRUCTURES & ALGORITHMS**	**5**	**5**

Course Objectives

1. Introduce object Orientation
2. Introduce file concepts
3. Get knowledge of reusable coding
4. Get knowledge of Abstract data types
5. Ability to sort numbers efficiently

Unit-I	**Classes and Objects**	**15 Hours**

Principles of Object-Oriented Programming: Object Oriented Paradigm-Basic Concepts of OOPS-Classes and Objects-Datamember & Memberfunctions-Array of class object-Friend function-Static functions-Constructor and Destructor.

Unit-II	**OOPS Paradigms**	**15 Hours**

Operator Overloading-Unary and Binary Operator-Function Overloading-Inheritance: Single, Multiple, Multi-Level, Hierarchical and Hybrid Inheritance-Polymorphism-Templates-Class and Function template.

Unit-III	**Stack and Queue**	**15 Hours**

Different views of data – Abstraction and Built-in Types – ADTs Stacks and Queue (Linear and Linked), Stack (Array and Pointer) - Applications- Infix to Postfix Conversions – Queue (Array and Pointer).

Unit-IV	**List and Binary Trees**	**15 Hours**

List (Array and Pointer) – Applications: (Polynomial Addition) - Doubly Linked Lists. Binary Search Tree: Implementation – Tree Traversal.

Unit-V	**Graph Implementation, Sorting and Searching Technique**	**15 Hours**

Implementations – BFS – DFS – Dijkstra's Shortest Path Algorithm – Hashing & Collision – **Sorting:** Insertion, Merge, Quick. **Searching**: Binary and Linear Search.

Books for study.

1. Object Oriented Programming with C++, E Balagurusamy, Tata McGraw Hill, 8th Edition, 2014. (Units I, II).
2. C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers, 45th Edition, 2015. (Units III, IV& V).

Books for Reference:

1. C++ the Complete Reference, Herbert Scheldt, Tata McGraw Hill, 4th Edition, 2003.
2. OOP in ANSI C and Turbo C, Ashok N.Kamthene, Pearson Education, 6th Edition, 2008.
3. Data Structures and Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Addison Wesley Longman Inc., 2nd Edition, 1999.

E-Resources:

https://www.tutorialspoint.com/cplusplus/cpp_quick_guide.htm
https://www.geeksforgeeks.org/c-plus-plus/
https://www.geeksforgeeks.org/data-structures/

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Ability to hide data	**K3**
CO2	Ability to write coding with minimal error	**K6**
CO3	Understand arranging numbers	**K4,K6**
CO4	Implement abstract data	**K3**
CO5	Prior knowledge for networking	**K2 ,K6**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO 9	PSO 10
CO1	✓	✓		✓	✓	✓	✓	✓		✓
CO2			✓	✓						
CO3	✓	✓	✓		✓	✓		✓	✓	
CO4							✓			✓
CO5		✓	✓	✓	✓	✓		✓	✓	
Number of matches = 28 , Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCCCPC22		**Data Structures & Algorithms Lab**	**3**	
Course Objectives				
3. To learn about abstract data types 4. Prepare the student for composite data structures 5. Develop in depth use of pointers				
Lab Experiments: 1. Implementation of Stack Using (Array/Pointer) 2. Implementation of Queue Using (Array/Pointer) 3. Implementation of List Using (Array/Pointer) 4. Implementation of List application : Polynomial Arithmetic 5. Implementation of Doubly linked list 6. Implementation of Binary Search Tree Traversal. 7. Graph Implementation, BFS and DFS. 8. Sorting: Merge, Quick. 9. Searching: Linear and Binary. 10. Hashing & Collision.				
Books for study: Department Lab Manual				
Books for Reference:C++ Plus Data Structure, Nell Dale, Jones & Bartlett Publishers, 45th Edition, 2015.				

E-Resources: **https://www.geeksforgeeks.org/data-structures/**

Methodology of Teaching:
ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Ability to apply reusable coding	**K3**
CO2	Ability to protect data	**K1,K2**
CO3	Perform better searching	**K3**
CO4	Perform better sorting	**K3**
CO5	Implement abstract data types	**K6,K2**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO 9	PSO 10
CO1	✓	✓		✓		✓		✓		✓
CO2	✓		✓		✓		✓		✓	
CO3	✓	✓		✓		✓		✓		✓
CO4	✓		✓		✓		✓		✓	
CO5	✓	✓		✓		✓		✓		✓
Number of matches = 28, Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
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SEMESTER II BCA				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UCBCTC21		**OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++**	**5**	**5**

Course Objectives

1. Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc
3. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism

4. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming **5.** Demonstrate the use of various OOPs concepts with the help of programs		
Unit-I	**Introduction to C++**	**15 Hours**
key concepts of Object-Oriented Programming –Advantages–ObjectOrientedLanguages– I/OinC++-C++Declarations.ControlStructures:- Decision Making and Statements: If ..else, jump, goto, break, continue, Switch case statements - Loops inC++ :for, while, do - functions in C++ - inline functions – Function Overloading.		
Unit-II	**Classes and Objects:**	**15 Hours**
Declaring Objects – Defining Member Functions –StaticMembervariablesandfunctions– arrayofobjects–friendfunctions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.		
Unit-III	**Operator Overloading and Inheritance**	**15 Hours**
:Overloading unary, binary operators–Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance–Virtual base Classes– AbstractClasses.		
Unit-IV	**Pointer and Polymorphism**	**15 Hours**
Pointers–Declaration–Pointer to Class, Object–this pointer–Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object –Binding, Polymorphism and Virtual Functions.		
Unit-V	**Files**	**15 Hours**
Files –File stream classes –file modes–Sequential Read /Write operations–Binary and ASCII Files–Random Access Operation–Templates –Exception Handling- String – Declaring andInitializingstringobjects–StringAttributes–Miscellaneousfunctions.		
Books for study. E.Balagurusamy,–Object-OrientedProgrammingwithC++‖,TMH2013,7thEdition.		
Books for Reference: Ashok N Kamthane,–Object-Oriented Programming with ANSI and Turbo C++‖, Maria Litvin & Gray Litvin,–C++foryou‖,Vikaspublication2002. PearsonEducation2003.		
E-Resources: https://alison.com/course/introduction-to-c-plus-plus-programming		

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Remember the program structure of C++ with its syntax and semantics	**K3**
CO2	Understand the programming principles in C++ (datatypes, operators, branching and looping, arrays, functions, structures, pointers and files)	**K6**
CO3	Apply the programming principles learnt in real-time problems	**K4,K6**
CO4	Analyze the various methods of solving a problem and choose the best method	**K3**
CO5	Code, debug and test the programs with appropriate	**K2 ,K6**

	testcases	
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO 9	PSO 10
CO1	✓	✓		✓	✓	✓	✓	✓		✓
CO2			✓	✓						
CO3	✓	✓	✓		✓	✓		✓	✓	
CO4							✓			✓
CO5		✓	✓	✓	✓	✓		✓	✓	
Number of matches = 28 , Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

SEMESTER II BCA				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
UCBCPC22		OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++ LAB	5	

Course Objectives

1. Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc
3. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
4. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
5. Demonstrate the use of various OOPs concepts with the help of programs

1. Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.
2. Write a C++ program to demonstrate Class and Objects
3. Write a C++ program to demonstrate the concept of Passing Objects toFunctions
4. Write a C++ program to demonstrate the Friend Functions.
5. Write a C++ program to demonstrate the concept of Passing Objects to Functions
6. Write a C++program to demonstrate Constructor and Destructor
7. Write a C++ program to demonstrate Unary Operator Overloading
8. Write a C++ program to demonstrate:
   Single Inheritance
   Multilevel Inheritance
   Multiple Inheritance
   Hierarchical Inheritance

Hybrid Inheritance
9. Write a C++program to demonstrate Virtual Functions.
10. Write a C++program to manipulate a Text File.
11. Write a C++program to perform Sequential I/O Operations on a file.
12. Write a C++program to find the Biggest Number using Command Line Arguments
13. Write a C++program to demonstrate Class Template
14. Write a C++program to demonstrate Function Template.
15. Write a C++program to demonstrate Exception Handling.

Methodology of Teaching:

ICT Presentation, Demonstration

Books for Study

Department Lab Manual

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Remember the program structure of C++ with its syntax and semantics	**K3**
CO2	Understand the programming principles in C++ (datatypes, operators, branching and looping, arrays, functions, structures, pointers and files)	**K6**
CO3	Apply the programming principles learnt in real-time problems	**K4,K6**
CO4	Analyze the various methods of solving a problem and choose the best method	**K3**
CO5	Code, debug and test the programs with appropriate test cases	**K2 ,K6**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO 9**	**PSO 10**
CO1	✓	✓		✓	✓	✓	✓	✓		✓
CO2			✓	✓						
CO3	✓	✓	✓		✓	✓		✓	✓	
CO4							✓			✓
CO5		✓	✓	✓	✓	✓		✓	✓	
Number of matches = 28 , Correlation: High										

Mapping Correlation Benchmark

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