ISLAMIAH COLLEGE

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

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

(AIDED & SELF FINANCE)

SYLLABI BOOK XVI

17TH ACADEMIC COUNCIL MEETING

(For the UG & PG Candidates Admitted from 2022-2023)

23rd JANAUARY 2023

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
UG - FOUNDATION COURSE
REVISED SYLLABUS FOR ALL UG II YEAR FROM 2022 – 2023 ONWARDS (BOS MEETING HELD ON 28.11.2022)

TITLE: URDU PAPER – III (SEMESTER III)

PAPER III.. PROSE, HISTORY OF URDU LITERATURE & GENERAL ESSAYS

UNIT - I:
1. QISSA-E-HATIM TAI --- MEER AMMAN DEHLAVI
2. URDU ZUBAN KI IBTIDA AUR USKA IRTIQA
3. GENERAL ESSAY

UNIT II:
1. SIR SYED MARHOOM AUR URDU LITERATURE
2. URDU KI IBTIDA KE BARE ME MUKTALIF NAZARIAT
3. ALLAMA IQBAL

UNIT III:
1. NOOR JAHAN … MOHAMMED HUSSAIN AZAD
2. MIRZA GHALIB
3. GENERAL ESSAY

UNIT IV:
1. KHANWADA-E-WALAJAHI KA EK GUMNAM SHA'ER-NAWAB MAHMOOD… Dr. Syed Sajjad Husain
2. MUNSHI PREM CHAND
3. SIR SYED AHMED KHAN

UNIT V:
1. MARHOOM KI YAAD MEIN . PUTARS BUKHARI
2. MAULANA ABUL KALAM AZAD
3. MOULANA ALTAF HUSAIN HALI

BOOKS PRESCRIBED:
1. FAIZAN-E-ADAB , APPLIED BOOKS, NEW DELHI
2. URDU NASAR , APPLIED BOOKS, NEW DELHI
3. Guldasta-e-Mazameen-o-Insha Pardazi, Published by Educational Book House, Aligarh

UG - FOUNDATION COURSE

REVISED SYLLABUS FOR ALL UG II YEAR FROM 2021 – 2022 ONWARDS (BOS MEETING HELD ON 28.11.2022)

URDU PAPER IV (SEMESTER IV)

TITLE: NON-DETAILED TEXT (SHORT-STORIES), DRAMA & URDU DTP

UNIT - I:
1. KAFAN --- Munshi Prem Chand
2. DRAMA DARWAZEY KHOL DO – Krishan Chandar (Part-I)
3. URDU DTP

UNIT II:
1. JAMUN KA PED … Krishan Chandar
2. KHUSH NASEEB .. Ali Akbar Amburi
3. URDU DTP

UNIT III:
1. BARF GUZEDA LOG .. Akbar Zahid
2. DRAMA DARWAZEY KHOL DO – Krishan Chandar (Part-II)
3. URDU DTP

UNIT IV:
1. DARD KA EHSAAS .. Ameerunnisa
2. AATHWAN PANKHA .. Shubaib Ahmed Kaaf
3. URDU DTP

UNIT V:
1. PANKHADIYAN GULAAB KI – RASHEED MADRASI
2. DRAMA DARWAZEY KHOL DO – Krishan Chandar (Part-III)
3. URDU DTP

BOOKS PRESCRIBED:

1. **MAZHAR-E-ADAB, APPLIED BOOKS, NEW DELHI**
2. **URDU AFSANEY, APPLIED BOOKS, NEW DELHI**

Course Outcomes: URDU PAPER III

SEMESTER III (PROSE, HISTORY OF URDU LITERATURE & GENERAL ESSAY)

1. Able to learn and inculcate moral and ethical values through Ancient & Patriotic Poets like Mirza Ghalib, Moulana Abul Kalam Azad and Allama Iqbal etc.,.

2. Prose make students understand National Integration, Communal Harmony, Brotherhood and they inculcate moral and human values within themselves.
3. To Aware about the Indian Language and How Urdu Language initiated and developed.

4. Able to understand Modern Period through Poets and authors.

5. Able to write and use the language correctly and to develop writing skills through general essays.

6. Prose makes Students to develop their creative writing skills.

…..

COURSE OUTCOMES: URDU PAPER IV

NON-DETAILED TEXT (SHORT-STORIES), DRAMA & URDU DTP

1. Able to understand and inculcate loyalty, human values through short stories.
2. Able to appreciate Modern Fiction and develop interest in Short-Stories.
3. Able to understand and promote Communal Harmony, Humanity and Patriotism through One Act Play Dramas.
4. Able to understand the Socio-Cultural & Political background of Indian Culture and its values through Drama.
5. To develop their Typing Skill through Urdu Language.

……..

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
UG - FOUNDATION COURSE

Non-Major Course – URDU Under CBCS

TITLE: BASIC Urdu – I UBURNM31
with effect from 2022-2023

III SEMESTER

(BOS MEETING HELD ON 28.12.2022)

Unit I : Urdu alphabet, Reading & Writing practice in Urdu
Unit II : Word completion, Pronunciation, Connecting words
Unit III : Vowels, Prepositions & Urdu Numerals
Unit IV : Formation of Simple Sentences
Unit V : Conversation & Urdu Calendar (Week days and Months)

……..

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
UG - FOUNDATION COURSE

Non-Major Course – URDU Under CBCS
TITLE: BASIC Urdu – II UBURNM41

with effect from 2022-2023
IV SEMESTER

(BOS MEETING HELD ON 28.11.2022)

Unit I: Basics of Urdu Grammar
Unit II: Names of flowers, fruits, birds, colours & Vegetables
Unit III: Composition (A short paragraph consisting of four or five simple sentences)
Unit IV: Two simple poems.
Unit V: Translation (Technical terms and a passage).

ARABIC SYLLABUS FOR ALL UG II YEAR FOR THE STUDENTS WHO HAVE ADMITTED FROM THE ACADEMIC YEAR 2022-2023 ONWARDS

ARABIC PAPER III
(Classical Arabic)

Semester III - Part I Language

Sub-Code	Part	Title of the Paper	Hours Week	Credit	Theory/ Practical	Exam Hours	CIA	External Marks	Total Marks
UBFAR301	1	Arabic Paper III	4	4	Theory	3	25	75	100

Course Objectives:

Students are aimed to develop reading and writing skills, and moral & ethical values.

Course Outcomes:

Students will be able
CO1: To understand the moral values
CO2: To read classical Arabic with correct pronunciation
CO3: To understand the ethical values

Unit - I	Surathul Fatiha, Chapter No.105, 106 & 107
Unit - 2	Chapters No.108 to 111
Unit - 3	Chapters No.112 to 114
Unit - 4	Hadith 1 to 10
Unit - 5	Hadith 11 to 20

Prescribed Text Book:

Title of the Book	Author Name	Publishing House
Glorious Quran Selected Chapters		
Ahadith Sahla	Dr. V. Abdur Rahim	IFT, Chennai

Recommended Book for Reference:

Title of the Book	Translated by
The Glorious Quran	Abdullah Yousuf Ali

ARABIC SYLLABUS FOR ALL UG II YEAR FOR THE STUDENTS WHO HAVE ADMITTED FROM THE ACADEMIC YEAR 2022-2023 ONWARDS

Arabic Paper IV
[Essays and Communication in Arabic]

Semester IV - Part I Language

Sub-Code	Part	Title of the Paper	Hours Week	Credit	Theory/ Practical	Exam Hours	CIA	External Marks	Total Marks
UBFAR401	1	Arabic Paper IV	4	4	Theory	3	25	75	100

Course Objectives:

Students are aimed to develop writing & communicative skills and translate Arabic sentences.

Course Outcomes:

Students will be able
CO1: To write the Arabic articles
CO2: To read the Arabic passages
CO3: To translate the Arabic sentences
CO4: To converse in Arabic

Unit - I	Nafhathul Adab	Lessons 1 to 5
Unit - 2	Nafhathul Adab	Lessons 6 to 10
Unit - 3	Nafhathul Adab	Lessons 11 to 15
Unit -4	Functional Arabic	Lessons 1 to 7
Unit - 5	Functional Arabic	Lessons 8 to 15

Prescribed Text Book:

Title of the Book	Author Name	Publishing House
Nafhathul Adab	Moulana Waheed-uz-Zaman Qasimi [Deoband]	Kutub Khana Hussainiya
Funcitonal Arabic	Dr. S. K. Bahmani	Alif Publications

Recommended Book for Reference:

Title of the Book	Author Name	Publishing House
Kithab Al Arabiya [Teaching Arabic to Non-Native Speakers]	Prof.[Dr.]Abdul Tawab Abdullah Huissain Dr. Tajudeen A.S Noushad Hudawi	Department of Arabic University of Kerala

SEMESTER III				
COURSE	COURSE	COURSE TITLE	HRS./WEEK	CREDIT

CODE				
UBARNM31	LANGUAGE	BASIC ARABIC I	4	4

Course Objectives:

Students are aimed know basic Arabic reading skill.

Course Outcomes:

Students will be able

CO1: To understand the Alphabet.

CO2: To understand the definite article

CO3: To understand the preposition

CO4: To understand interrogatives

CO5: To understand the personal pronouns

Unit - I	Minhaj-al-Arabiyyah	Lesson 1 & 2
Unit - 2	Minhaj-al-Arabiyyah	Lesson 3 & 4
Unit - 3	Minhaj-al-Arabiyyah	Lesson 5 & 6
Unit - 4	Minhaj-al-Arabiyyah	Lesson 7 & 8
Unit - 5	Minhaj-al-Arabiyyah	Lesson 9 & 10

Prescribed Text Book:

Title of the Book	Author Name	Publishing House
Minhaj-al-Arabiyyah	Dr. Syed Karamathullah Bahmani	Alif Books & Prints, Chennai

SEMESTER IV				
COURSE CODE	COURSE	COURSE TITLE	HRS./WEEK	CREDIT
UBARNM41	LANGUAGE	BASIC ARABIC II	4	4

Course Objectives:

Students are aimed know basic Arabic writing skill.

Course Outcomes:

Students will be able

CO1: To understand the Noun.

CO2: To understand the use of LAISA & BI

CO3: To understand the pro nominal suffix

CO4: To understand the words AIYYU & KULLU

CO5: To understand the indefinite form

Unit - I	Minhaj-al-Arabiyyah	Lesson 11 & 12
Unit - 2	Minhaj-al-Arabiyyah	Lesson 13 & 14
Unit - 3	Minhaj-al-Arabiyyah	Lesson 15 & 16
Unit - 4	Minhaj-al-Arabiyyah	Lesson 17 & 18
Unit - 5	Minhaj-al-Arabiyyah	Lesson 19 & 20

Prescribed Text Book:

Title of the Book	Author Name	Publishing House
Minhaj-al-Arabiyyah	Dr. Syed Karamathullah Bahmani	Alif Books & Prints, Chennai

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
THIRD SEMESTER – HINDI PAPER – III

Code : UBFHD301 Credits : 4 Hours: 4/Week Revision : 4%

OBJECTIVES: 1.To makes the student able to appreciate Ancient and Medieval Poetry and to identify the peculiarities of each period and understand the literary thoughts and styles of that period. 2. To develop an outlook about the History of Hindi literature through literary descriptions of three periods. 3. To make them able to critically evaluate the Novel prescribed for non detailed study.

SYLLABUS AND BOOKS PRESCRIBED :

I ANCIENT &MEDIEVAL POETRY :

1.Kabir – Dohe 1 – 5 *only &* 1 Pad no.1
2. Tulsidas - Dohe 1 – 6 *only*
3. Rahim – Dohe 1 – 6 *only*
4. Bihari – Dohe 1 – 6 *only*
5.Thiruvalluvar - Kural 1 – 6 *only*

II UPANYAS : Daud *by* Mamta Kaliya (Non Detailed Study only)

III HINDI LANGUAGE: (i) MUHAVARE – ARTH AUR PRAYOG
(ii) LOKOKTIYAN - ARTH AUR PRAYOG
(Prescribed Idioms And Proverbs Enclosed)

IV APPLIED GRAMMAR -: 1.Vaachya (Voice)
2. Kaal – no sub divisions (Tense)
3. Upasarg(Prefix)
4. Pratyaya((Suffix)
5. Samshruti Bhinnarthak Shabd (Homonyms)

V HISTORY OF HINDI LITERATURE :
General Information about (Pramukh Visheshtayen) the First Three Periods:- 1. Aadi kaal 2. Bhakti Kaal and 3. Reeti Kaal

BOOKS FOR STUDY :

1.Sanrachna Kavya Sanchayan, Sanrachna Prakashan, Allahabad
2. Daud, Mamta Kaliya, Vaani Prakashan, New Delhi.

BOOKS FOR REFERENCE:

1.Hindi Sahitya Ka Itihas, Ramchandra Shukla, Karvi Prakashan, Jaipur
2. Hindi Sahitya ka Subodh Itihas, Babu Gulab Roy, Lakshmi Narain Agarwal Educational Publishers, Agra – U.P.
3. Vyavaharik Hindi Vyakaran by Dr.Hardev Bahri , Lokbharathi Prakashan, Allahabad.
4. Hindi: Shabd – Arth – Prayog by Dr.Hardev Bahri, Abhivyakti Prakashan, Allahabad.

-0-

THIRD SEMESTER – HINDI PAPER – III
PRESCRIBED IDIOMS AND PROVERBS

1. जोड़ तोड़ करना = उपाय करना मु.
2 कोल्हू का बैल = बहुत अधिक परिश्रम करनेवाला। *मु.*
3 उल्टी गंगा बहाना = अनहोनी बात करना / प्रतिकूल बात करना। *मु.*
4 छाती पर मूंग दलना = सामने रहकर दुःख देते रहना। *मु.*
5 तीन तेरह करना = तितर बितर करना। *मु.*
6 टेढी खीर = मुश्किल काम। *मु.*
7 अंगूठा दिखाना = मना कर देना / तिरस्कार करना *मु.*
8 हाथ मलना = पछताना। *मु.*
9 दॉत खट्टे करना = बुरी तरह हरा देना। *मु.*
10 जी चुराना = काम करने से कतराना मु.
11 गागर में सागर भरना = थोडे में बहुत कुछ कहना। *मु.*
12 काठ का उल्लू = महामूर्ख *मु.*
13 कमर कसना = तैयार रहना मु.
14 नाक रगड़ना = दीनता दिखाना *मु.*
15 अड़ियल टट्टू = हठी / जिद्दी *मु.*

लोकोक्तियाँ

1. ईंद का चॉद होना = दर्शन दुर्लभ होना / बहुत कम दिखाई देना।
2. उल्टा चोर कोतवाल को डॉटे = दोष अपना और दूसरों को धमकाना।
3. थोथा चना बाजे घना = कम ज्ञान या गुण वाला बातें बढ़ बढ़कर करता है ।
4. हीरे की परख जौहरी जाने = गुणी ही गुणी को पहचान सकता है ।
5. ऊंची दुकान फीका पकवान = केवल बाहरी दिखावा
6. एक अनार सौ बीमार = एक चीज और चाहनेवाले बहुत।
7. धोबी का कुत्ता न घर का न घाट का = कहीं का न रहना।
8. हवन करते हाथ जलना = भलाई के बदले बुराई होना ।
9. जैसा देश वैसा भेष = जहॉ रहें वहीं की रीतियों का आचरण करना।
10. आग लगे तब खोदे कुआं = विपत्ति के आने पर उसका हल / उपाय सोचना ।

-०-

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI.
FOURTH SEMESTER – HINDI PAPER – IV
(For candidates admitted from 2022-2023 onwards)

Code : UBFHD401 **Credits : 4** **Hours: 4/Week** **Revision : 8%**

Objectives :

1. To make the students understand the development of modern Hindi Poetry.
2. To acquaint them with the thoughts, ideas and ideologies of modern Hindi Poets. 3. To develop essay writing skills.
4. Computer Terminology & typing help them to face the challenges of Competitive world effectively.

SYLLABUS AND BOOKS PRESCRIBED :

I.MODERN POETRY :

1. Yashoda – Uddhav Samvaad *by* Harioudh
2. Kaisa Ho Apna Sansar ?by Mythilisharan Gupta
3. Sukh - Dukh *by* Panth
4. Mera Jeevan by Subhadra Kumari Chouhan
5. Toota Pahiya *by* Dharmaveer Bharathi

II. APPLIED GRAMMAR :

1. Vaakya Ashudhhi Shodhan
2. Tatsam to Tatbhav & Vice versa
3. Anek Shabdon ke liye Ek Shabda

III. SAMANYA NIBANDH : General Essays Topics Prescribed:

1. Paryavaran aur Pradushan
2. Pustakalay
3. Samay ka Sadupayog
4. Vigyan : Vardan ya Abhishap
5. Mere Priya Lekhak / Kavi

IV. FUNCTIONAL HINDI : Official Correspondence – Circular, Reminder and Office Order (Definition and Context of usage only) – Computer Terminology (prescribed) & **Tankan (Practice)**

V . HISTORY OF HINDI LITERATURE - ADHUNIK KAAL :

General information about the prescribed poets / writers from Modern Period. 1. Agneya 2. Dinakar 3. Mannu Bhandari 4. Anamika 5. Geetanjali Shree

BOOKS FOR STUDY :

1. Sanrachna Kavya Sanchayan, Sanrachna Prakashan, Allahabad -1.

BOOKS FOR REFERENCE :

1. Hindi: Shabd – Arth – Prayog by Dr.Hardev Bahri , Abhivyakti Prakashan, Allahabad.
2. Hindi Sahitya Ka Itihas, Ramchandra Shukla, Karvi Prakashan, Jaipur
3. Hindi Sahitya ka Dusra Itihas, Bachchan singh, Radhakrishna Prakashan, New Delhi
4. Hindi Nibandh, Prof. Chandrasekhar Shastry, St. Joseph Publishing House, Delhi.
5. Prayojanmoolak Bhasha aur karyalayeen Hindi, Dr. Krishna Kumar Goswami, Kalinga Prakashan, Delhi.

-0-

FOURTH SEMESTER – HINDI

Prescribed Computer / IT / Internet Terminology from English to Hindi -

Access = अभिगम

Automation = स्वचालन

Axis = धुरी/ अक्ष

Binary = द्विपदी/ द्विआधारी

Bad Sector = अनुपयोगी खंड

Browser = विचरक

Coding = कूट लेखन

Circuit = परिपथ

Component = घटक

Central Memory = केन्द्रीय स्मृति

Ctrl. = नियंत्रण

Data = तथ्य / आंकड़ा

Database = आंकड़ा आधार

Digital = अंकीय

Home Page = मुख पष्ठ / पहला पन्ना

Input = निवेश

Internet = अंतरजाल

Key Board = कुंजीपटल

Log in = सत्रारंभ

Network = जाल तंत्र

Operating System = प्रचालन तंत्र

Password = कूट शब्द

Voice Mail = वाक् डाक

Word Processor = शब्द संसाधक

Storage = भंडारण

Text = paz लेखन

Netizen = जालवासी

Web server = वेब परिसेवक

WWW = विश्वव्यापी वेब

ZIP = संकुचित

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
NON MAJOR – OTHER ELECTIVE - BASIC HINDI – I
THIRD SEMESTER

CODE: UBHDNM31 CREDITS: 1 HOURS: 2/WEEK REVISION: 4%

Objectives:

To introduce the Hindi language to students who never had it at school. The students in this level will experience Hindi for the first time and will enjoy learning basic sounds, words and expressions of Hindi language.

SYLLABUS

UNIT – I VOWELS - CONSONANTS - COMPOUND LETTERS
BARAHKHADI
NASAL SOUNDS – ANUSWAR – ANUNASIK
WORD BUILDING

UNIT – II NOUN – PRONOUN
NAMES OF ANIMALS, BIRDS, COLOURS, FRUITS,
FLOWERS, VEGETABLES.
NAMES OF DAYS &
NUMBERS 1 TO 25 ***only***.

UNIT – III ROOT VERBS (20)
IMPERATIVES – तू, तुम, आप ---- WITH VERBS

UNIT –IV ADJECTIVES (अच्छा, बुरा, मीठा, खट्टा ...) - ENGLISH TO HINDI
USAGE OF का, की, के.
USAGE OF CASE ENDINGS / PREPOSITIONS - ने, में, पर, से, को.

UNIT – V PRESENT TENSE SIMPLE ONLY
PRESENT CONTINUOUS TENSE
INTERROGATIVES - (क्या, कौन, कहाँ ....)

BOOKS FOR STUDY:

1.SARAL HINDI PARICHAY, D.B.H..PRACHAR SABHA, TRICHY.2015

BOOKS FOR REFERENCE:

1.SARAL HINDI BODHINI, D.B. H.PRACHAR SABHA, CHENNAI. 2011
2.TEACH YOUSELF HINDI , MOHINI RAO, HIND POCKET BOOKS, NEW DELHI. 2004.

-0-

ISLAMIAH COLLEGE (AUTONOMOUS), VANIYAMBADI
NON MAJOR - OTHER ELECTIVE– BASIC HINDI – II
FOURTH SEMESTER

CODE: UBHDNM41 CREDITS: 1 HOURS: 2/WEEK REVISION: 6%

Objectives :

To continue to develop and enhance students' introductory level towards a higher level of reading, writing and translation skills in Hindi.

SYLLABUS:

UNIT – I	FUTURE TENSE
	RELATION NAMES
UNIT - II	PAST TENSE
	SIMPLE PAST TENSE WITHOUT **'nao'**
	NUMBER
UNIT –III	SIMPLE PAST TENSE WITH 'nao'
	GENDER
	CAUSATIVE VERB
UNIT –IV	TRANSLATION PRACTICE
	SIMPLE SENTENCES
	ENGLISH TO HINDI
UNIT –V	TRANSLATION PRACTICE
	SIMPLE SENTENCES
	HINDI TO ENGLISH

BOOK FOR STUDY :

1. SARAL HINDI PARICHAY, D.B.H.PRACHAR SABHA, TRICHY.2015
2. SARAL HINDI BODHINI, D.B.H.PRACHAR SABHA, CHENNAI, 2011

BOOK FOR REFERENCE:

1. HINDI PRAYOG, PART – I, D.B.H.PRACHAR SABHA, CHENNAI, 2005
2. NAYEE HINDI RACHNA- PART – II, D.B.HINDI PRACHAR SABHA, CHENNAI, 2008
3. ANUVAD ABHYAS – I, D.B.HINDI PRACHARSABHA, CHENNAI, 2009

-0-

SEMESTER III				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
UBFTA301	**LANGUAGE 3**	**TAMIL III**	**4**	**4**

Course Objectives

1. இலக்கண மரபுப்படி படைப்பாற்றலை மாணவர் அறிந்து கொள்ளுதல்
2. கடிதம் எழுதும் முறையை அறிந்து கொள்ளுதல்
3. இன்றைய மாணவர்களுக்குத் தமிழ்மொழியின் மரபு தன்மையை உணர்த்தி ஆங்கில மொழியிலிருந்து தமிழிலும் தமிழிலிருந்து ஆங்கிலத்திலும் மொழி பெயர்ப்பதற்குப் போதிய பயிற்சி அளிப்பது
4. இக்கால இலக்கியங்களை அறிந்து கொள்ளுதல் (கவிதை, சிறுகதை, புதினம், நாடகம், உரைநடை)

Course Outcomes

1. படைப்பாற்றலை வளர்த்துக் கொள்வர்.
2. மொழிபெயர்ப்புப் பயிற்சி பெறுவதன் மூலமாக வேலைவாய்ப்பினைப் பெறுவர்.
3. இக்கால இலக்கியங்களை அறிந்து கொள்வர்.

Unit-I	UNIT TITLE	4-- Hours
	அலகு 1 இக்கால இலக்கியம் 1. பாரதியார் கவிதை - பாரததேசம் 2. அழ. வள்ளியப்பா - குழந்தைக் கவிதை 3. கவிக்கோ அப்துல் ரகுமான் - காக்கைச்சோறு 4. அப்துல் காதர்- பேனாமினார் - ஈரப்பிறையே	

Unit-II	UNIT TITLE	4-- Hours
	அலகு 2 கடிதங்கள் 1. அலுவலக கடிதம் 2. உறவுமுறைக் கடிதம் 3. மொழிபெயர்ப்புக் கலை (மூன்றில் ஒருபங்காக சுருக்குக)	

Unit-III	UNIT TITLE	4-- Hours
	அலகு 3 உரைநடை 1. கண்ணகி தேவி- ஆ. கார்மேகக் கோனார் 2. சிலம்பமும் வீர வரலாறும் 3. தமிழ் அகராதிகளின் வரலாறும் வளர்ச்சியும்	

Unit-IV	UNIT TITLE	4—Hours
	அலகு 4 நாடகம் 1. நாடகத்தின் தோற்றமும் வளர்ச்சியும் 2. நாடக வகைகள் 3. தற்கால நாடகங்கள்	

Unit-V	UNIT TITLE	4- Hours

	அலகு 5 இலக்கிய வரலாறு தமிழ் இலக்கிய வரலாறு அறிமுகம் (கவிதை, சிறுகதை, புதினம், நாடகம், உரைநடை)	

Books for Study:

அடித்தளப்படிப்பு - தமிழ் இரண்டாமாண்டு - மூன்றாம் பருவம்

Books for Reference: **பார்வை நூல்கள்**

1.மொழிபெயர்ப்பியல்- சு.சண்முக வேலாயுதம், உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை.
2.தமிழ் இலக்கிய வரலாறு- மு.அருணாசலம், நியுசெஞ்சுரி புத்தக நிலையம், சென்னை.
3.கவிஞராக-ஆ.கி.பரந்தாமனார்

SEMESTER IV				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
UBFTA401	**LANGUAGE 4**	**TAMIL IV**	**4**	**4**

Course Objectives

1. இலக்கியங்களின் வாயிலாக பக்தியுணர்வை மாணவர் அறிந்து கொள்ளுதல்
2. இலக்கியங்களின் வாயிலாக சிற்றிலக்கியங்களை மாணவர் அறிந்து கொள்ளுதல்
3. பேச்சுக்கலையின் சிறப்புகளைப் புரிந்து கொள்ளுதல்

Course Outcomes

1. பக்தி இலக்கியங்களில் வாயிலாக இறையுணர்வை மாணவர்கள் அறிவர்
2. சிற்றிலக்கியங்களை அறிவர்
3. தன்னம்பிக்கைக் கட்டுரை படிப்பதன் வாயிலாக தன்னம்பிக்கை பெறுவர்

1.

Unit-I	UNIT TITLE **அலகு 1 பக்தி இலக்கியங்கள்** 1. திருஞானசம்பந்தர் - (முதல் மூன்று பாடல்கள்) 2. ஆண்டாள் - (முதல் மூன்று பாடல்கள்) 3. உமறுப்புலவர் (கடவுள் வாழ்த்து) - (முதல் மூன்று பாடல்கள்) 4. வீரமாமுனிவர் (கடவுள் வாழ்த்து) - (முதல் மூன்று பாடல்கள்)	4-- Hours
Unit-II	UNIT TITLE **அலகு 2 சிற்றிலக்கியங்கள்** 1. நந்திக்கலம்பகம் - கையறுநிலைப் பாடல்கள் (முதல் ஐந்து பாடல்கள்) 2. குற்றாலக்குறவஞ்சி - ஐந்து பாடல்கள் 3. ஆயிஷா நாச்சியார் பிள்ளைத்தமிழ் வருகைப் பருவம் கவி.கா.மு.ஷெரிப் - (முதல் ஐந்து பாடல்கள்)	4-- Hours
		4-- Hours

Unit-III	UNIT TITLE **அலகு 3 திறனாய்வு** 1. நூல் திறனாய்வு, திரைப்படத் திறனாய்வு 2. பேச்சுக்கலை (கவிதை, கட்டுரை) 3. நேர்காணல் (பதிவு செய்தல்)	
Unit-IV	UNIT TITLE **அலகு 4 தன்னம்பிக்கைக் கட்டுரை** 1. உன்னை வெல்க - அப்துல் ரஹீம் 2. சிகரம் தொடு - தமிழ்ச்செம்மல் முனைவர் இரத்தின நடராசன் 3. வெற்றிப் படிக்கட்டு - முனைவர் பி.கே.மனோகரன்	4-- Hours
Unit-V	UNIT TITLE **அலகு 5 இலக்கிய வரலாறு** தமிழ் இலக்கிய வரலாறு அறிமுகம் (பக்தி இலக்கியங்கள், சிற்றிலக்கியங்கள்)	4- Hours

Books for Study:

அடித்தளப்படிப்பு - தமிழ் இரண்டாமாண்டு - நான்காம் பருவம்

Books for Reference: பார்வை நூல்கள்

1. தமிழ்ச் சிற்றிலக்கியங்கள் - டாக்டர் இரா.சந்திரசேகரன், கௌரா பதிப்பகம், சென்னை
2. பேச்சாளராக, குமரி ஆனந்தன், கலைஞன் பதிப்பகம், தி.நகர், சென்னை
3. தமிழ் இலக்கிய வரலாறு – பூவண்ணன்

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
UBTANM 31	**JONON-MAR**	**ITHAZHIYAL I**	**2**	**1**

Course Objectives

1. மொழித்துறையில் வளர்ந்து வருகின்ற இதழியல் கலை பற்றி மாணவர் அறிந்து கொள்ளுதல்
2. இதழியல் கலையின் சில நுணுக்கங்களை புரிந்து கொள்ளுதல்
3. தமிழ்மொழி வழி இதழியலை மாணவர்க்குக் கற்பித்தல்

Course Outcomes

1. மாணவர் படைப்பாற்றலைப் பெறுவர்
2. இதழியல் துறையில் மாணவர்கள் வேலைவாய்ப்பைப் பெறுவர்.

Unit-I	**UNIT TITLE** **அலகு 1** 1. இதழியல் வளர்ச்சி வரலாறு 2. தமிழகத்தில் இதழியல் வளர்ச்சி 3. இதழியல் கலைச்சொற்கள்.	**2- Hours**
Unit-II	**UNIT TITLE** **அலகு 2** 1. தகவல் தொடர்பு – ஓர் அறிமுகம் 2. தகவல் தொடர்புச் சாதனங்கள் (அச்சுவழி, மின்வழித் தொடர்புச் சாதனங்கள்) 3. நவீனத் தொடர்புச் சாதனங்கள்	**2-- Hours**
Unit-III	**UNIT TITLE** **அலகு 3** 1. பத்திரிகைச் சுதந்திரம் 2. இதழ்களின் பணிகள் 3. செய்தி வகைப்பாடுகள்	**2-- Hours**
Unit-IV	**UNIT TITLE** **அலகு 4** 1. இதழியல் சட்டங்கள் 2. திரைப்படம் தோற்றமும் வளர்ச்சியும் 3. விளம்பரங்கள்	**2—Hours**
Unit-V	**UNIT TITLE**	**2- Hours**
	அலகு 5 1. செய்தி நிறுவனங்கள் 2. செய்தியாளர்கள் 3. தகவல் திரட்டுதல் (களப்பயிற்சி)	

Books for Study:

இதழியல் - இரண்டாமாண்டு - மூன்றாம் பருவம்

Books for Reference: பார்வை நூல்கள்

1. இதழியல் கலை, டாக்டர் மா.பா. குருசாமி, 117, சன்னதித் தெரு, திருச்செந்தூர் - 628 215.
2. இதழியல், கோதண்டபாணி, ஐந்திணப் பதிப்பகம், பாரதி சாலை, திருவல்லிக்கேணி, சென்னை - 600 005.
3. இதழியல், ராஜி, ஐந்திணப் பதிப்பகம், பாரதி சாலை, திருவல்லிக்கேணி, சென்னை - 600 005.

SEMESTER IV				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
UBTANM 41	NON-MAJOR	ITHAZHIYAL II	2	1

Course Objectives

1. செய்தித்தாளின் கட்டமைப்பினை அறிந்து கொள்வது
2. செய்தி தயாரிக்கும் முறையை புரிந்துகொள்வது
3. மின்னணு ஊடகங்கள் வாயிலாக தகவல்களைப் பயன்படுத்துதல்,

Course Outcomes

1. மாணவாகள் செய்தித்தாளின் வாயிலாக அறிவைப் பெறுவர்
2. இதழியல் துறையில் மாணவர்கள் பயிற்சி பெறுவர்
3. இதழியல் துறையில் மாணவர்கள் வேலை வாய்ப்பினைப் பெறுவர்.

Unit-I	UNIT TITLE அலகு 1 1. செய்தி பக்க வடிவமைப்பு 2. செய்தித்தாள் செப்பனிடுதல் 3. செய்தித்தாள் வடிவமைப்பு	2-- Hours
Unit-II	UNIT TITLE அலகு 2 1. இக்கால இதழ்கள் 2. தலையங்கம் 3. இதழ்களின் நடை	2-- Hours
Unit-III	UNIT TITLE அலகு 3 1. விடுதலைக்கு முன் இதழ்கள் 2. விடுதலைக்குப் பின் இதழ்கள் 3. சிறுபத்திரிகைகளின் சிக்கல்கள் - முனைவர் ப.சிவராஜி	2-- Hours
Unit-IV	UNIT TITLE அலகு 4 1. மின்னணு ஊடகச் செய்திகள் 2. வலையொளிச் செய்திகள் 3. புலனச் செய்திகள்	2—Hours

Unit-V	UNIT TITLE	2- Hours
	அலகு 5 1. வகுப்பறையில் செய்தி தயாரிப்பு 2. களப்பயிற்சி 3. இதழியல் வல்லுநர்களுடன் கலந்தாய்வு	

Books for Study:

இதழியல் - இரண்டாமாண்டு – நான்காம் பருவம்

Books for Reference: **பார்வை நூல்கள்**

1. இதழ் தோற்றம் வளர்ச்சி, அ.மா. சாமி, மோகன் பதிப்பகம், பாரதி சாலை, திருவல்லிக்கேணி, சென்னை-600 005.
2. விடுதலைக்கு முற்பட்ட தமிழ் இதழ்கள், இளங்கோவன், கீழைக்காற்றுப் பதிப்பகம், எல்லீசு சாலை, திருவல்லிக்கேணி, சென்னை-600 005.
3. எழுதுவது எப்படி? (3 பகுதிகள்), பழநியப்பா பிரதர்ஸ், மதுரை.

Course Code	Category	Course Title	Hours	Credit
UBFEN301	Generic Elective	ENGLISH PAPER -III	6	5

Course Objectives

1. To promote the linguistics competence into the minds of the young learners through teaching the basics of English.
2. To acquaint them with situational dialogues
3. To expose the learners to the production skills.
4. To expose the learners to receptive skills
5. To acquaint the learners with different speaking contexts.

Unit-I	PHILOSOPHY AND HUMAN VALUES	15 Hours

1. Philosophy and education
2. Sources of values

Unit-II	SELECTED SCENES FROM SHAKESPEARE	15 Hours

1. Merchant of Venice-Trial Scene
2. Julius Caesar-Antony's Speech

Unit-III	COMMUNICATIONSKILLS	14 Hours

1. Situational Dialogues
2. Virtual Interview Etiquette

Unit-IV	GRAMMAR	14Hours

1. Modal Verbs
2. Tenses
3. Framing Sentences

Unit-V	WRITINGESSAYS	12 Hours

1. Formal education and online education
2. Full-time job vs. freelance
3. Pros and Cons of Social Media

Books for Study:

1. Foundation English text book printed by Islamiah College Publications.

CO	COURSE OUTCOMES: The students will be able to	Knowledge Level
CO1	Read the English prose and comprehend the moral and social values.	K1
CO2	Paraphrase and interpret the poems.	K2
CO3	Categorize personal traits and develop their personality.	K4
CO4	Articulate dialogues on their own in a given situation.	K3
CO5	Rewrite the sentences using basic grammar.	K6
	K1-Remembering/knowledge,K2-Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create	

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

SEMESTER IV

Course Code	Category	Course Title	HRS/WEEK	CREDIT
UBFEN401	Generic Elective	ENGLISH PAPER -IV	6	5

Course Objectives

1. To promote the linguistics competence into the minds of the young learners through teaching the basics of English.
2. To acquaint them with situational dialogues
3. To expose the learners to the production skills.
4. To expose the learners to receptive skills

To acquaint the learners with different speaking contexts

Unit-I	PHILOSOPHY AND HUMAN VALUES	15 Hours

1. Philosophy and education
2. Sources of values

Unit-II	SELECTED SCENES FROM SHAKESPEARE	15Hours

1. Merchant of Venice-Trial Scen
2. Julius Caesar-Antony's Speech

Unit-III	COMMUNICATIONSKILLS	14Hours

1. Situational Dialogues
2. Virtual Interview Etiquette

Unit-IV	GRAMMAR	14Hours

1. Modal Verbs
2. Tenses
3. Framing Sentences

Unit-V	WRITINGESSAYS	14Hours

1. Formal education and online education
2. Full-time job vs. freelance
3. Pros and Cons of Social Media

Books for Study:

3. Foundation English text book printed by Islamiah College Publications.

CO	**COURSE OUTCOMES:** The students will be able to	Knowledge Level
CO1	Relate and summarize the English prose and comprehend the moral and social values.	**K1,K2**
CO2	Relate and correlate nature with the life through poetry.	**K4**
CO3	Apply interpersonal skills in day to day life.	**K3**
CO4	Develop descriptive writing and interview skills.	**K6**
CO5	Reframe and Rewrite the sentences using voice and reported speech.	**K5**
	K1-Remembering/knowledge,K2-Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create	

Prepared by**: S. KHADER NAWAZ** Verified by: **K. NAZER HUSEN**

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS. /WEEK**	**CREDIT**
UBVBC301	**VBC**	**N.C.C, N.S.S, YRC & RRC**	**1**	**1**

Course Objectives:

The objectives of the course is to

1. Know about the history of NCC, its Organization and incentives of NCC.
2. Acquire knowledge of duties and conduct of NCC cadets
3. Furnish the youth representation part towards Youth Red Cross for their humanitarian commitment.
4. Equip the Young volunteers for providing significant contribution to the most vulnerable peoples.

Unit I	**NATIONAL SERVICE SCHEME AND ITS REGULAR ACTIVITIES**	**3 Hours**

History of NSS and its Objectives- Organizational structure of N.S.S. at National, State, University and College Levels - Advisory committee and their functions.

Cleaning the campus -Traffic regulation- Working with Police and traffic Police department - Working with municipality of Vaniyambadi - Working with Health Department, supporting service with Blood donation camp.

Unit II	**SPECIAL PROGRAMME AND SPECIAL CAMPING PROGRAMME**	**3 Hours**

Tree plantation and maintaining biodiversity –maintaining Vermi compose -Legal awareness - Health awareness - First-aid and disaster management-Yoga for healthy life style.

Selection of camp site and physical arrangement-Adopted Villages - Organization of N.S.S. camp through various committees and discipline in the camp - Activities to be undertaken during the N.S.S. camp - Use of the mass media in the N.S.S. activities.

Unit III	**NATIONAL CADET CORPS: AT A GLANCE**	**3 Hours**

History of NCC- NCC organization – directorate of NCC in India- Skeleton of NCC Administration –NCC training- Activities of Training ‘A’- Activities of Training ‘B’- Conduct of NCC certificate examination – NCC uniform- Promotion of NCC cadets- Aims & Advantages of NCC Training – NCC Badges of Rank- Honours and Awards- Incentives for NCC Cadets by Central and State Govts.

Unit IV	**DEFENCE SERVICES**	**3 Hours**

Indian Army- Indian Navy- Indian Air force –military History & War Heros – Battles of Indo-Pak War – Param Vir Chakra

Unit V	**INTRODUCTION TO YOUTH RED CROSS**	**3 Hours**

Introduction- History of Red Cross and Red Crescent Movement- Origin of Indian Red Cross Society - Principles of YRC- Academic Activities. Mission: Indian Red Cross Society - Fundamental Principles of the International Red Cross and Red - Crescent Movement- Junior/Youth Red Cross - History- Valuing the role of young people.

Books for study:

1. National Service Scheme Manual, Government of India.
2. National Cadet Corps – A concise Handbook of NCC Cadets for 'A', 'B' & 'C' Certificate Examination, R.K. Gupta, Ramesh Publishing house, New Delhi
3. Guidelines for Junior and Youth Red Cross, Indian Red Cross Society.

Books for References:

1. Indian First Aid Manual 2016 (7th Edition) Authorized Manual

2. Junior Red Cross Activities: Teachers Manual. October, 1918 Paperback – Import, 2 September2011

3. Basics about red cross - Published by : Indian Red Cross Society, National Headquarters.

4. Training Programme on National Programme scheme, TISS.

5. Orientation Courses for N.S.S. Programme officers, TISS.

6. Light on Yoga by B K Iyenger (Thorsons)

7. A Hand Book of NCC, Major R C Mishra,Kanti Prakash Publishers.

Web Source

1. https://www.indianredcross.org/youth/

2. https://indianredcross.org/publications/basics-of-red-cross.pdf

3.https://:indianncc.nic.in

Course Outcomes (Cos)

By the End the Course, the Students will be able to

CO1 – Imbibe the conduct of NCC Cadets

CO2 – Understand the defence services and wars of Indian army.

CO3–Equip to conduct social and health awareness programmes.

CO2 – Making awareness regarding red cross service and social activities.

CO3 – Encourage and to youth members and other students to contribute in red cross activities.

SEMESTER				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBVBC 302	**Value based course**	**Physical Education Sports II**	**1**	**1**

Course Objectives

1.To Understand The Sports and Nutrition.

2.To Make The Students Gain The Skill on Cardio Respiratory Performance And Maintaining The Fitness.

3.To Impact The Knowledge Among The Students To About Physical Activity And Health And Fitness Benefits of Sports.

UNIT-I	**Effect of Exercise on Cardio Respiratory System**	**3 Hours**

- Effect of Exercise on Cardiovascular – short term (increased Heart Rate – Blood Circulation _ Cardiac Output)
- Effect of Exercise on Cardiovascular _ Long Term (increased Size and Strength of Heart – Decrease in Resting Heart Rate)

Unit-II	**Sports and Nutrition**	**3 Hours**

- Balanced Diet & Nutrition : Macro & Micro Nutrients
- Nutritive & Non- Nutritive Components of Diet.
- Eating For Weight Control – A Healthy Weight – Food Intolerance & Food Myths.

Unit-III	**Effect of exercise on Muscular system**	**3 Hours**

- Short Term – Increased blood supply – increased muscle temperature – increase muscle flexibility.
- Long Term – Increased in strength of tendons – Increased in size and number of mitochondria

Unit-IV	**Test and Measurement in Sports**	**3 Hours**

- Motor Fitness Test – 50 M Standing start – 600 M Run/ Walk – Push Up – Pull Up- Standing Broad Jump- Shuttle Run
- Standing Broad Jump – Zig Zag Run – Medicine Ball put.
- Measurement of cardio vascular Fitness – Harvad Step Test

Unit-V	**Biomechanics and Sports**	**3 Hours**

- Meaning and importance of Biomechanics in Sports
- Types of Movements(Flexion – Extension –Abduction – Adduction)

Books For Study

1.Physical Education Book –Sports And Exercise Nutrition –William D Mcardle,-Lippincott Willams &Wilkins 2012

2. Physical Activity For Health And Fitness – Allen Jackson,-Champaign IL.Human Kinetics 2003

Books For Reference:

1. Dhanajay Shaw (2000) Mechanical Basis of Biomechanics, Sports Publication,Delhi,.

2. Bangsbo, J.(1994), Fitness training in football : A scientific approach,Bagsvared, Denmark: Hostorm.

3.Jockers, D.D (2016, 4 16) Retrieved 11 25, 2020,

Course Learning Outcomes The Students

CO 1 will be able to understand training on cardiovasular system.

CO 2 will be gain the knowledge above importance of nutritions required for maintaining the fitness of body

CO 3 will be able to understand the muscular system.

CO 4 will be acquire the knowledge of test and measurement of sports & biomechanic of sports

CO 5 will be apply to maintance there physical fitness.

SEMESTER				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBVBC401	**VBC4**	**CYBER SECURITY**	**1**	**1**

Course Objectives

1. Understand the digital security concepts.
2. Able to grasp keywords involved for secure browsing.
3. Understanding computer networks and their protocols
4. Awareness on cyber attacks and data breaches.

Unit-I	**Introduction to Cyber security**	**3 Hours**

Defining Cyberspace and Overview of Computer and Web-technology, Concept of cyber security, Issues and challenges of cyber security.

Unit-II	**Cybercrime and Cyber law**	**3 Hours**

Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks.

Unit-III	**Social Media Overview and Security**	**3 Hours**

Introduction to Social networks. Types of Social media, Social media monitoring, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Best practices for the use of Social media.

Unit-IV	**E - Commerce**	**3 Hours**

Definition of E- Commerce, Main components of E-Commerce,Elements of E-Commerce security, E-Commerce threats.

Unit-V	**Digital Payments**	**3 Hours**

Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Aadhar enabled payments, Digital payments related common frauds and preventive measures.

Books for study:

1. CyberCrimeImpactintheNewMillennium,byR.CMishra,AutherPress.Edition2010.

Books for Reference:

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
2. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)

3. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
4. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
5. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
6. Fundamentals of Network Security by E. Maiwald, McGraw Hill.

E-Resources

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understanding about digital security and measures taken to protect device from threats.	**K2**
CO2	Able to protect servers from various attacks.	**K3 K1**
CO3	Understand the basics of a computer network and security of network protocols.	**K2 K3**
CO4	Understand about cyber-attacks &data breaches and learn about the preventive measures.	**K2 K3**
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
CO1	✓		✓		✓		✓	
CO2		✓	✓	✓	✓	✓		✓
CO3	✓						✓	
CO4		✓	✓	✓	✓	✓		
CO5	✓	✓		✓		✓	✓	✓
Number of matches =23, Correlation: Moderate								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBVBC402	**Value-Based Course**	**ENTREPRENEURSHIP**	**1**	**1**

Course Objectives

1. To familiarize students with the concept and overview of entrepreneurship.
2. To impart knowledge on the basics of entrepreneurial skills and competencies.
3. To provide the students with necessary inputs for creation of new ventures and sources of finance.

Unit-I	**Introduction**	**3 Hours**

Entrepreneurship – Meaning and Importance – Factors Influencing Entrepreneurship – Characteristics of an Entrepreneur – Types of an Entrepreneur.

Unit-II	**Dimensions of Entrepreneurship**	**3 Hours**

Social Entrepreneurship – Technopreneurship – Netpreneurship -Ecopreneurship– Health Entrepreneurship – Tourism Entrepreneurship – Women Entrepreneurship.

Unit-III	**Entrepreneurship Development**	**3 Hours**

Entrepreneurship skill and Competencies – Types of Entrepreneurship Skills –Business Management Skills – Financial Skills – Analytical and Problem-Solving Skills.

Unit-IV	**Entrepreneurship Process**	**3 Hours**

Generation of Business Ideas – Opportunity Sensing and Identification – Developing a Business Proposal – Plant Location – Registration – Infrastructure – Government Clearance.

Unit-V	**Entrepreneurial Finance**	**3 Hours**

Sources of Finance – Commercial Banks and Development Banks – Business Incubation Centers – Startup India – Stand-up India – Make in India Initiative.

Books for Study

1. **Dr. S.S. Khanka,** Entrepreneurship Development - S. Chand & Co., New Delhi.
2. **Jayashree Suresh,** Entrepreneurial Development –Margham Publication, Chennai.
3. **Vasant Desai,** Dynamics of Entrepreneurial Development –Himalaya Publication.
4. **Robert D. Hisrich, Michael P. Peters & Dean A. Shepherd,** Entrepreneurship - Tata McGraw Hill Publishing Company Limited, New Delhi.
5. **CB Gupta and N.P Srinivasan,** Entrepreneurial Development, Sultan Chand Publications, New Delhi.

Books for Reference:

1. **Rabindra N. Kanungo,** Entrepreneurship and Innovation, Sage Publications, New Delhi.
2. **Holt D. H.,** Entrepreneurship New Venture Creation. New Delhi: Prentice Hall of India.
3. **Hisrich R, and Peters, M.,** Entrepreneurship. New Delhi: Tata McGraw Hill.
4. **Rajkonwar A.B.,** Entrepreneurship, Kalyani Publisher, Ludhiana.
5. **Charantimath,** Poornima, Entrepreneurship Development and Small Business Enterprises, Pearson Education, New Delhi.

e-Resources:

1. http://www.mbaexamnotes.com/entrepreneur.html
2. http://www.mim.ac.mw/books/Bygrave's%20Entrepreneurship%202nd%20Edition.pdf
3. https://www.slideshare.net/esmatullahamini1/entrepreneurial-developmentbook-pdf

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concept of entrepreneurship.	K1, K2
CO2	Know the dimensions of entrepreneurship.	K1, K2
CO3	Develop understanding of entrepreneurship skills and competencies.	K1, K2
CO4	Comprehend entrepreneurial process for initiating new ventures.	K1, K2
CO5	Know sources of finance to entrepreneurs.	K1, K2
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 = 14, Correlation: Moderate								

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**
UBEN3001	**Discipline Specific Core Course**	**DRAMA**	**5**	**4**

Course Objectives

1. 1. To understand the past history of all sections of the society from gentry to humble craftsmen
2. To acquaint students with the changing times of linguistic development of the language.
3. To capture the main ideas in the dramatic scripts.

Unit-I	**ELEMENTS OF DRAMA**	**12 Hours**

Origin of Drama
Technical Aspects of Drama
Plot, Character, Genre, Diction, Dialogue, Setting, Space, Theme.
Christopher Marlowe: Doctor Faustus

Unit-II	**DRAMA- DETAILED**	**12 Hours**

Bernard Shaw: Mrs. Warren Profession

Unit-III	**DRAMA- NON-DETAILED**	**12 Hours**

Oliver Goldsmith: The Vicar of Wakefield

Unit-IV	**DRAMA- NON-DETAILED**	**12Hours**

John Osborne: The Entertainer

Unit-V	**DRAMA- NON-DETAILED**	**12Hours**

Samuel Beckett: Act Without Words I

Books for study:

1. **Mrs. Warren Profession: Maple Classics, 2014- Bernard Shaw**
2. **The Vicar of Wakefield: Dynamic Classic Publisher, 1999-Oliver goldsmith**
3. **Doctor Faustus Paperback-Marlowe Christopher**
4. **The Entertainer Paperback – john Osborne**
5. **Act Without Words- I by Samuel Beckett**

Books for Reference:

1. **Mrs. Warren Profession: Maple Classics, 2014- Bernard Shaw**
2. **The Vicar of Wakefield: Dynamic Classic Publisher, 1999-Oliver goldsmith**
3. **Doctor Faustus Paperback-Marlowe Christopher**
4. **The Entertainer Paperback – john Osborne**
5. **Act Without Words- I by Samuel Beckett**

E-Resources:

1. http://www.gutenberg.org/files/8121/8121/-h/8121-h.htm
2. http://www.archive.org/stream/productionbookfo100bake_djuv.txt.
3. http://www.self.gutenberg.org/articles/eng/Rhinoceros
4. https://www.bl.uk/collection-items/waiting-for-godot-by-samuelbeckett-1954-american
5. https://www.scribd.com/book/387783819/The-Balcony-A-Play
6. https://www.britannica.com/topic/The-Robbers
7. https://www.gutenberg.org/files/6782/6782-h/6782-h.htm
8. https://www.sparknotes.com/drama/missjulie/summary/
9. https://www.britannica.com/topic/Miss-Julie

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

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	To explain human righteousness and morality of a good citizen	K5
CO2	To justify how body and mind can be changed if true guidance given	K4
CO3	To measure the perspectives of a city and village dweller	K1
CO4	To recommend the learners the importance of Unity	K2
CO5	To maximize the thought that every individual is a significant contributor of the society	K6
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 = 26 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**
UBEN3002	**Discipline Specific Core Course**	**ENGLISH POETRY**	**4**	**3**

Course Objectives

1. To comprehend different themes and period in which a poem was written and the techniques applied by listed poets.
2.To analyze how the figurative language is used as medium to set the tone.
3.To understand the central idea of the poem and read with perfect rhythm and rhyme.
4. To make the learners recognize poetic devices and techniques
5. To make the learners interpret the literal meaning of a poem

Unit-I	**POETRY (DETAILED)**	**10 Hours**

John Milton: On His Blindness
William Wordsworth: The World Is Too Much With Us

Unit-II	**POETRY (DETAILED)**	**10 Hours**

John Keats: Ode to a Nightingale, Ode to Autumn
P. B. Shelley: Ode to the West Wind

Unit-III	**POETRY**	**10 Hours**

Alexander Pope: The Rape of the Lock

Unit-IV	**POETRY**	**9 Hours**

Mathew Arnold: Thyrsis

Unit-V	**POETRY**	**9 Hours**

W.B. Yeats: The Second Coming

Books for study:

1. **Kurzmann, Antje. Analysis of Shelley's Ode to the West Wind. Germany, GRIN Verlag, 2007.**
2. **Pope, Alexander. The Rape of the Lock: An Heroi-Comical Poem. N.p., CreateSpace Independent Publishing Platform, 2018.**

Books for Reference:

1. **McLane, Maureen N.. The Cambridge Companion to British Romantic Poetry. N.p., Cambridge University Press, 2008.**
2. **The Romantic Poets. Germany, Wiley, 2008.(**Editor:Uttara Natarajan)

E-Resources:

1. https://www.owleyes.org/text/on-his-blindness/read/text-poem#root-418824-1
2. https://www.litcharts.com/poetry/william-wordsworth/the-world-is-too-much-with-us
3. https://www.bl.uk/romantics-and-victorians/articles/an-introduction-to-ode-on-a-

nightingale#:~:text='Ode%20to%20a%20Nightingale'%20is,and%20Other%20Poems%20(1820).
4. https://www.bl.uk/romantics-and-victorians/articles/to-autumn-a-city-dwellers-perspective
5. https://www.studocu.com/in/document/aligarh-muslim-university/victorian-and-modern-poetry/thyrsis-a-pastoral-elegy-by-matthew-arnold/20357191
6. https://poemanalysis.com/william-butler-yeats/the-second-coming/.

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 themes, periods, and poets' approaches.	K2
CO2	Examine how figurative language sets the scene and tone.	K4
CO3	Apply the approaches and grasp the poem's theme and read with flawless rhythm and rhyme.	K3
CO4	Analyse poetic methods and skills.	K4
CO5	Perceive poetry literally and write poetry.	K6
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 = 25				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**
UBENAL31	**OTHER ELECTIVE COURSE**	**ALLIED- THE HISTORY OF ENGLISH LITERATURE (1851-1950)**	**5**	**4**

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		

Books for study:

Hudson, William Henry. An Outline History of English Literature. India, Atlantic Publishers & Distributors, 1999.

Books for Reference:

Long, William J.. English Literature. India, Copia Interactive, LLC, 2021.

E-Resources:

1. http://www.unife.it/letterefilosofia/lm.lingue/insegnamenti/letteratura-inglese-ii/materiale-didattico-2019-2020/Edward%20Albert-%20History%20of%20English%20Literature-%20OUP-%202000.pdf
2. https://www.academia.edu/36004761/David_Daiches_A_Critical_History_of_English_Literature_vol_I
3. http://www.englandandenglishhistory.com/english-social-history/anglo-saxon-england-449-ad-to-1066-ad
4. https://khandyeducation.weebly.com/1550-1630.html
5. http://englishlanguagelearningforum.blogspot.com/2009/03/age-of-pope-1700-1750.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 evolution of language and literature	**K2**
CO2	Compare the society's 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		

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

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

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBENAL32	**OTHER ELECTIVE COURSE**	**NEW CRITICISM IN CONTEMPORARY LITERATURE**	**3**	**3**

Course Objectives

1. To picture the evolution from Old English (450-1100 AD), Middle English (1100-circa 1500 AD) to Modern English (since1500)
2. To portrait the words that has been passed up till now, coined by Roman merchants and soldiers
3. To understand the cultural, artistic, political and economic rebirth
4. To paint the idea of what life was like in fourteenth century

Unit-I	**INTRODUCTION**	**8 Hours**
Unit-II	**HISTORY**	**7 Hours**
Unit-III	**DEFINITION AND ORIGINS OF NEW CRITICISM**	**7 Hours**
Unit-IV	**NEW CRITICISM THEORY**	**7Hours**
Unit-V	**CHIEF EXPONENTS OF NEW CRITICISM**	**7 Hours**

Books for study:

1. Contemporary Literary Criticism, Sharad Rajimwale, Rama Brothers Publishers, 2022
2. Modern Literary Criticism and Theory: A History, M.A.R. Habib, Wiley Blackwell Publishers, 2007

Books for Reference:

1. A Modern Criticism on Language and Literature, Dr.Veerendra Kumar, Mishra, Arjun Publishing House

E-Resources:

1. https://englishsummary.com/new-criticism/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Compare and contrast the works of different writers	**K1, K2**
CO2	Infer with the ideas of different authors	**K2**
CO3	Analyze ideas associated with human relationships for prospective development	**K4**
CO4	Evaluate from life experience that desire and happiness are just a little proportion	**K5**
CO5	Create the patriotism through prose	**K6**

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 = 26					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

Prepared by**: S. KHADER NAWAZ** Verified by: **K. NAZER HUSEN**

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBEN4001	**DISCIPLINE SPECIFIC CORE COURSE**	**SHAKESPEARE**	**6**	**5**

Course Objectives

1. 1.To understand the Elizabethan and Jacobean Age
2. To interpret the strategically-employed structure in the tragedy play.
3. To discuss the Shakespearean language and expression.

Unit-I	**ROMANTIC COMEDY(DETAILED)**	**15 Hours**
Twelfth Night		
Unit-II		**15 Hours**
The Tempest		
Unit-III	**TRAGEDY(DETAILED)**	**14 Hours**
Othello		
Unit-IV	**ROMAN PLAY**	**14 Hours**
Antony and Cleopatra		
Unit-V	**WOMEN IN SHAKESPEARE'S WRITING**	**14 Hours**

Desdemona in Othello
Julia in Two Gentle Men of Verona
Helena in A Midsummer Night's Dream
Rosalind in As You Like It
Miranda in Tempest

e-Books for study:

1.https://www.kobo.com/us/en/ebook/twelfth-night-59
2.https://www.ebooksread.com/authors-eng/william-shakespeare/twelfth-night-018.shtml
3.http://www.gutenberg.org/ebooks/1796
4.https://www.globalgreyebooks.com/antony-and-cleopatra-ebook.html
5.https://www.thoughtco**.com/introducing-shakespeares-women-2984938**

Books for Reference:

Peter Ackroyd Shakespeare: The Biography Anchor Publisher, Nov.14, 2006.
Kurian Anna, Shakespeare, Orient Blackswan, 2016.

E-Resources:

1.https://www.sparknotes.com/shakespeare/twelfthnight/summary/
2. https://www.nosweatshakespeare.com/play-summary/tempest/
3.http://www.shakespeares-sonnets.com/sonnet/18
4.https://www.historic-uk.com/HistoryUK/HistoryofEngland/William-Shakespeare/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understands the Elizabethan age.	K2
CO2	Increases the expressions of language.	K1
CO3	Develops how idea can be implemented in different context.	K4
CO4	Creates the process by comparing two or more works of different dramatists.	K6
CO5	Enhances the writing skills.	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 = 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

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

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBEN4002	**Discipline Specific Core Practical**	**AMERICAN LITERATURE**	**3**	**3**

Course Objectives

1. 1. To create an awareness of historical, cultural and formal issues.
2. To make learner to compete with complex literary texts.
3. To make learners to use them as primary and secondary sources.

Unit-I	**POETRY**	**8 Hours**

Emily Dickinson- Success counted sweetest
Edgar Allan Poe- The Raven
Robert Frost-The Road not Taken

Unit-II	**SHORT STORY**	**7Hours**

O. Henry- After Twenty Years

Unit-III	**PROSE**	**7 Hours**

Ralph Waldo Emerson- The American Scholar

Unit-IV	**FICTION**	**7 Hours**

Ernest Hemingway-The Old man and the Sea

Unit-V	**DRAMA**	**7Hours**

Tennessee Williams- Glass Menagerie

Books for study:

Donald,Heiney&Lenteil H Essentials of Contemporary Literature of the Western World,(vol,3&4) Baron's Educational Series, 1918.
Hoffman, Daniel Contemporary Guide to American Writing Indian Reprint, OUP.Delhi, 1981.
MacGowan, Christopher Twentieth Century American Poetry Blackwell Publication, 2005

Books for Reference:

Massa, Ann American Literature in Context Methuen & Co. Ltd. London &New York, 1982.
Vinson,James Twentieth Century American Literature Macmillan, 1980

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-to-american-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	KNOWLEDGE LEVEL
CO1	Identifies the key features of prose.	K5
CO2	Clarifies the key features of poetry.	K2
CO3	Discusses the major critical approaches to literary interpretation.	K4
CO4	Understands the cultural developments of colonial America	K3
CO5	Infers the major conventions, tropes and themes.	K6
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 = 27					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

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

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBENAL41	**OTHER ELECTIVE COURSE**	**THE HISTORY OF ENGLISH LANGUAGE**	**5**	**3**

Course Objectives

1. To picture the evolution from Old English (450-1100 AD), Middle English (1100-circa 1500 AD) to Modern English (since1500)
2. To portrait the words that has been passed up till now, coined by Roman merchants and soldiers
3. To understand the cultural, artistic, political and economic rebirth
4. To paint the idea of what life was like in fourteenth century

Unit-I	**LANGUAGE CHANGE AND THE ORIGINS OF ENGLISH**	**12 Hours**
Unit-II	**INTRODUCTION TO MODERN ENGLISH GRAMMAR**	**12 Hours**
Unit-III	**THE ENGLISH RENAISSANCE AND THE ENGLISH LANGUAGE**	**12 Hours**
Unit-IV	**THE 19TH CENTURY – AMERICAN ENGLISH**	**12Hours**
Unit-V	**ARRIVAL AND DEVELOPMENT OF ENGLISH LANGUAGE IN INDIA**	**12Hours**

Books for study:

1. A History of the English Language, Albert Baugh and Thomas Cable, Routledge, 2012
2. A History of English Language, Richard Hogg and David Denison, Cambridge University Press, 2006

Books for Reference:

1. An Outline History of English Language, Frederick Wood, 2017

E-Resources:

1. https://core.ac.uk/download/pdf/326229904.pdf
2. https://en.wikipedia.org/wiki/History_of_the_English_language_%28education%29
   3.http://www.studyenglishtoday.net/english-language-history.html
   4.http://www.open.edu/openlearn/languages/english-language/the-history-english-ten-minutes
3. https://www.barnesandnoble.com/w/the-renaissance-hourly-history/1131581378;jsessionid=AA1670C84C3E87B3A63499E19AB676C4.prodny_store01-atgap16?ean=2940153196770
4. https://www.britannica.com/topic/English-language
5. https://papyr.com/hypertextbooks/grammar/cl_intro.htm
6. https://www.examweb.in/short-note-old-english-characteristics-features-5315#:~:text=Old%20English%20indicates%20the%20relation,upon%20the%20consideration%20of%20s
7. https://public.oed.com/blog/nineteenth-century-english-an-overview/
8. https://guides.lib.jmu.edu/c.php?g=642733&p=4527834

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Define the essential literary forms in literature	**K1**
CO2	Sketch the literary forms in a given text	**K3**
CO3	Paraphrase poetry, play, novel and short story	**K2**
CO4	Contrast the literary genres, fiction and non-fiction	**K4**
CO5	Write the appreciation of literary texts	**K6**
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 = 30					**Correlation =Very High**			

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

Prepared by: **S. KHADER NAWAZ** Verified by: **K. NAZAR HUSEN**

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBENAL42	**OTHER ELECTIVE COURSE**	**AMERICAN LITERARY HISTORY**	**3**	**3**

Course Objectives

1. To introduce the learners to the early American History.
2. To know different periods and thoughts.
3. To acquaint the learners with the colonial impact on the American Literary History
4. To understand how literature created national identity.
5. To understand political and social ideas

Unit-I	**AMERICAN LITERATURE DURING THE COLONIAL**	**8 Hours**
Unit-II	**THE MAKING OF AMERICAN LITERATURE (1800 – 1865)**	**7 Hours**
Unit-III	**NOVEL**	**7 Hours**
One of the earliest American Novels, a struggle to find a unique American voice – William Hillbrown's *Power of Sympathy (1789)*		
Unit-IV	**NINETEENTH CENTURY POETRY**	**7 Hours**
Walt Whitman, Emily Dickinson		
Unit-V	**COLONIAL LITERATURE**	**7 Hours**
Captain John Smith; Political Writing – Samuel Adams, Benjamin Franklin and Thomas Pain		

Books for study:

1.History of American Literature, Tilak, Prakash Book Depot, 2020

2.American Literature –A Journey of Literary History and Criticism, T.K. Nagarajan, Swastik Publications, 2012

Books for Reference:

1. A Literary History of America, Barrett Medell, Classic Reprint Series, Forgotten Book Publishers

E-Resources:

1. https://www.biography.com/writer/washington-irving
2. https://www.biography.com/writer/edgar-allan-poe
3. https://www.britannica.com/biography/Mark-Twain
4. https://www.ucg.ac.me/skladiste/blog_22930/objava_67636/fajlovi/A%20Brief%20History%20of%20American%20Literature.pdf
5. The Oxford Companion to American Literature-James D. Hart
6. American Literature of the Nineteenth Century –An anthology, Eurasia Publishing House-New Delhi'
7. American Literature 1890-1965, an Anthology, Eurasia Publishing House, New Delhi.
8. https://www.biography.com/writer/emily-dickinson
9. Studies in Classical American Literature, Lawerence H.D.
10. Modern American Literature, Rajeswar Mittapalli.

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understanding cross-cultural literary works	**K1, K2**
CO2	Comprehending the influential principles in literary work creation	**K2,K3**
CO3	Understanding literary expression to protest opression	**K2**
CO4	Evaluating Societal thinking reforms in poetry	**K5**
CO5	Analysing literary forms during colonial era	**K4**
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 = 25					Correlation = High			

<u>Mapping Correlation Benchmark</u>

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**
PBEN3001	**Discipline Specific Core Course**	**MODERN AND POST MODERN LITERATURE**	**6**	**4**

Course Objectives

1. 1. To get the glimpse of modern language, theme and ideology.
2. To understand the works of modern thinkers.
3. To create awareness of diverse literary cultures.

Unit-I	**MANIFESTOS AND MODERNISMS**	**15 Hours**

INTRODUCTION AND BACKGROUND
THE EARLY MODERNPERIOD
MODERNISM
MODERNIST LITERATURE

Unit-II	**THE WASTE LAND-PASSAGE ANALYSIS**	**15 Hours**

T.S. ELIOT-THE WASTE LAND-ANALYSIS
IMAGERY-LANGUAGE-ALLUSION-THEME-IDEOLOGY
THE BURIAL OF THE DEAD
WHAT THE THUNDER SAID

Unit-III	**THE SUN ALSO RISES- PASSAGE ANALYSIS**	**14 Hours**

IMAGERY-LANGUAGE-ALLUSION-THEME-IDEOLOGY
CHAPTERS- VIII – X

Unit-IV	**GRAVITY'S RAINBOW- THOMAS PYNCHON**	**14 Hours**

IMAGERY-LANGUAGE-ALLUSION-THEME-IDEOLOGY

Unit-V	**THE BOOK OF SAND –JORGE LUIS BORGES**	**14 Hours**

IMAGERY-LANGUAGE-ALLUSION-THEME-IDEOLOGY

e-Books for study:

1. https://canvas.uw.edu/courses/1145907/assignments/3775797
2. https://canvas.uw.edu/courses/1145907/assignments/syllabus
3. nterestingliterature.com/2016/10/a-summary-and-analysis-of-t-s-eliot-the-waste-land/
4. https://www.britannica.com/topic/The-Sun-Also-Rises
5. https://www.britannica.com/topic/The Book of Sand
6. https://www.britannica.com/topic/Gravity's rainbow

https://www.litcharts.com/lit/ceremony/section-7

e-Books for Reference:

1. **https://www.goodreads.com/book/show/154505.Postmodernism_for_Beginners**
2. **https://www.sparknotes.com/poetry/eliot/section2/s**
3. **https://www.sparknotes.com/lit/sun/**
4. **https://www.sparknotes.com/lit/ceremony/section7/**
5. **https://www.supersummary.com/tropic-of-orange/summary/**

E-Resources:

1. **https://www.goodreads.com/book/show/154505.Postmodernism_for_Beginners**

2. https://www.sparknotes.com/poetry/eliot/section2/s
3. https://www.sparknotes.com/lit/sun/
4. https://www.sparknotes.com/lit/ceremony/section7/
5. https://www.supersummary.com/tropic-of-orange/summary/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Knowing key ideas and texts and intellectual shifts in reading the culture, language and literature.	K1
CO2	Ideals with ideas and concepts of modernism	K2
CO3	Ideas associated with movements like structuralism and post structuralism.	K5
CO4	Deals with changing notions of the relationship between humans and nature	K4
CO5	Recurrence in later social, historical, cultural and literary contexts.	K6
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 = 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

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

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBEN3002	**DISCIPLINE SPECIFIC CORE COURSE**	**LITERARY THEORY AND CRITICISM- I**	**6**	**4**

Course Objectives

1. To expose the learners to the elements of literature and classical criticism.
2. To introduce the students to the concept of critical analysis.
3. To familiarize the learners to interpret the contexts.
4. To compare and contrast different narratives and genres.
5. To paraphrase the given context into readable segments.

Unit-I		**15 Hours**

Aristotle: poetics

Unit-II		**15 Hours**

Samuel Johnson – Preface to Shakespeare

Unit-III		**14 Hours**

P.B. Shelley: A Defence For Poetry
Thomas Stearns Eliot-Tradition And Individual Talent

Unit-IV		**14 Hours**

Ivor Armstrong Richards-Four Kinds Of Meaning
S.N. Gupta: The Theory Of Rasa

Unit-V		**14 Hours**

Cleanth Brooks: Language Of Paradox
Ivor Armstrong Richards-Four Kinds Of Meaning

Books for study:

Upstone, Sara. Literary Theory: A Complete Introduction. United Kingdom, John Murray Press, 2017.
Literary Theory and Criticism: An Oxford Guide. , Oxford University Press, 2006.

Books for Reference:

Goulimari, Pelagia. Literary Criticism and Theory: From Plato to Postcolonialism. United Kingdom, Taylor & Francis, 2014.

E-Resources:

1. https://interestingliterature.com/2021/07/sir-philip-sidney-an-apology-for-poetry-summary-analysis/
2. https://literariness.org/
3. https://ardhendude.blogspot.com/2012/02/dr-samuel-johnsons-preface-to.html
4. https://www.josbd.com/tradition-individual-talent-t-s-eliot/
5. https://www.literatureworms.com/2020/07/four-kinds-of-meaning-by-i-richards.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	Explore historical, cultural and formal issues	**K1,K2**
CO2	Apply literary theories in project	**K3**
CO3	Interpret the literary texts	**K3**
CO4	Analyse the narratives and genres	**K4**
CO5	Comprehend a text in the light of literary criticism	**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 =29Correlation =Very High								

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

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

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBEN3003	**DISCIPLINE SPECIFIC CORE COURSE**	**ENGLISH LANGUAGE TEACHING**	**5**	**4**

Course Objectives

1. To develop speaking and writing skills.
2. To enhance fluency and comprehension of the language.
3. To familiarize with the 44 sounds in the language.
4. To reflect the individual's personality through language.
5. To develop the concepts through the help of technology.

Unit-I		**12 Hours**
Psychology of Language Learning, Theories of Language Learning		
Unit-II		**12 Hours**
Methods and Approaches in Teaching English		
Unit-III		**12 Hours**
Curriculum Design, Types of Curriculum		
Unit-IV		**12 Hours**
English for Specific Purposes, English for Academic Purposes, Evidence Based Practices, Executive English Program		
Unit-V		**12 Hours**
Bringing the Outside World to the Classroom		

Books for study:

1. Howall A.P.R. A History of English Language Teaching, OUP, 1984
2. Richards, J and Rudgers, S. Approaches and Methods in Language Teaching, CambridgeUniversity Press, 2001
3. David Nunan, Language Teaching Methodology, Prentice Hall, 1991
4. Dr. S.V. Shrangare,English Language Teaching,2011
5. https://www.fluentu.com/blog/theory-of-language-learning/

Books for Reference:

1. https://files.eric.ed.gov/fulltext/ED512896.pdf
2. http://www.huntesl.com/a-brief-look-at-the-different-esl-teaching-approaches-and-methods/
3. https://www.wellesley.edu/careereducation/resources/curriculum-
4. https://www.journals.elsevier.com/english-for-specific-purposes
5. https://www.fluentu.com/blog/business-english/executive-english-training/

E-Resources:

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Promoting linguistic competence of the learner	**K3**
CO2	Developing production and receptive skills	**K4**
CO3	Enhancing the language to suit in different context	**K5**
CO4	Adapting to the global economy and the current markets with respect to English Language Skills	**K6**
CO5	Reflecting the individual's personality through language	**K6**
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 = 27					**Correlation = High**			

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

Prepared by: **S. KHADER NAWAZ** Verified by: **K. NAZER HUSEN**

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBEN3004	**Discipline Specific Core Course**	**SUBALTERN LITERATURE**	**5**	**4**

Course Objectives

1. To create an awareness of historical, cultural and formal issues.
2. To make students proficient with complex literary texts.
3. To develop the critical approaches when dealing with text.

Unit-I	**SUBALTERN STUDIES**	**12 Hours**

A BRIEF HISTORY OF SUBALTERNITY

Unit-II	**SUBALTERN METHODOLOGY**	**12 Hours**

COLONIAL HISTORIOGRAPHY
MARXIST METHOD
ETHNOGRAPHY
MICRO THEORY AND METHOD
SUBALTERN CRITIQUE

Unit-III	**PEASANTRY AND SUBALTERN STUDIES**	**12 Hours**

CAPITAL, CLASS AND COMMUNITY
PEASANT MOVEMENT AND INDIAN NATIONALISM

Unit-IV	**SHORT STORY**	**12 Hours**

MAHESWATA DEVI-DRAUPATI

Unit-V	**NOVEL**	**12 Hours**

PREMCHAND- THE SHROUD

E-Books for study:

1. https://www.sas.upenn.edu/~dludden/ReadingSS_INTRO.pdf
2. https://www.britannica.com/topic/subaltern-history
3. http://egyankosh.ac.in/bitstream/123456789/44468/1/Unit-19.pdf
4. https://methods.sagepub.com/reference/the-sage-encyclopedia-of-communication-research-methods
5. http://egyankosh.ac.in/bitstream/123456789/44333/1/Unit-25.pdf

Books for Reference:

1. https://www.sas.upenn.edu/~dludden/ReadingSS_INTRO.pdf
2. http://pages.ucsd.edu/~rfrank/class_web/ES-200C/Articles/Guha.pdf
3. http://www-personal.umd.umich.edu/~delittle/Marxism%20and%20Method%203.htm
4. https://selfstudyhistory.com/2015/02/12/nationalism-and-the-peasant-movements/
5. https://sotosay.wordpress.com/2009/10/04/tamil-dalit-literature-quotations/

E-Resources:

1. https://www.sas.upenn.edu/~dludden/ReadingSS_INTRO.pdf
2. http://pages.ucsd.edu/~rfrank/class_web/ES-200C/Articles/Guha.pdf
3. http://www-personal.umd.umich.edu/~delittle/Marxism%20and%20Method%203.htm

4. https://selfstudyhistory.com/2015/02/12/nationalism-and-the-peasant-movements/
5. https://sotosay.wordpress.com/2009/10/04/tamil-dalit-literature-quotations/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Knowing key ideas and texts and intellectual shifts in reading the culture, language and literature.	K2
CO2	Ideals with ideas and concepts of Subaltern Literature.	K1
CO3	Associates with peasant movements and nationalism.	K4
CO4	Deals with changing notions of the relationship between humans and nature.	K3
CO5	Recurrence in later social, historical, cultural and literary contexts.	K5 &K6
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 = 26					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

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

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBENVB31	**VALUE BASED COURSE**	**RESEARCH METHODOLOGY AND ETHICS**	**3**	**3**

Course Objectives

1. To introduce the students to the concept of research.
2. To enable them to understand the stages of research.
3. To familiarize the learners to the procedures involved in research.
4. To sensitize them to the requirements of cohesion and coherence in continuous composition
5. To communicate to a range of audience

Unit-I	**MEANING AND NATURE OF RESEARCH**	**8 Hours**

What is research?- The fundamentals of Research- Characteristics of Research Types of research - Qualities of a Good Researcher

Unit-II	**MATERIALS AND TOOLS OF RESEARCH**	**7 Hours**

Primary and Secondary sources: Books, Anthologies, Biographies, Thesauruses, Encyclopedia, Conference proceedings, Unpublished theses, Newspaper articles, Journals, e-journals, Monographs, Translations, Web references, Library catalogues, Literature Resource Center, Govt. publications, Special libraries, Advanced study centers, Virtual libraries, Web search engines

Unit-III	**RESEARCH IN LITERATURE AND LANGUAGE**	**7 Hours**

Literary research and research in other Disciplines
Literary research-Interpretative, Theoretical, Biographical etc
Research methods in Linguistics
Research methods in Literature
Emerging areas of research in language and literature
Use of literary and linguistic theories in research

Unit-IV	**CONDUCTING RESEARCH**	**7 Hours**

Literature Review
Documentation styles (MLA, APA etc)
Plagiarism

Unit-V	**PRESENTATION OF RESEARCH**	**7 Hours**

Format of the Thesis -Language of the thesis- Research Ethics- Introductions and conclusions - Presentation of findings - Suggestions for future research

Books for study:

Hunt, Andy (2005), Your Research Project, New Delhi: Foundation Books

Abdul Rahim, F. (2005), Thesis Writing: A Manual for Researchers (New Delhi: New Age International)

Gibaldi, Joseph (6thedn. 2003), MLA Handbook for Writers of Research Papers,New York: MLA Association

Eliot, Simon and W. R. Owens (4thedn. 1998), A Handbook to Literary Research, London: Routledge & Open University

Richards, Jack C. 1972. An Introduction to Error Analysis. London: Longman.

Books for Reference:

1. Stren, H.H. 1983. Fundamental Concepts of Language Teaching Oxford University Press.
2. Yalden, Janice. 1987. Principles of Course Design for LanguageTeaching , Cambridge University Press.
3. C.R. Kothari and Gaurav Garg, Research Methodology-Methods and Techniques:New Age International Publishers
4. Santosh Yaday, Research and Publication Ethics: Ane Books Pvt.Ltd, Ansari Road, New Delhi.
5. Deepak Chawla and NeehaSondhi, Research Methodology-Concepts and Cases:second edition, New Delhi

E-Resources:
https://www.slideshare.net/AbhaPandey3/research-methodology-for-research-in-english-31535071

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 concept of research	K1,K2
CO2	Analyse the different research methodologies	K4
CO3	Equip themselves with the cohesiveness and coherence necessary for composition	K3
CO4	Apply research ethics throughout the research process	K6
CO5	Communicate with diverse audience	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 = 31Correlation =Very 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**
PBENDE31	**DISCIPLINE SPECIFIC ELECTIVE COURSE**	**INTERPRETATION OF LITERATURE**	**5**	**3**

Course Objectives

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

Unit-I	**INTRODUCTION**	**12Hours**

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"

Books for study:
Euron, Paolo. Aesthetics, Theory and Interpretation of the Literary Work. Netherlands, Brill, 2019.

Books for Reference:
Juhl, Peter D.. Interpretation: An Essay in the Philosophy of Literary Criticism. United States, Princeton University Press, 2014.

E-Resources:
1. https://pressbooks.online.ucf.edu/strategies/chapter/interpreting-literary-works/
2. https://www.speechanddebate.org/wp-content/uploads/Interpretation-Textbook.pdf

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 methods of interpretation of literature	K1,k2
CO2	Comprehend the strategies of interpretation	K3
CO3	Critically analyse a poem	K4
CO4	Interpret the meaning in prose genre	K6
CO5	Approach a play critically	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 = 29Correlation =Very 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

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

SEMESTER III				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
PAENEP32	CORE BASED ELECTIVE 3	SOUTH ASIAN LITERATURE IN TRANSLATION	5	3

Course Objectives

1. To highlight the cultural, political and social identity
2. To build interest in variety of literary texts.
3. To analyze the history , culture and races.
4. To examine the contextual reflections carefully.
5. To understand the emotions of writers.

Unit-I		12 Hours

INTRODUCTION

FLORA DREW: RED DUST

Unit-II		12 Hours
PHAN THANH HAO & FRANK PALMOS:THE SORROW OF WAR		
Unit-III		**12 Hours**
JEFFERY ANGLES:HIKIKOMORI: ADOLESCENCE WITHOUT END		
Unit-IV		**12 Hours**
VINAY DHARWADKER : KABIR: THE WEAVER'S SONGS		
Unit-V		**12 Hours**
REV. W.H. DREW AND REV. JOHN LAZARUS: THIRUKKURAL		

e book/Books for Study:

1. https://www.theguardian.com/books/2001/jun/10/travel.travelbooks
2. https://sites.google.com/site/sorrowofwarbybaoninh/summary-of-sorrow-of-war
3. https://www.researchgate.net/publication/272008250_Hikikomori_Adolescence_Without_End
4. https://www.projectmadurai.org/pm_etexts/pdf/pm0153.pdf
5. https://archive.org/details/THIRUKKURALEnglishTranslationAndCommentaryProjectMadurai

e/notes Books for Reference:

1. https://www.scribd.com/book/165869127/Red-Dust-A-Path-Through-China
2. https://www.gradesaver.com/the-sorrow-of-war
3. http://www.academia.edu/9948534/Hikikomori_Adolescence_Without_End_by_Saito_Tamaki?auto=download

CO	**COURSE OUTCOMES:** The students will be able to	Knowledge Level
CO1	Make use of notable 19th century creation of literary work.	**K1, K2**
CO2	Appreciate the poetic devices and techniques.	**K4**
CO3	Analyze the poems and prose critically	**K5**
CO4	To compare the urbanization of the working classes of the past and present century.	**K6**
CO5	To organize an ideal social set up inferring from the ideas from the writers.	**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)

Course Outcomes (CLOs)	Programme Learning Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓		✓		✓			✓
CO2	✓		✓		✓			
CO3	✓	✓			✓		✓	✓
CO4	✓				✓	✓	✓	✓
CO5		✓	✓			✓	✓	✓

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

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 III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBENDE33	**DISCIPLINE SPECIFIC ELECTIVE COURSE**	**AESTHETICS IN ENGLISH LITERATURE**	**5**	**3**
Course Objectives				
1. To analyze grammar and syntax aesthetically 2. To interpret a range of literatures 3. To recognize artistic discourse of literature 4. To demonstrate rhetoric awareness in writing 5. To perform comprehensive review of literature				
Unit-I				**12 Hours**
Aestheticism in English Literature				
Unit-II				**12Hours**
Artistic Uses of Language				
Unit-III				**12 Hours**
The Economics of Living Poetically				
Unit-IV				**12 Hours**
Literature and Emotions				
Unit-V				**12 Hours**
The Cognitive and Ethical Values of Literature				
Books for study: 1.Aesthetics and Literature, David Davies, Bloombury Publishing, 2007				

2.The Aesthetics of Paradoxism, P. Georgelin, F. Smarandache, and L. Popescu American Research Press, 2002
Books for Reference: 1. Aesthetics in English Literature, H Prasad, Kunal Books Publishers, 2007
E-Resources: 1. https://www.bloomsbury.com/us/aesthetics-and-literature-9780826496126/ 2. http://fs.unm.edu/Aesthetics.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Absorbing philosophical background of literature	**K3**
CO2	Engaging in sophisticated treatment of a fascinating subject	**K3**
CO3	Demonstrating contemporary aesthetics	**K5**
CO4	Designing artistic view for language	**K3**
CO5	Creating textual complexity artistically	**K6**
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 = 28					**Correlation = HIGH**			

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

Prepared by: **S. KHADER NAWAZ** Verified by: **K. NAZER HUSEN**

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBEN4001	**DISCIPLINE SPECIFIC CORE COURSE**	**LITERARY THEORY AND CRITICISM-II**	**6**	**5**

Course Objectives

1. To expose the learners to the elements of literature and classical criticism.
2. To introduce the students to the concept of critical analysis.
3. To familiarize the learners to interpret the contexts.
4. To compare and contrast different narratives and genres.
5. To relate literature and environment

Unit-I		**15 Hours**

ROLAN BARTHES- THE DEATH OF THE AUTHOR

Unit-II		**15 Hours**

GAYATRI SPIVAK- FEMINISM AND CRITICAL THEORY

Unit-III		**14 Hours**

STEPHEN GREENBLATT- RESONANCE AND WONDER

Unit-IV		**14 Hours**

CHERYLL GLOTFELTY: LITERARY STUDIES IN AN AGE OF ENVIRONMENTAL CRISIS

Unit-V		**14 Hours**

STUART HALL- CULTURAL IDENTITY AND DIASPORA

Books for study:

1. **Diaspora and Transnationalism: Concepts, Theories and Methods. Netherlands, Amsterdam University Press, 2010.**
2. Literary Theory and Criticism: An Oxford Guide. , Oxford University Press, 2006.

Books for Reference:

Goulimari, Pelagia. Literary Criticism and Theory: From Plato to Postcolonialism. United Kingdom, Taylor & Francis, 2014.

E-Resources:

1. https://interestingliterature.com/2021/10/barthes-death-of-the-author-summary-analysis/
2. https://codyjmanthei.wordpress.com/2010/11/18/feminism-and-critical-theory/
3. https://literariness.org/

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 important theoretical methodologies	K1, k2
CO2	Evaluate the relationship between literature and environment	K3
CO3	Appreciate the relevance of critical texts	K2,K4
CO4	Compare the critical thoughts of the authors	K5
CO5	Evaluate the texts from cultural and diasporic point of view	K6
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 = 29Correlation =Very 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 IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBEN4002	Discipline Specific Core Course	SHAKESPEARE STUDIES	6	4
Course Objectives				
1. To understand the Elizabethan and Jacobean Age 2. To interpret the strategically-employed structure in the tragedy play. 3. To discuss the Shakespearean language and expression.				
Unit-I				**15 Hours**
THE ELIZABETHAN THEATRE AND AUDIENCE TRENDS IN SHAKESPEARE STUDIES				
Unit-II	**COMEDY PLAY**			**15 Hours**
AS YOU LIKE IT				

Unit-III	**HISTORY PLAY**	**14 Hours**
HENRY IV PART I		
Unit-IV	**TRAGEDY PLAY**	**14 Hours**
OTHELLO		
Unit-V		**14 Hours**
KING LEAR		

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**

Books for Reference:

1. https://www.enotes.com/topics/as you like it
2. https://sowersohs.files.wordpress.com/2015/08/othello_enotes.pdf
3. https://www.researchgate.net/publication/259565401_King Lear_Learning_and_Teaching_Guide
4. https://www.sparknotes.com/shakespeare/antony/
5. https://www.sparknotes.com/shakespeare/antony/section1/

E-Resources:

1. https://www.enotes.com/topics/as you like it
2. https://sowersohs.files.wordpress.com/2015/08/othello_enotes.pdf
3. https://www.researchgate.net/publication/259565401_King Lear_Learning_and_Teaching_Guide
4. https://www.sparknotes.com/shakespeare/antony/
5. https://www.sparknotes.com/shakespeare/antony/section1/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**Understands the Elizabethan age.**	**K1**
CO2	**Increases the expressions of language.**	**K2**
CO3	**Develops how idea can be implemented in different context.**	**K4**
CO4	**Creates the process by comparing two or more works of different dramatists.**	**K5**
CO5	**Enhances the writing skills.**	**K6**
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 = 30					Correlation = Very 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

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

SEMESTER IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBEN4003	DISCIPLINE SPECIFIC CORE COURSE	SPECIAL AUTHORS	5	4

Course Objectives

1. To explain human righteousness and morality of a good citizen.
2. To justify how body and mind can be changed if true guidance given.
3. To measure the perspectives of a city and village dweller.
4. To recommend the learners the importance of Unity.
5. To maximize the thought that every individual is a significant contributor of the society.

Unit-I		**12 Hours**
Literature and Environment, Diasporic Literature, Travel Literature		
Unit-II		**12 Hours**
William Blake		
Unit-III		**12 Hours**
T.S. Eliot		
Unit-IV		**12Hours**
Virginia Woolf		

Unit-V		12 Hours
W.B. Yeats		

Books for study:

1. The Cambridge Introduction To Literature And The Environment Edition, CP Clark, Cambridge University Press, 2011
2. Travel Literature and the Evolution of Novel, Percy G Adams, The University Press of Kentucky, 2014
3. William Blake, Selected Works, Oxford World Classic, 2019
4. The Tower, Facsimile Edition, YB Yeats, 2003

Books for Reference:

1. Virginia Woolf, Classic Collection, Fingerprint Publishing, 2016

E-Resources:

1. https://www.theartstory.org/artist/blake-william/artworks/
2. https://interestingliterature.com/2016/10/a-summary-and-analysis-of-t-s-eliot-the-waste-land
5. https://mastersreview.com/craft-lessons-and-prompts-stream-of-consciousness-and-virginia-woolf/
6. https://www.britannica.com/biography/William-Butler-Yeats
7. https://poetryarchive.org/poet/william-butler-yeats/
8. https://www.jstor.org/stable/426788?seq=1
9. https://www.researchgate.net/publication/337075624_Literature_of_Diaspora_Including_Immigration_and_Refugees
10. https://www.sparknotes.com/poetry/eliot/section2/
11. http://dspace.bracu.ac.bd/xmlui/bitstream/handle
12. https://www.biography.com/writer/william-butler-yeats

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Gaining knowledge of different historical events	K1
CO2	Understanding the history of English literature	K1,K2
CO3	Classifying the ideas of different authors	K3
CO4	Comprehending literary terminologies	K4
CO5	Creating awareness about critical approaches	K4
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 = VERY 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

Prepared by: **S. KHADER NAWAZ** Verified by: **K. NAZER HUSEN**

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBENPJ41	**SKILL ENHANCEMENT COURSE**	**PROJECT**	**5**	**4**

Course Objectives

1. To develop a research proposal to resolve a problem.
2. To collect data to find solution to a problem.
3. To enhance critical and analytical skills.
4. To develop a scaffolding method to reach a conclusion.
5. To take students learning levels to a new heights.

Unit-I		**12 Hours**

THE TITLE PAGE
CERTIFICATE FROM THE GUIDE
DECLARATION OF THE STUDENT

Unit-II		**12 Hours**

ACKNOWLEDGEMENT
TABLE OF CONTETS
INTRODUCTION

Unit-III		**12 Hours**

CHAPTERS
CONLUSIONS

Unit-IV		**12 Hours**

WORKS CITED
ANNEXURES (IF ANY)

Unit-V		**12 Hours**

SIMILARITY CHECK
CHECKING CITATIONS

Books for study:

1. MLA Handbook for Writers of Research Papers, New Delhi;Affliated East-West Press Pvt. Ltd.,
2. JohnLangan, College Writing Skills, New York :McGraw Hill,1985.(Covers UnitI)
3. JosephGibaldi, MLA Handbook for Writers of Research Papers, New Delhi:Affiliated East-West PressPvt.Ltd.,2003.(Covers Units II to V)
4. DonaldM.Murray, Write to Learn, New York:Holt,RinehartandWinston,Inc.,1987.

Books for Reference:

1. MarjorieBoulton,TheAnatomy of Poetry, London:Routledge&KeganPaul,1982.
2. MarjorieBoulton, The Anatomy of Prose, London:Routledge&KeganPaul,1952.
3. CleanthBrooks, Fundamentals of Good Writing :A Handbook of Modern Rhetoric, New York:ReadBooks,2008.
4. R.A. Lanham, AHand list of RhetoricalTerms,California:UniversityofCalifornia Press,1991.
5. James McCrimmon,Writing with a Purpose,Boston:MifflinCompany,1963.

E-Resources:
https://dal.ca.libguides.com/English/ResearchSteps

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	Collect data to find answer to a research problem	K3
CO2	Improve critical and analytical thinking	K1
CO3	Create a research proposal	K6
CO4	Develop a framework to attain a conclusion	K5
CO5	Improve the learning levels to unprecedented heights	K2
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 = Very 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

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

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBENNM41	**OTHER ELECTIVE COURSE**	**COMPUTER LITERACY IN TEACHING**	**3**	**2**

Course Objectives

1. To learn the fundamentals of computer
2. To develop the communication skills of the learners through technology
3. To train the learners to use the teaching tools
4. To make the future teachers technically skilled
5. To upgrade the learning level of students to international standard

Unit-I		**8 Hours**

ANCIENT METHOD OF TEACHING
USING TECHNOLOGY FOR TEACHING

Unit-II		**7 Hours**

USEFUL APPLICATIONS FOR TEACHING
USING WORD, EXCEL, PPT

Unit-III		**7 Hours**

GOOGLE CLASSROOM
GOOGLE FORM

Unit-IV		**7 Hours**

CREATING QUIZ LINK FOR TEACHING
USING ZOOM AND GOOGLE MEET FOR TEACHING

Unit-V		**7 Hours**

HOW TO START AND JOIN A SCHEDULED ONLINE CLASS?
ONLINE CLASS ETIQUETTES
SAVING THE IMPORTANT FILES IN GOOGLE DRIVE

Books for study:

1. James Bernstein, Google Apps made Easy, Google Books
2. Mathew Guay, The Ultimate Guide to G Suite, Zappier App guides book
3. Barrie Roberts, Beginner's Guide to Google apps – Sheets and Forms, Google Apps Script Publishing

Books for Reference:

1.Barrie Roberts, Google Sheet Functions: A step-by-step Guide, Google Workspace App
2.Hywel Stayte, Get More Out of G-Suite: A teacher's Guide, Independently Published

E-Resources:

1.https://www.henryharvin.com/blog/digital-literacy-why-is-it-important-for-teachers/
2.https://www.goodreads.com/book/show/35127104-the-ultimate-guide-to-g-suite
3.https://www.goodreads.com/book/show/38226185-beginner-s-guide-to-google-apps-script-1-2---sheets-forms

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 fundamentals of computer	K2
CO2	Use the computer tools for learning	K3
CO3	Develop their teaching skills using technology	K5
CO4	Enhance the language skills using latest applications	K1
CO5	Identify the appropriate tool for learning and teaching	K4
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 = 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 IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBENDE41	DISCIPLINE SPECIFIC ELECTIVE COURSE	SUCCESS WITH LANGUAGE	5	4
Course Objectives				
1. To seek job opportunity 2. To possess the technical skill 3. To gain basic computer literacy to communicate 4. To run the business more effectively and promising 5. To share the data worldwide				
Unit-I				**12 Hours**
Language Learning and Language Learners				
Unit-II				**12Hours**

Becoming an Effective Learner		
Unit-III		**12 Hours**
Competence in Listening and Speaking Skills		
Unit-IV		**12 Hours**
The World as a Classroom		
Unit-V		**12 Hours**
ICT to support Language Learning		
Books for study: 1. English Language Skills, Veerendra Mishra, Cambridge Publications, 2020		
Books for Reference: 1. ICT and Language Learning, A Chambers, Jean Conacher and Jeanette Littlemore, A&C Black Publishers, 2004		
E-Resources: 1.https://www.taylorfrancis.com/books/edit/10.4324/9780203028377/success-languages-stella-hurd-linda-murphy		

Methodology of Teaching

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Knowing key ideas and texts and intellectual shifts in reading the culture, language and literature	**K1**
CO2	Inferring ideas and concepts of successful language learning strategies	**K2**
CO3	Evaluating proven language production and reception skills	**K4**
CO4	Analyzing online tools to practice language skills	**K5**
CO5	Global Competency development with language skills	**K6**
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 = 27					**Correlation = HIGH**			

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBENDE42	**DISCIPLINE SPECIFIC ELECTIVE COURSE**	**TECHNICAL WRITING**	**5**	**4**

Course Objectives

1. To prepare technical and operating manuals.
2. To understand the nuances of business correspondence.
3. To develop official media postings.

Unit-I		**12 Hours**

INTRODUCTION TO TECHNICAL WRITING
Situational Imagination – Expression of Imagination in Language –
Creation of Word Pictures – Creation of Ambience

Unit-II		**12 Hours**

Writing Process – Prewriting, Writing and Rewriting; the Rationale; the Process; Writing Effective Sentences; Structure of a Paragraph; Writing Effective Paragraphs

Unit-III		**12 Hours**

Copy Writing and Advertisement
Introduction to Copy Writing – Copy Writing and Creativity – Copy
Writing for Target Groups – Use of Language in Effective Copy Writing

Unit-IV		**12 Hours**

Instructions and User Manuals; Writing Summaries, Reports and Proposals
Writing different kinds of letters, memos, CV, E-mail communication, Presentation

Unit-V		**12 Hours**

Technical Writing Today, Case Studies, Designs and Layout, Computer Skills, Production.

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

E-Resources:
www.jerz.setonhill.eduwww.creativewriting.uchicago.edu

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understands copywriting	K1
CO2	Writes technical specifications	K6
CO3	Plans the contents of technical texts	K4
CO4	Designs graphic specifications	K2
CO5	Edits technical write-ups	K6
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 = 26					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

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

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBENDE43	**DISCIPLINE SPECIFIC ELECTIVE COURSE**	**PRINCIPLES OF PUBLIC SPEAKING**	**5**	**4**
Course Objectives				
2. To understand various speaking occasions 3. To compose ideas for public speaking 4. To enhance language for public speaking for different contexts 5. To perfect the use of Grammar in the right context 6. To express fluency and comprehension of the language				
Unit-I				**12 Hours**
Types of Speeches and Speaking Occasions				
Unit-II				**12Hours**
Developing Informative Speeches				
Unit-III				**12 Hours**
Ethics in Public Speaking				
Unit-IV				**12 Hours**
Speaking with Confidence				
Unit-V				**12 Hours**
Speech Audios and Videos				
Books for study: 6. Principles of Public Speaking, Kathleen M German, Taylor & Francis				
Books for Reference: 1. First Principles of Public Speaking, Loren Dudley Reid, Literary Licensing Publishers, 2012				
E-Resources: 1.https://s3.amazonaws.com/lumenlearning/success/Master+PDFs/Principles-of-Public-Speaking_1-2-17.pdf				

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Reflecting individual's personality through language	**K3**
CO2	Developing linguistic competence	**K3**
CO3	Demonstrate opinions precisely for different public speaking contexts	**K5**
CO4	Adapting language flair for current global trends	**K3**
CO5	Producing effective public speeches	**K6**
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 = 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

Prepared by**: S. KHADER NAWAZ** Verified by**: K. NAZER HUSEN**

Programme Outcomes **(POs) of the UG Programme in History**

After the completion of B.A. History programme, the students will be able to

PO 1	Communicate in English, ideas, thoughts & knowledge effectively in conversations, and meetings & especially in a Digital environment. Develop linguistic skills in one Indian/Regional language
PO 2	Demonstrate domain-specific knowledge and its applications in real-life situations
PO 3	Synthesize learned knowledge and skills to effectively and efficiently perform the job duties of a profession
PO 4	Critically evaluate a situation and suggest a solution after careful consideration of the alternatives
PO 5	Exhibit potential to accomplish tasks independently or as a member or leader of a team
PO 6	Plan and Execute a Project after careful evaluation of the activities involved
PO 7	Develop products, Design Policies, and/or collaborate to help Society in building a Sustainable Environment
PO 8	Discover a passion for Lifelong Learning through MOOCs, ODL, and Self - Learning techniques through optimum use of ICT
PO 9	Demonstrate ability towards critical thinking about his role as a responsible citizen
PO 10	Identify and assess various issues in Environment and suggest measures to overcome them. 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 **(PSOs) of the UG Programme in History**

After the completion of B.A. History programme, the students will be able to

PSO 1	Explain the evolution, growth and progress of human Civilization in different parts of the world and India, acquire the attributes and values required for the development of our World and our Nation.
PSO 2	Discover skills required for career building through competitive examinations, develop skills required to be employed in other allied disciplines and pursue higher education in Historical Studies and Allied Disciplines
PSO 3	Recognize the manifold factors influencing the development of an administrative structure and national policies that impact the society, economy and culture and develop the qualities to become good administrators.
PSO 4	Use the leadership qualities acquired like decision - making ability, knowledge of allied disciplines, developing self-learning skills and art of communication to express their view points.
PSO 5	Recognize the varied historical narratives from various of sources and critically interpret narratives with the capacity to effectively communicate individual opinion.
PSO 6	Interpret the implication of the past on the present and acknowledge its relevance in the future development.
PSO 7	Identify and effectively communicate the problems in the relevant field of study and apply the acquired knowledge to work for better solutions.
PSO 8	Develop the passion to be a lifelong learner with the ability to construct a self-developed Bibliography on any area of interest and utilize e-resources and libraries to acquire the knowledge.

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 = 62 Correlation: Very High										

<u>Mapping Correlation Benchmark</u>

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 III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBHI3001	**Discipline Specific Core Course**	**HISTORY OF INDIA FROM CE 1526 TO 1707**	**5**	**4**

Course Objectives

1. To study about the establishment and expansion of Mughal rule in India.
2. To study about the socio–political, cultural and economic life during the Mughals.
3. To study about the administrative policies of the Mughals.
4. To learn about the rise of Marathas and Sikhs and their relations with the Mughals.

Unit–I	**Babur to Akbar:** Sources – Babur and his Battles – Humayun – Sher Shah Sur: His Reforms and Administration – Akbar: His military Campaigns – Rajput policy – Religious policy – Mansabdari system – Achievements of Akbar	**15 Hours**
Unit–II	**Jahangir to Aurangzeb:** Jahangir – Nur Jahan – Shahjahan – Golden Age of the Mughals – Aurangzeb: North-West Frontier Policy – Deccan Policy – Rajput policy – Religious policy – Decline of the Mughals	**15 Hours**
Unit–III	**Socio-Cultural Life of Mughal Period:** Socio-Economic life of the people during the Mughals – Technological development – Religion – Hindu-Muslim relations – Emergence of Composite Culture – Mughal Administration – Education – Language and Literature – Progress in Art, Architecture, Painting and Music	**15 Hours**
Unit–IV	**Rise of Marathas:** Shivaji: His Military Achievements and Administration – Venkoji – Sambaji – Rajaram-I – Relationship between Marathas and Mughals – The rise of Peshwas and their role in Maratha History	**15 Hours**
Unit–V	**Rise of Sikhs**: Origin and the rise of Sikhism: Guru Nanak and his teachings – Guru Amardas – Guru Ramdas – Guru Arjun – Guru TejBahdur – Guru Gobindh Singh – Relationship between Sikhs and Mughals	**15 Hours**

Books for Study

1. Khurana, K.L., *History of India from 1526 to 1967 A.D.*, Lakshmi Narain Agarwal Educational Publishers, Agra, 1995.
2. Krishna Reddy, *Indian History*, Tata Mc Graw–Hill publishing company limited, New Delhi, 2003.
3. Majumdar, R.C.,*An Advanced History of India*, Macmillan, New Delhi, 2002.

Books for Reference

1. Abraham,Eraly, *Emperors of the Peacock Throne, The Saga of Great Mughals*, Penguin Books, New Delhi,1997.

2. Irfan Habib (Ed) *Medieval India I*, Oxford University Press, New Delhi,1992.
3. Satish Chandra, *History of Medieval India*, Orient Black Swan, New Delhi, 2009.
4. Tripathi, R.P., *Rise and fall of the Mughal Empire*, Central Book Depot, Allahabad,1956.

E- Resources:

1. https://www.encyclopedia.com/history/encyclopedias-almanacs-transcripts-and-maps/introduction-mogul-conquest-india15261707#:~:text=The%20Mogul%20Empire%20(1526%E2%80%931857,Turkish%20prince%20and%20military%20adventurer.
2.https://www.britannica.com/place/India/The-Mughal-Empire-1526-1761
3.https://www.youtube.com/watch?v=uO8dCaD4WSk
4.https://sci-hub.hkvisa.net/10.1017/9781316276044.006
5.https://www.jstor.org/stable/44137074

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Describe an overview of the establishment of Mughal Empire.	K1
CLO2	Understand the various policies of Mughal rulers.	K2
CLO3	Articulate the knowledge of socio, economic and political ideas of Mughals.	K3
CLO4	Contrast the relationship between Marathas and Mughals.	K4
CLO5	Appraise the history of Sikhs in India.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓		✓	✓	✓	
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓	✓	✓	✓	✓	✓	✓	
CLO 4		✓	✓	✓	✓	✓	✓	✓
CLO 5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches = 36 Correlations: Very 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

Prepared by: Mr. M SIDDIQUE AHMED **Verified by: Mr. D. ABUL FAZAL**

SEMESTER– III				
COURSE CODE	**CATEGORY**	**COURSETITLE**	**HRS./WEEK**	**CREDIT**
UBHI3002	**Discipline Specific Core Course**	**HISTORY OF TAMILNADU FROM CE 1336 TO 1806**	**4**	**3**
CourseObjectives				
1. To study about the Muslim Invasions and the establishment of Vijayanagar rule in Tamil Nadu. 2. To make the students to understand the significance of Tamil country under Nayaks and Marathas. 3. To discuss the effects of the Carnatic Nawabs and the coming of Europeans. 4. To inform the students about the significance of the Poligar Rebellion.				
Unit-I	**Fall of Madurai Sultanate and Establishment of Vijayanagar Kingdom:** Madurai Sultanate – Malik Kafur – Muslim Invasions and its impacts – Origin of Vijayanagar Kingdom – Kumara Kampana's Southern Expedition – Administration – Battle of Talaikota– Socio-Economic Conditions – The Nayakara system – Contribution to Art and Architecture – Literature – Tamil Music and Painting & Foreign Travelers			**12 Hours**
Unit-II	**Tamilagam under Nayakas:** Nayakas of Madurai – Viswanatha Nayaka – Career and Achievements of Thirumalai Nayaka – Chokkanatha Nayaka – Rani Mangammal- Meenakshi – Nayakas of Ginji – Krishnappa Nayaka I – Nayakas of Tanjore – Sevappa Nayaka – Ragunatha Nayaka – Vijayaragava Nayaka – Poligar System – Social – Economic – Cultural Conditions under the Nayakas			**12 Hours**
Unit-III	**Marathas rule and Sethupathy of Ramnad:**The Marathas of Tamil Country– Serfoji I – Pratap Singh – Administration – Social and Economic conditions – Religious Contribution of Marathas to Tamil Culture – The Marava Country – Rise of Sethupathy – Sethupathis of Ramnad – Regunatha Sethupathy I – Regunatha Sethupathy II – Kilavan Sethupathy – Some aspects of the rule of Sethupathis – Society – Economy – Religion – Culture			**12Hours**
Unit-IV	**Advent of Europeans and Early Resistance:** European Settlements - The Portuguese – The Dutch – The British		**12 Hours**	

	–The French – The Anglo-French conflict – The Arcot Nawabs – The Carnatic Wars and Effects – Hyder Ali and Tipu Sultan	
Unit-V	**Poligars in Tamil Nadu:** The Rebellions of the Poligars – Khan Saheb – Puli Thevar – Veera Pandiya Kattabomman – Oomaithurai – South Indian Rebellion – Maruthu Brothers and their league – Peninsula Confederacy – Vellore Mutiny, Causes and Effects	**12 Hours**

BooksforStudy:

1. Manoranjithamani C., *History of Tamil Nadu up to 1565 AD.*, Dave-Beryl Publications, Tirunelveli, 2016.
2. Manoranjithamoni, C., *History of Tamil Nadu from 1529 AD to 1801 AD.*, Dave-Beryl Publications, Tirunelveli, 2019.
3. Subramanian, N, *Social and Cultural History of Tamil Nadu (1336 – 1984)*, Ennes Publications, Udumalaipet, 2007.

BooksforReference:

1. Mahalingam, T.V., *Administration and Social Life under Vijayanagar*, University of Madras, Madras, 1951.
2. Rajayyan, K., *History of Madras*, Madurai University, Madurai, 1974.
3. Subramanian, N., *History of Tamil Nadu*, Koodal Publications, Madurai, 1976.
4. Sathiyanathaier, R., A *History of the Nayakas of Madurai*, Ananda Book Depot.

E-Resource:

1. https://www.oliveboard.in/blog/history-of-tamil-nadu
2. https://www.britannica.com/place/Tamil-Nadu
3. https://www.socialvillage.in/resources/36716-history-tamilnadu
4. https://www.mapsofindia.com/tamilnadu/history.html
5. https://en.wikipedia.org/wiki/Tamil_Nadu

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

CLOs	**COURSELEARNINGOUTCOMES Bytheendof thecoursethestudentswillbeableto**	**KnowledgeLevel**
CLO1	Explain the Muslim Invasion, Vijayanagar Kingdom's Socio-Economic conditions, Art and Architecture.	K1
CLO2	Summarize the Social, Economic and Cultural conditions of Tamil Nadu under the Nayakas.	K2

CLO3	Articulate the religious contributions of Marathas and the administration of Sethupathy of Ramnad.	K3
CLO4	Relate the conditions for the European Settlements in Tamil Nadu.	K4
CLO5	Evaluate the significance of Poligar System and South Indian Rebellion in Tamil Nadu.	K5

MappingofCourseLearningOutcomeswithProgrammeSpecificOutcomes

CourseLearningOutcomes(CLOs)	**ProgrammeSpecific Outcomes(PSOs)**							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CLO1	✓	✓	✓	✓	✓	✓	✓	✓
CLO2	✓	✓	✓	✓	✓	✓	✓	✓
CLO3	✓	✓	✓	✓	✓	✓	✓	✓
CLO4	✓	✓	✓	✓	✓	✓	✓	✓
CLO5	✓	✓	✓	✓		✓	✓	
NumberofMatches =38 Correlations: Very High								

MappingCorrelationBenchmark

Mapping	**1-30%**	**31-60%**	**61-70%**	**71-100%**
Matches	**1-12**	**13-24**	**25-28**	**29-40**
Correlation	**Poor**	**Moderate**	**High**	**VeryHigh**

Prepared by: Dr. K MURUGAN **Verified by: Mr. D. ABUL FAZAL**

SEMESTER - III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBHIAL31	**Other Elective Course**	**TOURISM IN SOUTH INDIA**	**5**	**4**

Course Objectives

1. To recognize the Historical tourist resources in South India.
2. To identify the cultural strengths of South Indian Tourism.
3. To discuss about the Fairs, Festivals and Shopping Potential in South India.
4. To know the religious centres attracting tourists and to deliberate on the emerging trends in South IndianTourism.

Unit-I	**Historical Tourism:** Nagarjunakonda–Warangal Fort – Golconda Fort – Charminar –Mysore Palace – Hampi – Amaravati –Chandragiri – Rayadurgam Fort –Bidar – Ibrahim Rauza– Aihole –Thanjavur Royal Palace –Gangai Konda Cholapuram–Mahabalipuram –Gingee Fort – Padmanabhapuram Palace – Bolghatty Palace – Tipu's Fort	**15 Hours**
Unit-II	**Cultural Tourism:** Classical Music: Carnatic– Trinity of Carnatic Music: TyagarajaSwamigal – Muthusamy Dikshitar – Shyama Sastri – Carnatic Musical Instruments–Classical Dances: Kathakali – Kuchipudi – Mohiniaatam–Bharatha Natyam – Martial Arts: Kalaripayattu–Silambam – Varmakalai – Talimkhana – Folklore: Folk Music – Folk Dances	**15 Hours**
Unit-III	**Fairs, Festivals and Shopping:** Famous Regional Festivals: Ugadi– Dussehra – Pooram – Onam – Vallamkali – Pongal – Natyanjali Dance Festival – Car Festival – Tea and Tourism Festival –Clothing: Silk and Embroidery – Wood Craft – Stone Carving – Ivory Carving – Metal ware: Gold, Silver, Copper and Bronze – Bidri ware – Leather Crafts	**15 Hours**
Unit-IV	**Religious and Spiritual Tourism:**Badami Cave Temples – Shravanabelagola – Sringeri – Lepakshi – Puttaparthi – Hanamakonda –Badrachalam–Nagarjunasagar– Thirupathi – Srisailam –Srikalahasti– St. Philomena's Church, Mysore – St. Mary's Church, Belgaum – Velankanni Church – Cheraman Perumal Masjid – Nagore Dargah – KhwajaBande Nawaz Dargah –Rameshwaram – Nagapattinam – Madurai – Thanjavur – Guruvayur – Sabarimala – Sivagiri	**15 Hours**
Unit-V	**Eco-Tourism:** Backwaters, Alleppey– Rajamala National Park, Munnar – Gavi – Konni – Thenmala – Thodupuzha – Eravikulam National Park – Periyar National Park – Kodaikanal – Coorg – Nagarhole National Park – Bandipur National Park –Tyda– Maredumilli –**Dark Tourism:**Dhanushkodi – Viper and Cellular Jail, Andaman – **Medical Tourism:** Chennai, Health Capital of India –	**15 Hours**

	Bangalore (Stomach related Surgery) – Coimbatore (Heart Surgery and ENT Treatments) – Vellore (Cardiology) – Alleppey(Ayurveda) – Hyderabad(Plastic & Reconstructive Surgery)	

Books for Study:

1. Dominique Sila Khan, *Sacred Kerala, A Spiritual Pilgrimage*, Penguin Books India Pvt., Ltd., Chennai
2. Nirmala Choudhry y., *Historical and Eco-Tourism: Select Sites in Andhra Pradesh*,IthihasaPrabhasa Publishers, Hyderabad, 2007
3. Revathy Girish, *Indian Tourist Panorama*, Wisdom Press, New Delhi, 2010

Books for Reference:

1. Dr.PremaKasturi, Dr.G. Sundaram, *South India Heritage An Introduction*, East West Books Publishers., Chennai, 2007

2.Burkart A.J., and Madlik, *Tourism, Past, Present and Future*, Heinemann, London, 1994

3. Stark World Team, *Karnataka Tourist Map*, Stark World, Bengaluru, 2008

4. Michael Wood, *A South Indian Journey: The Smile of Murugan*, Penguin Books, New Delhi, 1996

E-Resources:

1. https://youtu.be/MtPDgrtR39M
2. https://www.thrillophilia.com/places-to-visit-in-south-india
3. https://www.holidify.com/collections/places-to-visit-in-south-india
4. https://www.holidify.com/pages/festivals-in-southindia-594.html
5. https://www.holidify.com/collections/religious-places-in-south-india

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Identify the Historical tourist resources in South India.	K1
CLO2	Summarise the cultural strengths of South Indian Tourism.	K2
CLO3	Sketch the Fairs, Festivals and Shopping Potential in South India.	K3
CLO4	Illustrate the religious centres attracting tourists	K4
CLO5	Appraise on the emerging trends in South Indian Tourism.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8

CLO 1	✓	✓	✓	✓	✓		✓	✓
CLO 2	✓	✓	✓		✓	✓	✓	✓
CLO 3	✓	✓			✓	✓		✓
CLO 4	✓	✓	✓		✓	✓	✓	✓
CLO 5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches = 34 Correlations: Very 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**

Prepared by: Mr. S. ZAINULLAH **Verified by: Mr. D. ABUL FAZAL**

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
UBHIAL32	**Other Elective Course**	**CONSTITUTIONAL HISTORY OF INDIA**	**3**	**3**
Course Objectives				
1. To study the Constitutional Developments from CE 1773 to 1892. 2. To study the changes in administration through the Act of 1909, the Government of India Acts 1919 and 1935. 3. To study the gradual decentralization of powers in India. 4. To study the salient features and values of the Republican Constitution.				
Unit-I	**Constitutional Developments up to CE 1853:**Regulating Act1773 – Pitt's India Act 1784 – Charter Acts of 1793, 1813, 1833 and 1853			**9 Hours**
Unit-II	**Indian Council Acts:** Government of India Act 1858 – Queen Victoria Proclamation – Indian Council Acts of 1861 and 1892			**9 Hours**
Unit-III	**Minto-Morley and Montague-Chelmsford Reforms:** Government of India Act 1909: Causes – Provisions of the Act – Separate Electorates – Causes for its failure – Government of India Act 1919: Causes – Provisions of the Act – Working and failureof Dyarchy – Rowlatt Act and Jallianwala Bagh Massacre – Simon Commission – Nehru Report			**9 Hours**
Unit-IV	**Government of India Act 1935:** Circumstances leading to the passing of the Act – Provisions of the Act – Criticism – Provincial Governments – Working of Provincial Autonomy – Cripps Mission – Cabinet Mission – Mountbatten Plan 1947			**9 Hours**

Unit-V	**The Republican Constitution of 1950:** Constituent Assembly – Drafting Committee – Salient features of the Republican Constitution: Preamble – Citizenship – Fundamental Rights and Duties – Directive Principles of State Policy – Amendment Procedures	**9 Hours**

Books for Study

1. Agarwal, R.C., *Constitutional Development and National Movement of India*, S. Chand & Company Ltd., Ram Nagar, New Delhi, 1997.
2. Durga Das Basu, *Introduction to the Constitution of India*, Wadhwa &Company, Law publishers, Agra, 2004.
3. Pylee, M.V. *Constitutional History of India*, S. Chand Publishing, New Delhi, 2010.

Books for Reference

1.Amal Roy and Mohit Bhattacharya, *Political Theory: Ideas and Institutions*, The World Press, Calcutta, 2002.
2. Bipin Chandra, *Modern India*, NCERT, New Delhi, 1972.
3.Grover. B.L., *A New Look of Modern Indian History*, S. Chand & Co, New Delhi,1974.
4. Percival Spear, *A History of India, Vol. II.* Penguin Books, New Delhi, 1965.

E-Resource:

1.https://en.wikipedia.org/wiki/Constitution_of_India#:~:text=It%20was%20adopted%20b%20%20%20%20%20%20y%20the,became%20the%20Republic%20of%20India
2. https://constitutionnet.org/country/india
3. https://www.clearias.com/historical-background-of-indian-constitution/
4. https://www.legalserviceindia.com/legal/article-8097-history-and-%20development-of-the-constitution-of-india.html
5. https://www.toppr.com/guides/legal-aptitude/indian-constitution/constitution-of-india-historical-background/

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Understand the circumstances for passing of various Acts.	K2
CLO2	Identify the history of Constitutional Developments in India.	K1
CLO3	Illustratethe gradual decentralization of powers in India.	K4
CLO4	Articulate the various Government of India Acts.	K3
CLO5	Evaluate the Indian Constitution and its values.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1		✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓	✓	✓	✓	✓	✓	✓	✓
CLO 4	✓	✓	✓	✓	✓	✓	✓	✓
CLO 5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches = 39 Correlations: Very 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	VeryHigh

Prepared by: Mr. M SIDDIQUE AHMED **Verified by: Mr. D. ABUL FAZAL**

SEMESTER– IV				
COURSE CODE	**CATEGORY**	**COURSETITLE**	**HRS./ WEEK**	**CREDIT**
UBHI4001	**Discipline Specific Core Course**	**HISTORY OF INDIA FROM CE 1707 TO 1857**	**6**	**5**

Course Objectives

1.Understand about the successors of Great Mughals.
2. Assess the factors that motivated the advent of Europeans.
3. Know about the various administrative reforms introduced by the British.
4. Evaluate the impact of the outbreak of 1857 Revolt.

Unit-I	**Later Mughals:** Successors of Aurangzeb – Rise and Fall Sayyed Brothers – Invasion of Nadir Shah – Maratha Under Peshwas – Regional States – Ahmad Shah Abdali's Invasion – Third battle of Panipat – Downfall of Mughals	**18 Hours**
Unit-II	**Advent of Europeans:** Portuguese – Dutch – Danes – English East India Company – French East India Company – Three Carnatic Wars – Battle of Plassey – Battle of Buxar – First Mysore War – Clive and English Supremacy	**18 Hours**
Unit-III	**Administration from Warren Hastings to Lord Wellesley:** Warren Hastings – Second Mysore War – Achievements of Warren Hastings – Lord Cornwallis – Third Mysore War – Permanent Land Revenue Settlement – Sir John Shore and non-intervention –Lord Wellesley – Subsidiary Alliance – Fourth Mysore War – The Second and Third Maratha Wars	**18 Hours**
Unit-IV	**Administration from Lord Hastings to Lord Dalhousie:** Lord Hastings – Nepal War – Pindari War – Fourth Maratha War – Maharana Ranjit Singh – Lord Amherst –Burmese Wars – Lord William Bentick – Social Reforms – Lord Auckland – Afghan Wars – Lord Hardinge – Sikh Wars – Lord Dalhousie – Burmese war – Reforms – Doctrine of Lapse	**18 Hours**
Unit-V	**Great Uprising and After:** Causes – Nature of the Great Uprising – Course and Events – Causes for the failure – Results of the Uprising	**18 Hours**

BooksforStudy:

1. Grover. B.L., *A New Look of Modern Indian History*, S. Chand & Co, New Delhi,1977.
2. Natarajan S. and Prema Ramakrishnan, *Political and Cultural History of India, Vol. II.* Secunderabad, 1991.
3. Percival Spear, *A History of India*, Vol. II. Penguin Books, New Delhi, 1976.

BooksforReference:

1. Desai, A.R., *Social back - ground of Indian Nationalism*, Popular Prakasam, Bombay,1960.
2. Lucy Sutherland, *The East India Company in 18th Century Politics*, Oxford, 1952.
3.Philips C.H., *East India Company*, London, 1962.
4.Ramachandran C., *East India Company and the South Indian Economy*, New Era Publications, Madras, 1980.

E- Resource:

1. https://www.researchgate.net/publication/340461495_HISTORY_OF_INDIA
2. https://myupsc.com/history-of-modern-india1707-1947
3. https://books.google.com/books/about/History_of_India_1707_1857.htm
4. https://archive.org/details/in.ernet.dli.2015.550880
5. https://egyankosh.ac.in/handle/123456789/73867

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

CLOs	**COURSELEARNINGOUTCOMES Bytheendof thecoursethestudentswillbeableto**	**Knowledge Level**
CLO1	Describe about the Later Mughals and their downfall.	K1
CLO2	Understand the factors for English supremacy.	K2
CLO3	Evaluate English Administration from Warren Hastings to Lord Wellesley.	K5
CLO4	Illustrate the English Administration from Lord Hastings to Lord Dalhousie.	K4
CLO5	Articulate the Causes, Course and Impact of the Great Uprising.	K3

Mapping of Course Learning Outcomes with Programme Specific Outcome

Course Learning Outcomes(CLOs)	Programme Specific Outcomes(PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CLO1	✓	✓	✓	✓	✓	✓	✓	✓
CLO2	✓	✓	✓	✓	✓	✓	✓	✓
CLO3	✓	✓	✓	✓	✓	✓	✓	✓
CLO4	✓	✓	✓	✓	✓	✓	✓	✓
CLO5		✓	✓	✓	✓	✓	✓	
Number of Matches = 38 Correlations: Very 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

Prepared by: Dr. MOHAMMAD OSMAN PASHA

Verified by: Mr. D. ABUL FAZAL

SEMESTER– IV				
COURSE CODE	CATEGORY	COURSETITLE	HRS./ WEEK	CREDIT
UBHI4002	Discipline Specific Core Course	HISTORY OF TAMILNADU FROM CE 1806 TO 2010	3	3
Course Objectives				
1. To examine the role of Christian Missionaries in the field of Education and Tamil Renaissance. 2. To understand the rising Political consciousness and the Freedom Movement in Tamil Nadu. 3. To explain the role of Tamil Nadu in Indian Struggle for Independence. 4. To elucidate the growth of Dravidian Movement and its impact on Tamil Nadu politics.				
Unit-I	**Political and Economic Conditionsin Tamil Nadu:** Economic conditions – British Revenue Policies – Permanent settlement , Mahalwari system and Roytwari System – Indigenous Education – Introduction of Western Education – Christian Missionary Activities – Development of Industries – Transport and Irrigation			9 Hours
Unit-II	**Social Reform Movements in Modern Tamil Nadu:** Tamil Renaissance – Development of Arts and Literature – Socio-			9 Hours

	Religious Reform Movements – Temple entry Movement — The Self Respect Movement	
Unit-III	**Freedom Movement in Tamil Nadu:** Role of Tamil Nadu in freedom Struggle – The early phase – V.O. Chidambaram – Subramanya Bharathi – Vanchinathan – Subramanya Siva – The later phase – Rajaji – Sathyamoorthy – Kamaraj	**9 Hours**
Unit-IV	**Pre and Post Independent TamilNadu:** The Rise and Fall of the Justice Party – Tamil Nadu under Congress rule – The Administration of Rajaji – The Administration of Kamaraj – Development of Education – Industry – Agriculture – Irrigation System – Achievements – Kamaraj Plan – Administration and Achievements of Bakthavasalam – The Anti-Hindi Agitation	**9 Hours**
Unit-V	**The Rise of Dravidian Parties in Tamil Nadu:** Rise and Growth of DMK - Formation of DMK Government – C.N. Annadurai – Achievements – DMK Manifesto – Administration of Karunanidhi – Policies and Programs – Education – The rise and growth of ADMK – M.G. Ramachandran – Administration and Achievements – J. Jayalalitha – Administration – Social Welfare Schemes – Economic Development of Tamil Nadu since Independence	**9 Hours**

BooksforStudy:

1. Devanesan, *History of Tamil Nadu*, Benu Publications, Madurai, 1990.
2. Rajayyan K, *History of Tamil Nadu*, Ratna Publications, Trivandrum, 1989.
3. Prof. J. Dharmaraj & Dr. D. Ebi James, *History of Tamil Nadu 1801 to 2017*, Tensy Publications, Sivakasi.

BooksforReference:

1. Chellam V.T, *History of Tamil Nadu*, Koodal Publications, Madras, 1995.
2. Subramanian N, *History of Tamil Nadu*, Koodal Publications, Madurai, 1972.
3. Baker C.J, *The Politics of South India*, Vikas Publishing House, New Delhi, 1976.
4. Eugene F. Irshik, *Politics and Social conflict in South India (The Non-Brahmin Movement and Tamil Seperation) 1916 – 1929*, Oxford University Press, 1969.

E-Resources:

1. https://www.scribd.com/document/452607759/TAMIL-CIVILIZATION-AND
2. https://docslib.org/doc/3312954/ractt2c-cultural-history-of-tamil-nadu
3. https://www.socialvillage.in/resources/36716-history-tamilnadu
4. https://www.researchgate.net/publication/340461480_CONTEMPORARY_TAMIL
5. https://www.ncertbooks.guru/tamil-nadu-history-books

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Identify the role of Colonial Government and Missionaries in promoting Western Education.	K1
CLO2	Evaluate the impact of Socio-religious reform movements in Tamil Society.	K5
CLO3	Analyze the nature of Tamil Renaissance and the role of Tamil Nadu in the Freedom movement.	K4
CLO4	Articulate the achievements of Congress and to understand the reasons for the failure of Congress in Tamil Nadu.	K3
CLO5	Summarize the administrative measures of the Chief Ministers from Dravidian Parties in Tamil Nadu.	K2

Mapping of Course Learning Outcomes with Programme Specific Outcome

Course Learning Outcomes (CLOs)	Programme Specific Outcomes(PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CLO1	✓	✓	✓	✓	✓	✓		✓
CLO2	✓	✓	✓	✓	✓	✓	✓	✓
CLO3	✓	✓	✓	✓	✓	✓	✓	✓
CLO4	✓	✓	✓	✓		✓	✓	✓
CLO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches =38 Correlations: Very 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

Prepared by: Dr. K MURUGAN **Verified by: Mr. D. ABUL FAZAL**

SEMESTER - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBHIAL41	**Other Elective Course**	**TRAVEL AGENCY MANAGEMENT**	**5**	**3**

Course Objectives

1. To create awareness about the evolution of Travel Agency business
2. To educate students about the functions of Travel Agencies
3. To impart knowledge about the Federations of Travel Agents
4. To educate students about the types of Travel Agencies and Travel Documentation

Unit-I	**History of Travel Trade**: Introduction – Origin of Travel Agency Business – Cox & Kings – Thomas Cook – First Excursion – Establishment of Modern Travel Agency – Travel Innovations	**15 Hours**
Unit-II	**Functions of Travel Agency and Tour Operation:** Introduction – Provision of Travel Information – Market Research and Development – Reservation of Tickets – Reservation of Hotel Rooms – Preparation of Itinerary – Reservation and Cancellation – Maintaining Relationship with Tourism Ministry – Travel Insurance – Currency Exchange	**15 Hours**
Unit-III	**Role and Responsibilities of Travel Trade Associations:** Roles and Functions UFTAA – Roles and Functions of PATA – Roles and Functions of ASTA – Roles and Functions of TAAI and IATO – Roles and Functions of ATAOI, ADTOI, IAAI, FIYTO and TAFI	**15 Hours**
Unit-IV	**Travel Agency Business:** Introduction –Wholesale and Retail – Types of Travel Agency– Online Travel Agency – Role and Services of Travel Agency – Tour Operator: Types, Role and Characteristics	**15 Hours**
Unit-V	**Travel Documentation and IATA Accreditation and Recognition from Government:** Passport – Types of Passport– Documents for Availing Passport – Tatkaal Scheme – Visa – Travel Document – Procedures to Apply for Visa – Category of Visas – Gratis Visa – Indian Diaspora – Currency Rules – Health Regulation – Travel Insurance	**15 Hours**

Books for Study:

1. Bhatia A.K., *The Business of Travel Agency & Tour Operations Management,* Sterling Publishers Pvt. Ltd., New Delhi.
2. Devanesan A., *Travel Management,* Renu Publications, Kanyakumari District.
3. Jagmohan Negi, *Air Travel Ticketing and Fare Construction*, Kanishka Publishers, New Delhi,

2008.

Books for Reference:

1. Bhatia, A.K., *International Tourism Management*, Sterling Publisher, New Delhi, 2004.
2. Biswanath Ghosh: *Tourism and Travel Management*, Vikas Publishing House Pvt Ltd., New Delhi, 2001.
3. James W, Morrison, *Travel Agents & Tourism – A Manual of Travel Agency Operation* ARCO Publishing Co, NYC.
4. Lickorish, L.J & Kershaw, A.G, *The Travel Trade*, Practical Press Ltd., London, 1958.

E-Resources:

1. https://youtu.be/GSpLgT0js34
2. https://youtu.be/hbRwV5nN4k8
3. https://youtu.be/MBoQ5c6Mwyo
4. https://youtu.be/LNLC7nqc2hU
5. https://youtu.be/FbZRTm_-lk8

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Relate the importance of Travel Agency business.	K4
CLO2	Understand the importance functions of Travel Agencies and Tour Operation of the Federations of Travel Agents.	K2
CLO3	Identify the services provided by the Federations of Travel Agents.	K1
CLO4	Articulate the types of Travel Agencies	K3
CLO5	Plan the required Travel Documentation and Government Recognition	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓		✓	✓	✓
CLO 3	✓	✓	✓	✓		✓	✓	✓
CLO 4	✓	✓	✓	✓			✓	
CLO 5		✓	✓	✓	✓		✓	✓
Number of Matches = 33 Correlations: Very High								

Mapping Correlation Bench mark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

Prepared by: Mr. MD GHUFRAN R **Verified by: Mr. D. ABUL FAZAL**

SEMESTER - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBHIAL42	**Other Elective Course**	**DEVELOPMENT ADMINISTRATION IN TAMIL NADU SINCE CE 1919**	**3**	**3**

Course Objectives

1.To understand the political parties that ruled Tamil Nadu and their governments.
2. To know the Human Resource Development Indexes of Tamil Nadu and compare them with other
State Human Resource Development indexes.
3. To understand the rationale for reservation policy.
4. To know how the welfare schemes of Tamil Nadu have led to social progress.

Unit-I	**Parties and their Governments:**Justice Party – Congress Party – Dravida Munnetra Kazhagam – All India Anna Dravida Munnetra Kazhagam	**9 Hours**
Unit-II	**Human development Indicators:** Human development – Multi-dimensional Poverty Index – Gender Inequality Index – Gender Development Index – Tamil Nadu Human Development Report 2017 - Gross State Domestic Product – Child Development Index – Food Security Index – Impact of Social Reform Movements in the Socio – Economic Development of Tamil Nadu	**9 Hours**
Unit-III	**Reservation Policy and Economic Trends:** Reservation Policy – Non-Brahmin Manifesto – Resolution of 1921 – Communal G.O. – CampakamDorairajan Case and First Amendment of 1951 – Various	**9 Hours**

	social measures 1951, 1971, 1980, 1989, 1994, 2007 and 2019 (EWS). Economic Trends: Highlights of Tamil Nadu Economy – Global Investors Meet 2015 and 2019 – Tamil Nadu Vision 2023	
Unit-IV	**Education and Health systems:Education**: Literacy – Government Welfare Schemes in Education – Recent initiatives by Tamil Nadu government in theEducationalsector – Tamil Nadu and New Education Policy 2020 – TNSCERT – **Health:** Quality Dimension – CDR, TFR, MMR, IMR, Life Expectancy – Health Care Institution in Tamil Nadu – Primary – Secondary and Tertiary – Tamil Nadu Government and Various Welfare Schemes – Tamil Nadu Health System Reform Programme – NITI Aayog Health Index – 2019	**9 Hours**
Unit-V	**Government policies and Economic Growth:** Human Geography – Tamil Nadu Infrastructure: Roads, Railways, Airports, Ports, Power, Telecom, Health – Industrial Infrastructure – Agriculture and Allied Industries – IT and ITes – Various Polices: Eco-tourism policy 2018, Tamil Nadu State Forest Policy 2018, Tamil Nadu State Youth Policy, Tamil Nadu Food Processing Policy 2018 – Tamil Nadu Electric Vehicle Policy 2019, Tamil Nadu Solar Energy Policy 2019, Tamil Nadu Aerospace & Defence Industrial Policy 2019 – e-Governance in Tamil Nadu	**9 Hours**

Books for Study:

1. Dr. G. Venkatesan, *History of Modern Tamil Nadu (1600 - 2011)*, V.C. Publications, 2011.
2. Prof. J. Dharmaraj & Dr. D. Ebi James, *History of Tamil Nadu 1801 to 2017*, Tensy Publications, Sivakasi.
3. A. Kalaiyarasan, M. Vijayabaskar, *Dravidian Model*, Cambridge University Press, 2021.

Books for Reference:

1. S. Narayanan, *The Dravidian Years*, Oxford University Press, 2018.
2. S. Navaneethan, *Social Issues in India and Tamil Nadu*, Tamizhi Books Publication, 2022.
3. V.T. Chellam, *Thamizhaga Varalarum Panpadum*, Manivasaga Pathipagam, 2005.
4. Eugene. F. Irshick, *Politics and Social Conflict in South India*(*The Non-Brahmin Movement and Tamil separatism) 1916-1929*, Oxford University Press, 1969.

E-Resources:

1. https://toppersnotes-main.s3.ap-south-1.amazonaws.com/wp-content/uploads/2022/07/12174937/VOLUME-8-Development-administration-in-tamilladu-TNPSC-ENG-12-07.pdf
2.https://youtu.be/ioJV8xVo0vk
3.https://youtu.be/KRLnDH23NWg
4.https://drive.google.com/file/d/13mimGOsrdLwkOGKpUlELLV6LozG7m192/view?pli=
5. https://www.youtube.com/watch?v=IZ5VNKidoJI

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Identify the political parties of Tamil Nadu and their governments and its welfare schemes.	K1
CLO2	Summarise the social welfare programs undertaken by the Tamil Nadu government.	K2
CLO3	Articulate the reasons for the eradication of poverty in Tamil Nadu	K3
CLO4	Connect the government welfare schemes undertaken for educational development and welfare of the people in Tamil Nadu.	K4
CLO5	Value the geography of Tamil Nadu in its economic development.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	
CLO 3	✓	✓	✓	✓	✓	✓	✓	
CLO 4	✓	✓	✓	✓	✓	✓	✓	
CLO 5	✓	✓	✓	✓	✓	✓	✓	
Number of Matches = 36 Correlations: Very 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

Prepared by: Dr. G. HARIGARAN **Verified by: Mr. D. ABUL FAZAL**

Programme Outcomes for Master of Arts Programme
After the completion of M.A. History programme, the students will be able to

PO 1	Conduct Research independently to bring out new facts and strengthen the existing body of knowledge. Communicate the findings of Research through well-structured Report.
PO 2	Demonstrate domain-specific knowledge and its applications in real-life situations
PO 3	Synthesize learned knowledge and skills to effectively and efficiently perform the job duties of a profession
PO 4	Critically evaluate a situation and suggest a solution after careful consideration of the alternatives
PO 5	Exhibit potential to accomplish tasks independently or as a member or leader of a team
PO 6	Plan and Execute a Project after careful evaluation of the activities involved
PO 7	Develop products, Design Policies, and/or collaborate to help Society in building a Sustainable Environment
PO 8	Discover a passion for Lifelong Learning through MOOCs, ODL, and Self - Learning techniques through optimum use of ICT
PO 9	Identify the need and importance of Human Rights, especially for Women, Children, Bonded Labourers and Refugees.
PO 10	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 **(PSO'S) of the PG Programme in History**
After the completion of M.A. History programme, the students will be able to

PSO 1	Recognize the historical events of the world and our nation to inculcate the social and individual values and skills required for a successful social life and individual accomplishments.
PSO 2	Compare the variety of resources like archaeological remains, documents, libraries, e resources for documentation and ensure their effective utilization.
PSO 3	Develop the skills to identify the cause and effect of any historical event to

	evolve conclusions and serve the faculty of History and enhance skills to shine in allied industries.
PSO 4	Develop the aptitude for Research with ability to identify research questions, select appropriate method for analysis to resolve and effective Presentation of conclusions.
PSO 5	Develop the skills to compete for a career in the field of Historical studies as teacher, researcher, other associated professions and also in the allied disciplines like tourism industry as well plan research oriented Higher Education in the field of History and allied disciplines.
PSO 6	Apply soft skills to communicate orally and in written form their view points in an effective manner.
PSO 7	Relate the knowledge of allied disciplines in proper understanding of History and engage in life-long learning of allied disciplines.
PSO 8	Appraise the diversities in the world arising out of a diverse condition and apply the knowledge to contribute for a better world.

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

Programme Specific Outcomes (PSOs)	**Programme Outcomes (POs)**									
	P O 1	**PO2**	**P O 3**	**P O 4**	**P O 5**	**P O 6**	**P O 7**	**P O 8**	**P O 9**	**PO10**
PSO1		✓	✓		✓	✓	✓		✓	✓
PSO2	✓	✓	✓		✓	✓	✓	✓		
PSO3	✓	✓	✓	✓	✓	✓	✓			
PSO4	✓	✓	✓	✓	✓	✓	✓		✓	✓
PSO5	✓	✓	✓			✓	✓	✓	✓	✓
PSO6		✓		✓	✓	✓	✓			
PSO7		✓		✓	✓	✓		✓		
PSO8	✓			✓	✓	✓	✓	✓	✓	✓
Number of Matches = 59 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

SEMESTER III				
COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PBHI3001	Discipline Specific Core Course	SOCIAL AND CULTURAL HISTORY OF INDIA FROM CE 1857 TO 2010	6	4
Course Objectives				
1. To Study the growth of Educational System in British India. 2. To know Government's initiatives for the development of Western Education. 3. To study the Socio-Religious Reform Movements and its impact. 4. To understand the rise of Trade Unions and Peasant Movements and Cultural Developments since independence.				
Unit-I	**Education under British India:** East India Company and Education: The Policy of Non-interference – Introduction of Western Education – Charter Acts – Macaulay's Minute – Downward filtration Theory – Wood's Despatch – Universities of 1857 – Hunter Commission – Indian Universities Act – The Sadler Commission – Education under Dyarchy – Hartog Committee – Wardha Scheme of Basic Education			**18 Hours**
Unit-II	**Development of Education since Independence:** Radhakrishnan Commission – University Grants Commission – Kothari Commission – National Policy on Education1968 – New Education Policy of 1986 – Centres of National Excellence: Indian Institute of Technology – Indian Institute of Managements – National Institutes of Technology – Engineering and Information Technology Education			**18 Hours**
Unit-III	**Socio-Religious Reform Movements in British India:** BrahmoSamaj – PrarthanaSamaj – Satya ShodhakSamaj – Arya Samaj – Ramakrishna Mission – Theosophical Society – SNDP – Muslim Reform Movements: Deoband – Aligarh – Barelwi and Ahl-i-Hadith – Sikh Reform Movements: Nirankari and Namdhari – Parsi Reform Movement: Rehnuma-i-Mazdayaznan Sabha			**18 Hours**
Unit-IV	**Trade Unions and Peasant Movements:** Trade Unions**:** Condition of workers in Industries – Rise of Trade Unionism: AITUC – BMS – INTUC – CITU – HMS – Impact – Peasant Movements: Condition of Peasants – Formation of All India Kisan Sabha and Ekta Movements – Mappila Rebellion – Bardoli Satyagraha – Great Depression and Agricultural Crisis in India – All India Kisan Congress – Impact			**18 Hours**
Unit-V	**Art and Architecture**: Colonial Art and Architecture – Independent India: Cultural Developments – Lalit Kala Academy – Sahitya Academy, Sangeet Natak Academy and Sangeet Kala Academy –			**18 Hours**

	Accomplished Classical Musicians and Dancers – Painters and Sculptors of Modern India	

Books for Study:

1.Chandra, Bipin, *India's Struggle for Independence*, Penguin Books, New Delhi, 2000.
2.Chandra, Bipin,*Nationalism and Colonialism in Modern India*, Orient Longman, New Delhi, 1999.
3.Sarkar, Sumit, *Modern India 1885-1947*, Macmillan Press, New Delhi, 2002.

Books for Reference:

1.Desai, A.R., *Social back ground of Indian Nationalism*, Popular Prakasam, Bombay,1960.
2.Grover, B.L. and Grover S., *A New Look at Modern Indian History*, S. Chand & Co, New Delhi,1998.
3.Jones, Kenneth W, *Socio – Religious Reform Movements in British India, The New Cambridge History ofIndia Series*, Foundation Books, Cambridge University Press, New Delhi, 1994.
4.Rajni Kothari, *Politics in India*, Orient Longman, Hyderabad, 1970.

E- Resources:

1. Crash Course Modern history India 1857 - 1947 | Polity UPSC, IAS, CDS, NDA, SSC CGL - YouTube
2. Political and Cultural History of Contemporary India [Lec 01] - YouTube
3.Political and Cultural History of Contemporary India [Lec 02] - YouTube
4.Dr Shashi Tharoor - Looking Back at the British Raj in India - YouTube
5. Balaji Premkumar - YouTube

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Relate the recommendations of various commissions for the development of Higher EducationSystem in British India.	K4
CLO2	Understand the efforts Government of Indiafor the development of western education.	K2
CLO3	Articulate the socio-religious reform movements and its impact on the society in British India.	K3
CLO4	Sketch the growth trade union and peasant movements in 19th and 20th Century India.	K1
CLO5	Appraise the development of art, architecture, fine arts and establishment of academies for the promotion of indigenous arts.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓	✓	✓	✓	✓	✓	✓	✓
CLO 4	✓	✓	✓	✓	✓	✓	✓	✓
CLO 5	✓	✓	✓	✓	✓		✓	✓
Number of Matches = 39 Correlations: Very High								

Mapping Correlation Bench mark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

Prepared by:Mr. D. ABUL FAZAL **Verified by: Dr. C MOHAMED FAHEEM**

SEMESTER –III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHI3002	**Discipline Specific Core Course**	**HISTORY OF MODERN CIVILIZATIONS**	**6**	**4**

Course Objectives

1. To know the developments that took place during Renaissance.
2. To study the causes and impact of French Revolution and Industrial Revolution.
3. To understand the emergence of Colonialism and Imperialism and its impact.
4. To study the World Wars and update the knowledge of modern scientific developments.

Unit-I	**Renaissance:** Introduction – Definition – Renaissance in Italy – Revival of Classical Literature – Renaissance Literature – Art – Sculpture – Science – Results – **Geographical Discoveries:** Causes and impact – Portugal – Spain – **Reformation:** Causes – Martin Luther – Ulrich Zwingli – John Calvin – King Henry VIII – **Counter Reformation:** Ignatius Loyola – Effects of Reformation.	**18 Hours**
Unit-II	**French Revolution:** Causes – American War of Independence – The French Philosophers – Convening of States General – National Assembly – Fall of Bastille – Political Clubs – The Legislative Assembly – The National Convention – Results – **Industrial Revolution:** Causes – Scientific Inventions – Development of Transport – Communication – Iron and Steel – Merits and demerits – **Agrarian Revolution** and its Impact	**18 Hours**
Unit-III	**Colonialism and Imperialism:** Rise of Colonialism and Imperialism – **First World War:** Causes, course and results – **Russian Revolution:** Causes, course and results – **League of Nations:** Establishment, aims and organs – Its achievements and failure – **Rise of Dictatorship:** Fascism and Nazism	**18 Hours**
Unit-IV	**Second World War:** Causes, course and results – **United Nations Organization:** Foundation and Organs – Achievements – UNESCO – UNICEF – WHO – UNHCR	**18 Hours**
Unit-V	**Cold War:** Introduction – Regional Security Agreements (NATO, SEATO, WARSAW) – Korean Crisis – Vietnam War – Cuban Crisis – End of Cold War – **Gulf War:** Causes and results – **Scientific Developments:** Scientific developments of the 19th and 20th Centuries	**18 Hours**

Books for Study

1. Ketelbey, C.D.M, *A History of Modern Times From 1789*, Oxford University Press, Bombay, 1965.
2. Swain, J. W., *Beginning of the Twentieth Century*, W. W. Norton & Company, New York, 1955.
3. William Cecil Dampier, *A History of Science and its relations with Philosophy of Religion*, Cambridge University Press, 1929.

Books for Reference

1. Davis,H.A., Revised by D.H.C. Blount, *An Outline History of the World*, New Delhi: Oxford University Press, 1968.
2. Hobsbawm, E.J., *The Age of Capital*, 1848-1875. Phoenix Press, London, 2010.
3. Hobsbawm, E.J., *The Age of Empire*, 1875-1914, Phoenix Press, London, 2011.
4. McKinley, Albert E.,Arthur C. Howland & Matthew L. Dawn,*World History*, Vol. I &II,New Delhi: Atlantic Publishers,1994.

E-Resources:

1. https://www.britannica.com/event/Renaissance
2. https://www.nationalarchives.gov.uk/education/resources/french-revolution/
3. https://d-nb.info/1031400591/34
4. https://en.wikipedia.org/wiki/World_War_II
5. https://www.britannica.com/event/Cold-War

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Identify the causes, developments and results of Renaissance.	K1
CLO2	Articulate the impact of French Revolution and Industrial Revolution.	K3
CLO3	Evaluate the impact of colonialism and imperialism.	K5
CLO4	Understand the role of UNO in maintaining World Peace.	K2
CLO5	Illustrate the Political and Scientific Developments of 20th century.	K4

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓	✓	✓	✓	✓	✓	✓	✓
CLO 4	✓	✓	✓	✓	✓	✓	✓	✓
CLO 5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches = 40 Correlations: Very 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

Prepared by: Dr. C MOHAMED FAHEEM **Verified by: Mr. D. ABUL FAZAL**

SEMESTER - III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHI3003	**Discipline Specific Core Course**	**HISTORIOGRAPHY**	**5**	**4**
Course Objectives				
1. Understand the meaning, nature and scope of History. 2.Realize the relationship between History and Allied Social Sciences. 3. Identify the different traditions of writing History. 4. Know about the ancient, medieval and modern Historical tradition of India.				
Unit-I	**Introduction:** History – Meaning and its Definitions – Nature and Scope, Purpose and Value of History – Philosophy of History – History as a Science and Art – Morality –Causation – Generalization		**15 Hours**	
Unit-II	**History and Allied Sciences:** History and its Relations with other Social Sciences – Geography –Archaeology – Anthropology – Economics – Political Science – Sociology – Psychology – Literature – History and Ancillary Sciences		**15 Hours**	
Unit-III	**World Historiography**: Greco-Roman Historiography – Herodotus and Thucydides – Livy and Tacitus – Christian Historiography – St. Augustine –Arab Historiography –Ibn Khaldun – Edward Gibbon – Ranke – Toynbee – Karl Marx		**15 Hours**	
Unit-IV	**Ancient and Medieval Indian Historiography**: Purana Itihasa Tradition in Ancient India – Kalhana –Bilhana – Bana – Medieval Historiography:Alberuni – Amir Khusrau – Ziauddin Barani – Abul Fazal – Abdul Hamid Lahori		**15 Hours**	
Unit-V	**Modern Indian Historiography**:Cambridge: Anil Seal – Nationalist: R G Bhandarkar – Marxist: Irfan Habib – Subaltern: Ranajit Guha		**15 Hours**	
Books for Study: 1. Aggarwal J.C., *Teaching of History- A Practical Approach*, Vikas Publishing House Pvt. Ltd.,				

New Delhi, 1992
2. RajayyanK., *History in Theory and Method*, Ratna Publications, New Delhi
3. Sheik Ali, History - *Theory and Method*, Macmillan, New Delhi, 1981

Books for Reference:
1. Carr E.H., *What is History*, Pelican Books, 1964
2. Chaffer, John & Lawrence Taylor, *History and the History Teachers*, George Allen & Unwin Ltd. London, 1975
3. Elton, *Practice of History*, Thomas. Y. Cromwell, New York, 1967
4. Ranajit Guha, *Subaltern Studies*, (Six Volumes) Oxford University press, New Delhi,1994

E-Resources:
1. https://ddceutkal.ac.in/Syllabus/MA_Education/Education_Paper_5_history.pdf
2. https://www.historydiscussion.net/history/relationship-of-history-with-other-sciences-study-of-history/638
3. https://youtube.com/playlist?list=PLfbwVKjZrho4jCCP-CdHUMw0yaRTlpAU_
4. https://youtu.be/BRivPTRYJU0
5.https://books.google.co.in/books/about/The_Origins_of_Modern_Historiography_in.html?id=VQvIAAAAQBAJ&printsec=frontcover&source=kp_read_button&hl=en&newbks=1&newbks_redir=0&gboemv=1&redir_esc=y#v=onepage&q&f=false

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Describe the nature and scope of History.	K1
CLO2	Use the resources of other disciplines in Historical Writing.	K3
CLO3	Compare the different trends of Historical writing as evolved in different parts of the world.	K2
CLO4	Categorise the different trends in Ancient and Medieval Indian Historiography.	K4
CLO5	Evaluate the modern trends in Indian Historiography and their influence.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓	✓	✓	✓	✓	✓	✓	✓
CLO 4	✓	✓	✓	✓	✓	✓	✓	✓
CLO 5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches = 40 Correlations: Very High								

MappingCorrelationBenchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	**1-12**	**13-24**	**25-28**	**29-40**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

EMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHI3004	**Discipline Specific Core Course**	**HISTORY OF THE OTTOMANEMPIRE**	**5**	**4**

Course Objectives

1. To trace the establishment and expansion of Ottoman Empire.
2. To familiarize the administrative structure of Ottoman Empire.
3. To study the welfare reform measures of Ottoman Turks.
4. To study the development of Art, Architecture and Science during the ottomans.

Unit-I	**Origin and Growth:** The Origin of the Ottomans – Osman I and his Conquests – Orkhan I: The Period of Initial Expansion and Consolidation – Murad I and his Victories – Bayezid I, Yildirim (The Thunderbolt) and the Interregnum – Mehmed I, The Restorer of the Empire – Murad II	**15 Hours**
Unit-II	**Classical Age:** Mehmed II, the Conqueror: Siege and Repopulation of Constantinople – Administration and Culture – Renaissance Artists – Bayezid II – Jewish and Muslims Immigration – Selim I – Foreign Relations: Shah Ismail and Babur	**15 Hours**
Unit-III	**Progress and Decline:** Suleiman the Magnificent – Military Campaigns – Reforms – Golden Age of Cultural Development – Selim II – Grand Vizier, Sokollu Mehmed Pasha – Sultanas and the Decline of the Empire	**15 Hours**
Unit-IV	**Administrative system of Ottoman Turks:** Central Administration – Provincial Administration – Vassal tributary States – Palace Schools – Madrassas and Khazis – Military Administration: Janissaries, a Model Modern Army	**15 Hours**
Unit-V	**Art, Architecture and Science:** Kulliye (Mosque Complex)–Grand Mosque of Bursa –Mimar Sinan – Complex of Sultan Bayezid II –Topkapi Palace – Historians: Kamal Pasha Zade – Saad-al-Din – Science: Suleymaniye Medical Madrasa –SerafeddinSabuncuoglu– The Constantinople observatory of Taqi ad-Din –**Mustafa bin Ali Al-Muwaqqit**– Piri Reis and Seydi Ali Reis	**15 Hours**

Books for Study

1. Roger Bigelow Merriman, *Suleiman the Magnificent*, 1520-1566, Lunderg Press, Midway, USA, 2013
2. Sir Paul Rycaut, *History of the Turkish Empire*, (1628-1700), 2 Volumes, Oxford University Press, London, U.K, 2005
3. Lord Kinross, *The Ottoman Centuries, The Rise and Fall of the Turkish Empire*, Harper Perennial, New York, 1979
4. Bernard Lewis, *Istanbul and the Civilization of the Ottoman Empire*, University of Oklahoma Press, USA, 1963
5. HalilInalcik, *The Ottoman Empire, The Classical Age 1300-1600*, Phoenix Press, New Heaven City, USA,2001

Books for Reference

1. William Deans, *History of the Ottoman Empire: From the Earliest Period to The Present Time* – Primary Source Edition, Wentworth Press, Sydney, 1854
2. Orhan Pamuk, *Istanbul Memories and the City*, Faber Publications, London, 2006

3. Sir Edward Shepherd Creasy, *History of the Ottoman Turks*, Nabu Press, South Carolina, USA, 2012
4. Stanley Lane Poole, *The Story of Turkey*, Kessinger Publishing Co, Montana, US, 2004
5. Herbert Adams Gibbon, *The Foundation of the Ottoman Empire*, Wentworth Press, Sydney, 2016

E-Resources:

1. https://youtu.be/f9c4Y7Vf7G0
2. https://youtu.be/UQlFvlrRNro
3. https://youtu.be/GnP59Nrucj0
4. https://youtube.com/playlist?list=PLvr5r4OXUCSKKb8z91959k6Iq-AsNvju_
5. https://youtu.be/WIF8EfDwdR8

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Describe about the formation of Ottoman Empire.	K1
CLO2	Understand how OttomanEmpire became a world power.	K2
CLO3	Articulate the secular nature of the Ottoman Emperors.	K3
CLO4	Analyse the procedure of training and development method in administrative system of Empire.	K4
CLO5	Appraise the major works on Art, Architecture and Science by Ottomans Turks.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓		✓	✓	✓	✓	✓	✓
CLO 2	✓		✓	✓	✓		✓	✓
CLO 3	✓		✓	✓	✓		✓	✓
CLO 4	✓		✓	✓	✓		✓	✓
CLO 5	✓		✓	✓	✓	✓	✓	✓
Number of Matches = 32 Correlations: Very 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				
COURSECODE	**CATEGORY**	**COURSETITLE**	**HRS./ WEEK**	**CREDIT**
PBHIVB31	**Value Based Course**	**RESEARCH METHODOLOGY AND ETHICS**	**3**	**3**

Course Objectives

1. To understand the basic concepts of research.
2. To acquaint the students with the basic Data Collection Methods.
3. To inform the students about the various stages of research.
4. To explain to the students process of Documentation following ethical principles.

Unit-I	**RESEARCH METHODOLOGY:** Meaning – Definitions – Objectives – Scope – Characteristics – Pre-requisites of a good researcher – Limitations – Risk assessment – Variables in research – Qualitative and Quantitative research – Types of research: Historical Method – Scientific Method – Inductive and Deductive Methods	**9 Hours**
Unit-II	**DATA COLLECTION METHODS:** Sources: Primary, Secondary, Oral and Online sources – Methods of Data collection: Experimental Method, Historical method, Observations, Questionnaire, Case Study, Survey, Interview, Census and Sampling	**9 Hours**
Unit-III	**STAGES OF RESEARCH:** Selection of a research problem – Review of literature – Data Collection – Importance and types of Hypotheses – Formulation – Verification – Abstract – Proposal – Synopsis	**9 Hours**
Unit-IV	**THESIS WRITING:** Research design – Features of a good research design – Research report – Thesis writing – Title page – Certificate – Preliminary pages – Abbreviations – Introduction – Chapterization – Documentation – Foot Notes – End Notes – Appendix – Bibliography	**9 Hours**
Unit-V	**RESEARCH ETHICS:** Plagiarism and ethical issues – Ethical committees (human and animal) – IPR Intellectual Property rights and Patent law – Commercialization – Copy right, Royalty, Trade related aspects of Intellectual Property rights (TRIPS) – Scholarly Publishing – IMRAD concept and design of research paper – Citation and Acknowledgement – Reproducibility and Accountability	**9 Hours**

Books for Study:

1. Chand, S, *Research Methodology*, S Chand and Company Ltd., New Delhi, 2003.
2. Gupta Santhosh, *Research Methodology and Statistical Techniques*, Deep and Deep Publication Pvt. Ltd., New Delhi, 2005.
3. Sabine Landau and Brian S. Everett, *A Handbook of Statistical Analyses using SPSS*, Chapman & Hall/CRC press LLC, 2004.

BooksforReference:

1. Anderson, J. and Derston., *Thesis and Assignment*, Wiley Eastern Ltd., Madras, 1991.
2. Kothari, C. R. *Research Methodology: Research and techniques*,New Age International Publishers, New Delhi, 1980.
3. Murthy C, *Research Methodology*, Vrinda Publications (P) Ltd., Delhi, 2012.
4. Ramadass P, Aruni A Wilson, *Research and Writing*, MJP Publishers, 2009.

E- Resources:

1. https://libguides.library.cityu.edu.hk/researchmethods/ethics
2. https://indiabioscience.org/policy-resources/resources-on-research-ethics
3. https://www.publichealthnotes.com/research-ethics-definition
4. https://www.publichealthnotes.com/research-ethics-definition
5. http://www.indianresearchjournals.com/pdf/IJSSIR/2013/May/15.pdf

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

CLOs	COURSELEARNINGOUTCOMES By the end of the course the students will be able to	KnowledgeLevel
CLO1	Develop an appropriate framework for the research study.	K6
CLO2	Understand the importance of collection of data.	K2
CLO3	Plan an appropriate research hypothesis for a research project.	K5
CLO4	Relate the ability to apply the research methods.	K4
CLO5	Identify the ill effects of Plagiarism and necessity of Research Ethics.	K1

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes(PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CLO1	✓	✓	✓	✓	✓	✓	✓	✓
CLO2	✓	✓	✓	✓	✓	✓	✓	✓
CLO3	✓	✓	✓	✓	✓	✓	✓	
CLO4	✓	✓	✓	✓	✓	✓	✓	✓
CLO5	✓	✓	✓	✓	✓	✓		✓
Number of Matches =38 Correlations: Very 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**	**COURSETITLE**	**HRS./ WEEK**	**CREDIT**
PBHIDE31	**Discipline Specific Elective Course**	**ECONOMIC HISTORY OF MEDIEVAL INDIA**	**5**	**3**

Course Objectives

1. To understand the importance of agriculture in Medieval India.
2. To enable the students to know the revenue system during Medieval India.
3. To explain the growth of various industries in Medieval India.
4. To make the students aware of the Trade and commerce and general economic position during Medieval India.

Unit-I	**Agriculture:** Agricultural production- Agricultural seasons – Methods of cultivation and crops grown - Irrigation system – Land reclamation – Horticulture: Cultivation of Fruits and Flowers – Development of Agriculture and Horticulture	**15 Hours**
Unit-II	**Revenue Administration:** Agrarian relations – Revenue policies – Fiscal policy – Sources of income and state expenditure –Developmental activities for the rise in resources	**15 Hours**
Unit-III	**Development of Industries:** Cottage Industries – Karkhanas – Artisan products – Metal Industry – Leather and other Industries – Agro-based industries like Textiles and Oils	**15 Hours**
Unit-IV	**Development of Trade and Commerce:** Trading Classes – Inland and Coastal Trade – Overseas Trade – Modes of Transport and Communication – Exports and Imports – Trading centers – Weights and Measurement – Monetary system and Prices	**15 Hours**
Unit-V	**State and Economy:** Population – Agrarian Economy – Urban Economy – Towns and Cities – Currency system – Economic policies – Standard of living	**15 Hours**

Books for Study:

1. Tapan Ray Chaudry and Habib Irfan, *The Cambridge Economic History of India*, Volume I, Cambridge
University Press, Cambridge, 2008.
2.Iswari Prasad, *History of Medieval India*, The Indian press Ltd., Allahabad, 1933.
3.Majumdar R.C. (ed): *The History and Culture of the Indian People*, Vol. VI, Bhartiya Vidya Bhavan,
Bombay, 1969.

BooksforReference:

1.Majumder B.P., *The Socio-Economic History of Northern India*, Firma K. L. Mukhopadhyay, Calcutta,
1960.
2.Venkatramanayya N, *Early Muslim expansion in South India*, Madras University, Series No XVII,
Madras, 1942.
3.Lunia B.L., *Life and Culture in Medieval India*, Kamal Prakashan, Indore, 1978.
4.Channa Reddy, P., *Guilds in Medieval India*, New Delhi, 1991.

E-Resources:

1.https://www.academia.edu/30902731/Economy_in_Medieval_In
2. https://books.google.com/books/about/Economic_History_of_Medieval
3. https://www.amazon.in/Economic-History-Medieval-India-1200-1500/dp/
4. https://prepp.in/news/e-492-economic-conditions-in-the-medieval-period
5. https://primusbooks.com/essays-medieval-indian-economic-history

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

CLOs	COURSELEARNINGOUTCOMES By the end of the course the students will be able to	KnowledgeLevel
CLO1	Understand the importance of Agriculture in Medieval India.	K2
CLO2	Explain the Revenue system of Medieval India.	K1
CLO3	Appraise the development of Industries in medieval India.	K5
CLO4	Illustrate the development of trade and commerce in Medieval India.	K4
CLO5	Articulate the general economic Condition of Medieval India.	K3

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes(PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CLO1	✓	✓	✓	✓	✓	✓	✓	✓
CLO2	✓	✓	✓	✓	✓	✓	✓	✓
CLO3	✓		✓	✓	✓	✓	✓	✓
CLO4	✓	✓	✓	✓	✓		✓	✓
CLO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches = 38 Correlations: Very 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**
PBHIDE32	**Discipline Specific Elective Course**	**PRINCIPLES OF MUSEOLOGY**	**5**	**3**
Course Objectives				
1.To know about the origin definition and purpose of Museum. 2. To understand about history and development of Museum. 3. To know about the types of Museums. 4. To know about the functions and organizations of Museum.				
Unit-I	**Introduction:** Origin, Definition, and purpose of Museum – Museology and Museography: Conventional Museology and New Museology – Current contested dimensions and debates – Changing role and social relevance of Museums		**15 Hours**	
Unit-II	**History and Development:** Museums in Global scenario – Museum Development in India – Regional Museums: Manjusha Museum, Keladi Museum and Mysore Museums		**15 Hours**	
Unit-III	**Types of Museums:** Open air Museums –Inclusive Museums – Community Centre –Interpretation Centre– Galleries and Virtual Museums		**15 Hours**	
Unit-IV	**Functions of Museum:** Collection – Storage - Preservation and Conservation – Documentation – Research – Exhibition – Security – Education and Knowledge dissemination – Publication		**15 Hours**	
Unit-V	**Organizations and Scopes:** Professional Museum Organizations – Regional, National and International – Role of UNESCO in the field of Museum and culture – ICOM (International Council of Museums)–Code of Ethics – Museology as a profession		**15 Hours**	
Books for Study: 1.Nigam M.L.,*Fundamentals of Museology*, Navahind Prakashan, 1966 2. Alexander E.P.,*Museums in Motion: An Introduction to History and Function of Museums*, Nashville, 1979 3.Agrawal, Usha,*Museums in India – a brief directory*, 2000				

Books for Reference:

1. Seth, Manvi.,*Communication and Education in Indian Museums*, Agam Kala Prakashan, New Delhi, 2012
2. Jain, Sunjay., *Museum Avam Museology*, Kanika Prakashan, Baroda, 2004
3. *Key Concepts of Museology*, ICOM Publication (online)
4. *Museology Working Papers*, ICOM Publication (online)

E-Resources:

1. https://youtu.be/B9zDceNSNBM
2. https://youtu.be/MHo928fd2wE
3. https://youtu.be/HdBObc9PwPQ
4. https://youtu.be/JqgMCZsFf5c
5. https://youtube.com/playlist?list=PLnl4bzqH5QqJOzKcGDV1KIjPF7yG9tWfl

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Tell about the origin definition and purpose of Museum.	K1
CLO2	Interpret the history and development of Museum.	K2
CLO3	Articulate the types of Museums	K3
CLO4	Illustrate the functions of Museum.	K4
CLO5	Evaluate the Organizations and Scope of Museum.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3			✓	✓	✓	✓	✓	✓
CLO 4			✓	✓	✓	✓	✓	✓
CLO 5	✓		✓	✓	✓	✓	✓	✓
Number of Matches = 35 Correlations: Very High								

SEMESTER - III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHIDE33	**Discipline Specific Elective Course**	**MAKERS OF MODERN INDIA II**	**5**	**3**

Course Objectives

1.To know about the Political leaders of Modern India
2. To know about the role of Indian leaders in Social Transformation
3. To know about the Communist Ideology and the achievements of Indian Scientists.
4. To know about the Cultural contribution of great intellectuals of India.

Unit-I	**Political Thinkers:** Mahatma Gandhi – Jawaharlal Nehru – Muhammad Ali Jinnah – Maulana Abul Kalam Azad– Netaji Subhas Chandra Bose – Rajagopalachari	**15 Hours**
Unit-II	**Social Thinkers:** B.R.Ambedkar – Vinoba Bhave – Dr. Muthulakshmi Reddy –E.V.R Periyar – Mother Theresa – Medha Patkar	**15 Hours**
Unit-III	**Economic Thinkers:** M.N. Roy – S.A. Dange– E.M.S. Namboodiripad – P. Jeevanandham – MalayapuramSingaravelu – Jaya Prakash Narayan – Ram Manohar Lohia	**15 Hours**
Unit-IV	**Scientists:** Sir C.V. Raman – Homi Jehangir Bhabha – Vikram Sarabhai – Dr. A.P.J. Abdul Kalam – M.S. Swaminathan – G. Nammazhvar	**15 Hours**
Unit-V	**Literatures:**SubramaniyaBarathi–PattukottaiKalayna Sundaram – Sarojini Naidu – Arundhati Roy – Thiru Vi. Ka. – Bharathidasan	**15 Hours**

Books for Study:

1.Ramachandra Guha, *Makers of Modern India*, Harvard University Press, Cambridge, 2013.
2. Rajmohan Gandhi, *Modern South India: A History from the 17th Century to our Times*, Aleph Book Company, New Delhi, 2018.
3. Naravane, V.S., *Modern Indian Thought*, Orient Longman, New Delhi.

Books for Reference:

1. Agarwal R. C., and Mahesh Bhatnagar, *Constitutional Development and National Movement of India*, S. Chand & Co., New Delhi, 2014.
2. Lal S., *50 Magnificent Indians of 20th Century*, Jaico Publication, Chennai, 2011.
3. Grover B.L., Grover S., *A New Look at Modern Indian History*, S. Chand & Co., New Delhi, 2004.
4. Agarwal R. C., and Mahesh Bhatnagar, *Constitutional Development and National Movement of India*, S. Chand & Co., New Delhi, 2014.

E-Resources:
1.https://www.youtube.com/watch?v=F7goIGuQWwQ
2.https://tripurauniv.ac.in/Content/pdf/StudyMaterialsDetail/MA%20Political%20Science%201st%20Semester/POLS-702C-Modern%20Indian%20Political%20Thought.pdf
3.https://www.google.com/search?q=nineteenth+century+indian+communist+thinkers+yutube&rlz=1C1GCEA_enIN977IN977&sxsrf=ALiCzsYLcWRXe6Gfu-
4.https://www.google.com/search?q=nineteenth+century+indian+women++thinkers+youtube&rlz=1C1GCEA_enIN977IN977&sxsrf=ALiCzsZeyRKOjjFd1aexJgMcrPLDqIyHew%3A1670205550291&ei=blCNY7uvEYWe4-EPuK-
5.https://www.youtube.com/watch?v=vQSJ0EGkR3U

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Identify the ideals and principles of the national leaders of our nation.	K1
CLO2	Articulate the Social Values and thinking reflected in the Social Thought of Indian Leaders.	K3
CLO3	Understand the economic dynamics of a socially Vibrant Society.	K2
CLO4	Appraise the necessity of Scientific advancement in National development.	K5
CLO5	Illustrate the relevance of literature in cultural development of an individual.	K4

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓		✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓		✓	✓
CLO 3	✓		✓	✓	✓	✓	✓	✓
CLO 4	✓	✓	✓	✓	✓	✓	✓	✓
CLO 5	✓		✓	✓	✓	✓		✓
Number of Matches = 35 Correlations: Very High								

MappingCorrelationBenchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	VeryHigh

Prepared by: Dr. G. HARIGARAN **Verified by: Mr. D. ABUL FAZAL**

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHI4001	**Discipline Specific Core Course**	**GROWTH OF PANCHAYATI RAJ INSTITUTIONS IN INDIA (WITH SPECIAL REFERENCE TO TAMIL NADU)**	**6**	**5**
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.				
Unit-I	**Evolution**: Genesis 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 Decentralisation - Lord Ripon and Local Self-Government - Royal Commission on Decentralisation			**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 Act 1958 - Tamil Nadu District Development Council Act 1958			**18 Hours**
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 ofTamil 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*, AjanthaAchagam, 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.*

E-Resources:

1.https://en.wikipedia.org/wiki/Panchayati_raj_in_India#:~:text=The%20Panchayati%20Raj%20system%20was,district%20on%202%20October%201959
2. https://www.insightsonindia.com/polity/functions-and-responsibilities-of-the-union-and-the-states-issues-and-challenges-pertaining-to-the-federal-structure-devolution-of-powers-and-finances-up-to-local-levels-and-challenges-therein/devolution-of-powers-and-finances-up-to-local-levels-and-challenges-therein/73rd-amendment-act-panchayati-raj/evolution-of-panchayati-raj/
3. https://www.drishtiias.com/important-institutions/drishti-specials-important-institutions-national-institutions/panchayati-raj-institution-pri
4. https://www.civilsdaily.com/panchayati-raj-institution-evolution-features-composition-powers-functions/
5. https://www.panchayat.gov.in/documents/20126/0/TamilNadu+PR+Act-+1994+%281%29.pdf/e5e55f75-97df-a0ad-88da-608a0ca3694b?t=1554884067408

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

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

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

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓		✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓	✓	✓	✓	✓	✓	✓	✓
CLO 4	✓		✓	✓	✓	✓	✓	✓
CLO 5			✓	✓	✓	✓	✓	✓
Number of Matches = 36 Correlations: Very 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 - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHI4002	**Discipline Specific Core Course**	**HISTORY OF MODERN WEST ASIA**	**6**	**4**

Course Objectives

1. To understand the Rise of Nationalism in West Asia.
2. To know the role of peace Maintenance Treaties after First World War.
3. To understand the emergence of Nations after First and Second World Wars.
4. To understand the peace Maintenance Treaties and role of UNO

Unit-I	**Rise of Nationalism:** Historical Background of West Asia – Arab Nationalism – First world War and West Asia – Balfour Declaration	**18 Hours**
Unit-II	**Post First World War:** Peace Treaties after First World War – British and French Mandates – Birth of Israel – Arab Jewish Conflict	**18 Hours**
Unit-III	**Emergence of Arab Nations**: Syria – Iraq – Jordan - Saudi Arabia – Second World War and West Asia	**18 Hours**
Unit-IV	**Rise of Arab Nations after Second World War:** Lebanon – UAR – UAE – Qatar and Bahrain – Yemen – Oman – Kuwait – Gulf War	**18 Hours**
Unit-V	**Peace Treaties and Organisations:** CENTO – OPEC – PLO – Nixon and Kissinger – Regan – Camp David Agreement – Formation of Palestine – Role of UNO in Peace Maintenance	**18 Hours**

Books for Study:

1. Talmiz Ahmed, *West Asia at War*, Harper Collins India, 2022.
2. Sanjay Singh, *West Asia in Transition Volume II*, Pentagon Press Publications, 2016.
3. Sujata Ashwarya and Mujib Alam, *Contemporary West Asia*, Imprint Unknown Publications, 2016.

Books for Reference:

1.Majumdar and Srivastava, *History of Middle East*, Surjeet Publications, Delhi.
2. Kirk. G. E., *A Short History of Middle East*, Surjeet Publications, Delhi.
3. Fisher Sydney Netland, *The Middle East A History*, Routledge and Kegan Paul, London.
4. Wilber Donald N, *Iran – Past and Present*, Princeton University Press, New Jersey.

E-Resources:

1. https://www.britannica.com/topic/nationalism/Asian-and-African-nationalism
2. https://www.britannica.com/place/Israel/Establishment-of-Israel
3. https://www.encyclopedia.com/humanities/encyclopedias-almanacs-transcripts-and-maps/arab-nationalism
4. https://youtu.be/3LYNHQ2c1T8
5. https://www.britannica.com/topic/United-Nations/Functions

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Summarise the Rise of Nationalism in West Asia	K2
CLO2	Articulate the role of peace Maintenance Treaties after First World War	K3
CLO3	Illustrate the emergence of nations after First World War	K4
CLO4	Evaluate the emergence of nations after Second World War	K5
CLO5	Explain the peace Maintenance Treaties and role of UNO	K1

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓		✓	✓
CLO 3	✓	✓	✓	✓	✓		✓	✓
CLO 4	✓	✓	✓	✓	✓		✓	✓
CLO 5	✓	✓	✓	✓	✓		✓	✓
Number of Matches = 36 Correlations: Very 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

Prepared by: Mr. MD GHUFRAN R **Verified by: Mr. D. ABUL FAZAL**

SEMESTER IV

COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PBHI4003	**Discipline Specific Core Course**	**HISTORY OF ENGLAND FROM CE 1603 TO 1945**	**5**	**4**

Course Objectives

1. To study the ideological conflict between the Crown and Parliament.
2. To analyze the origin and course of Civil War.
3. To study the importance of Oliver Cromwell's period in England.
4. To study the Glorious Revolution and political importance of Hanoverians period.

Unit-I	**James I:** Divine Right Theory – Causes for the struggle between King and Parliament – James I and his Four Parliaments – Religious Policy – Foreign Policy	**15 Hours**
Unit-II	**Charles I:** Charles I and his Parliaments – Petition of Rights – King's Arbitrary Rule and Measures – Long Parliament – Civil War and the execution of King – Foreign Policies	**15 Hours**
Unit-III	**Oliver Cromwell and his Protectorate**: The Common Wealth – Protectorate Rule – Causes for the failure of Cromwell's Constitutional Experiments – Foreign Policy – Richard Cromwell	**15 Hours**
Unit-IV	**Restoration:** Restoration settlement – Charles II's Second Phase Rule – Titus-Oates Popish Plot – Foreign Policy of Charles II – James II – Glorious Revolution – William & Mary: Act of Settlement 1701 – Queen Anne: Party Government – Act of Union 1707– Foreign Policy	**15 Hours**
Unit-V	**19th& 20th Century England**:George I and Sir Robert Walpole – George II and Pitt, the Elder –The War of Austrian Succession –American War of Independence – Industrial Revolution – Reform Acts of 19th Century – England and the World Wars.	**15 Hours**

Books for Study

1. Mahajan, V.D., *England Since 1688*, S. Chand, Delhi, 1963
2. George W. Southgate, *A Text Book of Modern English History, Book One, The Tudor and Stuart Periods*, J.M. Dent & Sons Ltd., London, 1938
3. Southgate, G.W., *A Textbook of Modern English History*, Vol. 1 and 2, J.M.Dent & Sons Ltd., London, 1938

Books for Reference

1. Woodward, F.L., *A History of England*, Routledge Publications, Taylor & Francis India, New Delhi, 1990
2. John Thron, *A History of England*, A.I.T.B.S. Publishers, New Delhi, 2000
3. Sir George Clark, *English History -A Survey*, Oxford University Press, Chennai, 1971
4. Adams, G.B., *Constitutional History of England*, Jonathan Cape, London, 1920

E-Resources:

1. https://youtu.be/DCKOdHKnTa4

2. https://youtu.be/O53VC2766to 3. https://youtu.be/U3NjaOkD9yw 4. https://youtu.be/Gx9N0mrTPtw 5. https://youtu.be/hyifbSJsOA0

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Explain about the ideological conflict between the Crown and Parliament.	K1
CLO2	Summarise the origin and course of Civil War.	K2
CLO3	Articulate the importance of Oliver Cromwell's period in England.	K3
CLO4	Illustrate the Glorious Revolution	K4
CLO5	Criticise about the political importance of Hanoverians period.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓		✓	✓	✓	✓	✓	
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓		✓	✓	✓		✓	✓
CLO 4	✓	✓	✓	✓	✓		✓	✓
CLO 5	✓	✓	✓	✓	✓	✓	✓	✓
Number of Matches = 35 Correlations: Very High								

<u>Mapping Correlation Benchmark</u>

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 –IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHI4004	**Discipline Specific Core Course**	**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 Medical and Physical Sciences.
3. To study the contribution of Muslims to Mathematics and Astronomy.
4. 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 Abbasids –Contribution of Arabs to the Cultural and Scientific Developments – Role of Public Libraries	**15 Hours**
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 Shahabuddee, 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

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

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

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓		✓	✓	✓	✓	✓	✓
CLO 3	✓		✓	✓	✓	✓	✓	✓
CLO 4	✓		✓	✓	✓	✓	✓	✓
CLO 5	✓		✓	✓	✓	✓	✓	✓
Number of Matches = 36 Correlations: Very High								

MappingCorrelationBenchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	VeryHigh

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHINM41	**Other Elective Course**	**INTRODUCTION TO JOURNALISM**	**3**	**2**

Course Objectives

1. To understand the basic concepts of Journalism.
2. To study the evolution and legal procedures of Journalism.
3. To familiarize the actions relating to News gathering.
4. To acquire editing skills and practical training in writing News Items.

Unit-I	**Introduction:** Definitions of Journalism –Nature and Scopeof Journalism – Functions and Duties of Journalism – Types of Journals – Democracy and Journalism – Freedom of Press	**9 Hours**
Unit-II	**Establishment and Evolution:** Procedures for establishment – Administrative Functions – Career Opportunities in Journalism – Press Legislations – Growth of Indian and Tamil Press	**9 Hours**
Unit-III	**News and News Reporting:** Definition of News – News Gathering – Role of News Agencies – Importance of Interviews – Types and Nature of News reporting	**9 Hours**
Unit-IV	**Editing:** Editor – News Editor – Sub Editor – Reporter – Anatomy of Editing –Language and style – Headlines – Design and Makeup	**9 Hours**
Unit-V	**Project Work:** Reporting a news story – Writing news features – Writing a column – Writing an editorial on current themes – Writing a story on developmental issues	**9 Hours**

Books for Study

1. Ahuja, A.N.,*Theory and Practice of Journalism*, Surjeet Publication, Delhi,1984
2. Chalapathi Rau, M.,*The Press*, National Book Trust, India, New Delhi,1973
3. Kamath M.V.,*The Journalists Hand Book*, Vikas Publishing House Ltd., New Delhi,1983

Books for Reference

1. Bruce Westley, *News Editing*, Oxford& IBH Publishing co., 1968.
2. Eari Newsom, D, *The News Paper*, Prentice Hall, New Jersey,1981.
3. Markekar, D.R., *The Press under Pressure*, Indian Book Company, New Delhi,1973.
4. Stein, M.L.,*How to be a Journalist*, Pyramid Books, New York, 1985.

E- Resources:

1. What is Journalism? | C-SPAN.org
2. https://youtu.be/GCC8mq6ADJc
3. https://youtu.be/jxVirFIVfFs
4. https://youtu.be/pHGfwZdvjMk
5. Introduction to Campus Journalism Chapter 1 (Part 1) - YouTube

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Identify the nature and scope of Journalism.	K1
CLO2	Understand the evolution and the establishment of press in India.	K2
CLO3	Articulate the functions of News and News Reporting.	K3
CLO4	Illustrate the qualities required for an Editor.	K4
CLO5	Plan the presentation techniques in news writing.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓	✓	✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓	✓	✓	✓	✓	✓	✓	✓
CLO 4		✓	✓	✓	✓	✓	✓	✓
CLO 5		✓	✓	✓	✓	✓	✓	✓
Number of Matches = 38 Correlations: Very 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– IV				
COURSE CODE	**CATEGORY**	**COURSETITLE**	**HRS./WEEK**	**CREDIT**
PBHIDE41	**Discipline Specific Elective Course**	**ECONOMIC HISTORY OF MODERN INDIA**	**5**	**4**

Course Objectives

1. To understand the basic concepts of Agriculture in Modern India.
2. To enable the students to know the revenue policies of Modern India.
3. To understand the various agricultural policies of Modern India.
4. To know about the trade and commerce of British period and the various types of transportation systems.

Unit-I	**Agriculture prior to the British Rule:** Indian Economy prior to the British Rule – Village Community – Traditional Agricultural systems, Subsistence Agriculture, Podu cultivation – Village Economic life – Artisans and their professions – Self-sufficient village economic life	**15 Hours**
Unit-II	**Revenue Systems of British Period:** The Evolution of Agrarian Structure under the East India Company – The Zamindari System –Permanent Settlement, Ryotwari and Mahalwari Systems of Revenue – Its impact on Economy and Society	**15 Hours**
Unit-III	**British Agricultural Policies:** British Policies – Impact on Agriculture, factors for the growth of Commercialization – Effects on Economy – Indebtedness and Land Lordism – Technical changes in Agriculture, Famines – Causes and Impact – Famine Relief measures during Company's Rules	**15 Hours**
Unit-IV	**Trade and Commerce during the British Rule:** Introduction of Free Trade and Impact on Handicrafts during early 19th Century – Handicrafts – Urban Handicrafts, Guild system – Trade, Barter system – Village Markets	**15 Hours**
Unit-V	**Transport and Communication System during the British Rule:** Transport systems – Introduction of Railways and Communications and their impact on Indian Economy – Impact of Company's policies on Trade and Industry in Bengal and South India	**15 Hours**

BooksforStudy:

1.Bipin Chandra: *Rise and Growth of Economic Nationalism in India: Economic Policies of Indian National Leadership,1880 – 1905,* People's Publishing House, New Delhi, 1966.

2. Chaudhary, S.B.: *Civil Disturbances during the British Rule in India,* World Press, Calcutta, 1955.

3. R.C. Dutt, *Economic History of India in the Victorian Age*, Routledge, New Delhi, 2013.

BooksforReference:
1. R.P Dutt, *India Today*, Victor Gollancz, London, 1940.
2. Ramachandran C., *East India Company and the South Indian Economy*, New Era Publications,

Madras, 1980.
3. Desai, A.R., *Social back - ground of Indian Nationalism*, Popular Prakasam, Bombay,1960.
4. Lucy Sutherland, *The East India Company in 18th Century Politics*, Oxford, 1952.

E-Resources:
1.historyreclaimed.co.uk/an-economic-history
2. https://www.accessebookpages.com/full/an-economic-history-of-india
3.https://historyreclaimed.co.uk/an-economic-history-of-india-1707-1857
4.https://youbookinc.com/pdf/an-economic-history-of-india-1707-1857
5.https://prepp.in/news/e-492-economic-condition-in-18th-century

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

CLOs	COURSELEARNINGOUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Understand the importance of Agriculture to Indian Economy.	K2
CLO2	Evaluate the impact of the Revenue Systems on Economy.	K5
CLO3	Relate the relationship between Agricultural policies and Economy.	K4
CLO4	Articulate the significance of trade and commerce for the Economy.	K3
CLO5	Describe the importance of Transport and Communication to Economy.	K1

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes(PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CLO1	✓		✓	✓	✓		✓	✓
CLO2	✓	✓	✓	✓	✓		✓	✓
CLO3	✓	✓	✓	✓	✓		✓	✓
CLO4	✓	✓	✓	✓	✓		✓	✓
CLO5	✓	✓	✓	✓	✓		✓	✓
Number of Matches =34 Correlations: Very High								

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 -				
COURSE CODE	CATEGORY	COURSE TITLE	HRS./ WEEK	CREDIT
PBHIDE42	Discipline Specific Elective Course	INTRODUCTION TO SOCIOLOGY	5	4

Course Objectives

1. To give knowledge to students about scope and development of Sociology as a scientific discipline.
2. To make them understand basic concepts and their perspectives.
3. To introduce basic concepts and social processes to studentswithout any previous exposure to sociology
4. To make the students to understand how the culture and civilization works.

Unit-I	**Sociology:** Meaning, Nature and scope of Sociology – Origin and Development –Importance of the Study of Sociology – Relationship with other social sciences	**15 Hours**
Unit-II	**Men and Society:** Society –Origin – Nature of society – Relationship between Individual and Society – Socialization – meaning – functions - Agencies of Socialization	**15 Hours**
Unit-III	**Social Institutions:** Family, Marriage, Kinship, Religion, Caste, Education, Economy and Politics - Characteristics - merits and demerits of Social Institutions	**15 Hours**
Unit-IV	**Basic Concepts:** Community, Association, Institution – Folkways and MoresSocial Processes: Associative and dissociative processes – Social Groups: Meaning, Characteristics, Classification and functions of Social Groups	**15 Hours**
Unit-V	**Culture and Civilization:** Culture –Meaning –types of culture – features and elements of culture – Civilization – Relationship and differences between Culture and Civilization – Cultural lag	**15 Hours**

Books for Study:

1. Shankar Rao C.N, *Sociology*, Chand & Company Ltd. 2006.
2. Harton and Hunt, *Sociology*, Tata Mc. Graw – Hill, 2006.
3. Leonard Broom, *Principles of Sociology*, Media Promoters and Publication Pvt. Ltd., Bombay, 1993.

Books for Reference:

1. BottomoreT.B.(1962) *A guide to problems and literature*, George Allen and Unwin Ltd., London.
2. Ogburn William F and Mayer F.Nimkoff (1964*) A hand book of sociology*, Routledge and Keganpaul Ltd., London.
3. Sachdev and Vidhya Bhusan – *Introduction to Sociology*, Kitabmahal.
4. Haralambos, *Sociology: Themes and Perspectives*, Oxford University, Bombay, 1980.

E-Resources:
1. https://youtu.be/zVi5hx37yvw
2. https://youtu.be/vX6Mye3PA_c
3. https://youtu.be/PnkuKRUkQ-w
4. https://youtu.be/i5AaBrpJTYQ
5. https://youtu.be/NrYboahoJSY

Mapping Correlation Benchmark

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Explain the origin and development of sociology as a distinctive discipline	K1
CLO2	Understand how social structure operates.	K2
CLO3	Sketch the basic concepts such as culture, social group, social institutions, social organization and disorganization, etc.	K3
CLO4	Illustrate how the institutions interconnect in their effects on each other and on individuals.	K4
CLO5	Judge how the social control system working as formal and informal control over the society.	K5

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓		✓	✓	✓		✓	✓
CLO 2	✓		✓	✓	✓		✓	✓
CLO 3	✓		✓	✓	✓		✓	✓
CLO 4	✓		✓	✓	✓		✓	✓
CLO 5	✓		✓	✓	✓		✓	✓
Number of Matches = 30 Correlations: Very 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

Prepared by: Mr. S. ZAINULLAH **Verified by: Mr. D. ABUL FAZAL**

SEMESTER - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBHIDE43	**Discipline Specific Elective Course**	**INDIAN GEOGRAPHY**	**5**	**4**

Course Objectives

1. To know about the Climate, Rainfall, Soils, and Natural resources of India.
2. To discuss the importance of Indian Agriculture.
3. To identify the Mineral resources of India.
4. To study the Industrial Progress and human resources available in India.

Unit-I	**Introduction:** India: Location – Physiography and its significance – Climate – Rainfall variation and Distribution – Climatic Regions – Soil: Types and Distribution – Erosion and Conservation – Natural Vegetations – Forest distribution and its Products – Water Resource – River Irrigation: Types – Distribution – Multipurpose Projects – Damodar Valley Corporation	**15 Hours**
Unit-II	**Agriculture**: Importance of Agriculture – Cultivation and Distribution of crops: Paddy, Wheat, Cotton, jute, Tea and Coffee – Problems of Indian Agriculture	**15 Hours**
Unit-III	**Mineral Resources:** Production, Distribution and Trade of Minerals: Iron, Manganese, Mica and Bauxite – Power Resources: Coal, Petroleum and Natural Gas – Atomic Minerals – Power Distribution and Production	**15 Hours**
Unit-IV	**Industries**: Location factors – Major Industries: Iron and Steel, Textile, Shipbuilding, Chemical, Paper, Cement, Sugar and Leather	**15 Hours**
Unit-V	**Human Resources**: Population - Growth and Distribution – Rural and Urban Population – Migration: Types – Causes and Consequences	**15 Hours**

Books for Study:

1. Ranjit Tirtha, *Geography of India*, Rawat Publications, Jaipur, 1996.
2. Majid Hussain, *Geography of India*, Tata Mc Graw Hill, New Delhi, 2017.
3. Arvind Kumar, *Geography of India*, Periyar Prakashan, Patna, 2021.

Books for Reference:

1. Bhumika Saini, *Indian and World Geography*, Tata Mc Graw Hill, New Delhi, 2022.
2. Gopal Singh, *Geography of India*,Atma Ram & Sons Publications, Kanpur, 2010.
3. R.C. Tiwari, *Geography of India*, Pravalika Publications, Allahabad, 2016.
4. Dr. M.C. Mandal, *Geography of India*, Aspiration Academy Publications, 2018.

E-Resources:

1. https://youtu.be/4SlNS-WuZRQ
2. https://youtu.be/iH48p4MMNhk
3. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=KwH6LnSyFhsLI6M9Z0+tvw
4. https://youtu.be/U2mvE0N1P34
5. https://youtu.be/SLh3Tr-K0oI

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

CLOs	COURSE LEARNING OUTCOMES By the end of the course the students will be able to	Knowledge Level
CLO1	Tell the geography of India, climate and resources in India.	K1
CLO2	Understand the Indian agricultural system and types of crops	K2
CLO3	Discover the mineral resources of India.	K3
CLO4	Appraise the industrial progress in India.	K5
CLO5	Relate the importance of human resources in national progress.	K4

Mapping of Course Learning Outcomes with Programme Specific Outcomes

Course Learning Outcomes (CLOs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CLO 1	✓		✓	✓	✓	✓	✓	✓
CLO 2	✓	✓	✓	✓	✓	✓	✓	✓
CLO 3	✓		✓	✓	✓	✓	✓	✓
CLO 4	✓	✓	✓	✓	✓		✓	✓
CLO 5	✓		✓	✓	✓	✓	✓	✓
Number of Matches = 36 Correlations: Very High								

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

DEPARTMENT OF BUSINESS ADMINISTRATION

For the Students admitted from Academic Year 2022-2023

SEMESTER III				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
UBBA3001	Discipline Specific Core Course	STRATEGIC MANAGEMENT	5	4

Course Objectives

1. 1. Impart knowledge about the importance of strategic management processes.
2. Provide knowledge about firms' formulation, implementation and evaluation of business strategies.
3. Impart the concepts of generic and growth strategies.
4. Deliver the methodology of strategic implementations.

Unit-I	Introduction	15 Hours

The business system – objectives of the business – branches- Strategic Management- mission – vision- goals – objectives – advantages- elements - levels – processes - Strategic Business Unit (SBU)- strategic analysis of functional areas – production – marketing – human resources – finance – analyzing corporate capabilities – SWOT Analysis- Case Study

Unit-II	Strategic Environment	15 Hours

Internal Environment – Factors influencing business decisions, marketing resources, mission, vision and objectives.

External Environment – Micro Environment- supplier, customer, competitors- Macro Environment- economic, political, legal, socio-cultural, technological - Analysis of the Macro Environment & Industry Forecasting the Environment

Unit-III	**Corporate strategy**	15 Hours

Nature and scope – types of corporate strategy (Stability Strategy, Growth Strategy, Retrenchment Strategy and Combination Strategy)- strategic planning- process of strategic planning – formulation of strategy – process of strategy formulation- project life cycle – portfolio analysis – BCG (Boston Consulting Group) matrix – GE (General Electric) matrix – strategic decision making- Process of strategic decision making.

Unit-IV	**Generic strategy and Growth strategy**	15 Hours

Generic strategic alternatives – Diversification Strategy- horizontal, vertical diversification – Reasons for diversification Strategy- Integration- types of integration.

Growth Strategy- Internal Growth Strategy- horizontal, vertical, concentric and conglomerate - External growth strategy – merger, joint venture, acquisition, amalgamation.

Strategic organizational structure – Types of Strategic organizational structure – evaluation of organizational structure – management of change- Characteristics of management of change- Strategic evaluation and control- Kinds of Strategic evaluation and control

Unit-V	**Implementation of strategy**	15 Hours
Elements of strategy implementation- process of strategy implementation- steps involved in strategy implementation – Leadership- qualities of leadership- functions of strategic leader- leadership styles- Organizational Climate – types- advantages- impact of good organizational climate- Strategic planning, control and implementation- process.		
Books for study: 1. Dr. C. B. Memoria & Dr. Satish Memoria - Business planning and policy, Himalaya Publishing House 2. L.M. Prasad- Strategic Management, Sultan Chand & Sons 3. Dr. S. Sankaran, Strategic Management, Margham Publications		
Books for Reference: 1. S.C. Bhattacharya - Strategic Management Concepts and Cases S. Chand & Co 2. AzharKazmi - Strategic Management & Business Policy, Tata Mc Graw Hill. 3. Gupta, Gollakote and Srinivasan – Business Policy and Strategic Management, Prentice Hall of India. 4. Saloner and Shepard – Strategic Managent, John Wiley 5. Fred R. David-Strategic Management and Cases –Prentice Hall of India		
E-Resources: 1. http://www.rjspm.com/PDF/Strategic-Management-Notes-PDF.pdf 2. https://www.slideshare.net/UmarKhan48/case-study-on-strategic-management 3. https://en.wikipedia.org/wiki/Strategic_management		

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Explain the concepts, tools and techniques of strategic management	K1
CO2	Summarize the Internal and External Environment of Strategic Management	K2
CO3	Acquire knowledge on work environment and strategic leadership styles.	K1
CO4	Categorize to design corporate, business and functional strategies according to external environment and internal capabilities.	K2
CO5	Implementation of various processes of Strategic planning and control.	K3
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 = 38						Correlation = 95 %		

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
UBBA3002	Discipline Specific Core Course	BUSINESS REGULATORY FRAMEWORK	4	4

Course Objectives

1. To provide the basic knowledge on Business Legislations.
2. To highlight the essential elements of a valid Contract.
3. To enable the students to learn the concepts of Agency, Bailment & Pledge and Sale of Goods

Unit-I	Indian Contract Act, 1872	12 Hours

Law – Meaning – Objectives - Nature and Sources of Business Law - Indian Contract Act, 1872 – Classification of Contracts – Essential Elements of Contract – Legal rules as to Offer – Acceptance – Revocation of Offer and Acceptance – Consideration - Essentials and Legal rules for a Valid Consideration

Unit-II	Capacity of Parties and Free Consent	12 Hours

Capacity of Parties - Definition - Persons Competent to Contract - Free Consent – Coercion - Undue Influence – Fraud - Misrepresentation – Mistake. Discharge of Contract - Modes – Remedies for Breach of Contract - Quasi Contract – Features – Types.

Unit-III	Indemnity & Guarantee, Bailment & Pledge	12 Hours

Indemnity and Guarantee – Meaning – Kinds of Guarantee – Rights of Surety – Discharge of Surety - Bailment – Essentials – Kinds – Duties and Rights of Bailor and Bailee – Finder of Lost Goods – Rights and Duties of Finder of Lost Goods – Pledge – Essentials – Rights and Duties of Pawnor and Pawnee

Unit-IV	Sale of Goods Act,1930 and Competition Act, 2002	12 Hours

Sale of Goods Act, 1930 – Essentials of Contract of Sale – Sale and Agreement to Sell –Competition Act,2002 – Salient features of Competition Act – Powers of Central Government under the Competition Act – Major Provisions of the Competition Act.

Unit-V	Contract of Agency	12 Hours

Law of Agency – Essentials of an Agency – Kinds of Agent - Irrevocable Agent - Duties and Rights of an Agent- Duties and Rights of Principal – Termination of Agency

Books for study:

1. Pillai, R.S.N. & Chand, S, Business Law, S Chand & Co, Delhi
2. Ramaswamy, K.N., Business Law, S Chand & Co, Delhi
3. Shukla, M.C, Business Law, S. Chand & Co.
4. S.S.Gulshan: Mercantile Law, Excel Books.
5. S.N.Maheswari: Business Laws, Himalaya Publications
6. S. Thameemul Ansari, Business Regulatory Framework, Mayura Publications.

Books for Reference:

1. Balachandran. V & Thothadri.S, Business Law, Vijay Nicole Imprints Pvt.Ltd. Chennai
2. Kapoor, N.D. Business Laws, Sultan Chand and Sons.
3. Sreenivasan, M.R. Business Laws, Margam Publications.
4. Dhandapani, M.V. Business Laws, Sultan Chand and Sons.
5. Badre Alam, S. & Saravanavel, P. Mercantile Law

E-Resources:

1. www.cramerz.com www.digitalbusinesslawgroup.com

2. http://swcu.libguides.com/buslaw
3. http://libguides.slu.edu/businesslaw

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Evaluate the basics of Business Regulatory Framework and Indian Contract Act, 1872	**K2, K5**
CO2	Understand capacity of parties to enter into a valid contract.	**K1, K2**
CO3	Develop the knowledge on legalities of Indemnity, Guarantee, Bailment and Pledge	**K1, K2**
CO4	Understand Sale of Goods Act and Competition Act.	**K2**
CO5	Comprehend the Law of Agency and discuss the Rights and Duties of Agent and Principal.	**K2**
KI- 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

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**			

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

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

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBA3003	**Discipline Specific Core Course**	**MODERN MARKETING**	**4**	**4**

Course Objectives

1. To impart knowledge on various Functions, Concepts and Approaches of Marketing.
2. To enlighten students about Marketing Environment and its significance.
3. To create awareness among students about recent developments in Marketing.

Unit-I	**Modern Marketing**	**12 Hours**

Marketing – Meaning – Definition – Features – Functions - Marketing vs Selling – Concepts of Marketing – Approaches – Features of Modern Marketing – Marketing Mix - Element

Unit-II	***Marketing Environment***	**12 Hours**

Marketing Environment – Meaning – Types - Demographic – Economic – Natural – Political – Legal and Socio-cultural Environment – Market Segmentation - Bases of Segmentation

Unit-III	**Marketing Research and Sales Forecasting**	**12 Hours**

Marketing Research – Meaning – Benefits – Process – Challenges – Marketing Information System – Benefits of MIS – Sales Forecasting – Benefits – Methods – Sales Manager – Qualities of a Successful Sales Manage

Unit-IV	**Branding and Packaging**	**12 Hours**

Branding – Meaning – Advantages – Disadvantages – Brand Positioning – Brand Image. Packaging – Objectives – Functions – Essentials of Good Packaging

Unit-V	**Digital Marketing**	**12 Hours**

Digital Marketing – Meaning – Features – Advantages – Disadvantages – Traditional Marketing vs E-Marketing – Social Media Marketing - Mobile Marketing – Services Marketing – Green Marketing – Sustainability Marketing Strategies - Rural Marketing – Features – Challenges in Rural Marketing

Books for study:

1. R.S.N. Pillai & Bagavathi, Modern Marketing, S. Chand & Co. Ltd., New Delhi.
2. J. Jayasankar, Marketing, Margham Publications, Chennai.
3. Rajan Nair, Marketing, Sultan Chand & Sons, New Delhi.
4. C.B. Gupta, Marketing Management – Text & Cases, Sultan Chand & Sons, New Delhi.
5. Rajan Saxena, Marketing Management, Tata McGraw Hill, Chennai

Books for Reference:

1. Philip Kotler & Gary Armstrong, Principles of Marketing, Pearson Education, New Delhi
2. Roberto G. Mendia, Principles of Marketing, Rex Printing Company
3. Dr. RL Varshney & Dr. SL Gupta, Marketing Management, Sultan Chand & Sons, New Delhi.
4. Kotler, Kartajaya and Setiawan, Marketing 4.0: Moving from Traditional to Digital, Wiley, Canada.
5. J.C. Gandhi, Marketing Management, Tata McGraw Hill, Noida

E-Resources:

www.study.com, www.investopedia.com

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the features of Modern Marketing	K1, K2
CO2	Analyse Marketing Environment	K1, K4
CO3	Comprehend the process of Marketing Research and Forecast Sales	K1, K2, K3
CO4	Appraise significance of Branding and Packaging	K2, K5
CO5	Evaluate the significance of Digital Marketing	K2, 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 = 19				Correlation = Moderate				

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**
UBBAAL31	**OTHER ELCTIVE COURSE**	**BUSINESS TAXATION**	**4**	**4**

Course Objectives

1. Identify the Direct and Indirect taxation system of India.
2. Explain the concepts of Income Tax.
3. Extract the different types of Income.
4. Illustrate the total income and Tax liability after deductions.
5. Summarize the concepts , structure and functions of GST

Unit-I	**Introduction**	**10 Hours**
Introduction- Objectives of Taxation- Direct: Income Tax and Indirect Tax: GST.		
Unit-II	**Income Tax Act**	**12 Hours**
The structure and scope of Indian Income Tax Act, concepts and definitions under the Act, Agricultural Income, Assesee, Assessment year, Income, previous year, person, residential status.		
Unit-III	**Heads of Income**	**12 Hours**
Salaries, Income from House property, Profit and Gains from business and Profession, Capital gains and Income from other sources		
Unit-IV	**Computation of Total Income**	**12 Hours**
Total income & Tax liability of an individual- Deductions		
Unit-V	**Goods & Services Tax**	**14 Hours**
Introduction to Goods and Services Tax – GSTIN – Structure-features- functions – HSN Code – Tax Invoice – Credit Notes –Debit Notes– Procedure for Registration		

Books for study:

1. Business Taxation: T.S Reddy and Hariprasad Reddy
2. Business Taxation: Akhileshwar Pathak and Savan Godiawala
3. Business Taxation: Whittenburg, Gerald E.

Books for Reference:

5. Taxation (Direct and Indirect): Monica Singhania and Vinod K Singhania
6. Business Taxation: Radhakrishnan P
7. Business Taxation: Akhileshwar Pathak and Savan Godiawala

E-Resources:

1. **https://www.studocu.com/row/document/university-of-karachi/political-science/business-taxation-notes-b/7699803**
2. **https://cbic-gst.gov.in/pdf/ovw-short.pdf**
3. **https://cleartax.in/s/gst-book-online-pdf**

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Recognize the Direct and Indirect taxation system of India.	K1
CO2	Understand the concepts of Income Tax.	K2
CO3	Classify the different types of Income.	K2
CO4	Interpret the total income and Tax liability after deductions.	K2
CO5	Understand GST and its concepts.	K2
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 = 35					**Correlation = Very 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**
UBBAAL32	**OTHER ELECTIVE COURSE**	**BUSINESS ECONOMICS**	**4**	**3**

Course Objectives

1. To familiarize students with basic concepts in Economics.
2. To acquaint students with various laws of Economics, Demand and Supply.
3. To enlighten students on various application of economics Theories and National Income

Unit-I	**Introduction**	**12 Hours**

Business Economics – Definition – Characteristics – Importance – Scope – Differences between Micro Economics and Macro Economics – Roles and Responsibilities of a Business Economist – Economic System and its Types.

Unit-II	***Utility Analysis and Market Structure***	**12 Hours**

Utility - Meaning – Characteristics – Cardinal – Ordinal – 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.

Unit-III	**Demand and Supply**	**12 Hours**

Demand – Definition – Characteristics – Types of Demand - Factors determining Demand – Law of Demand - Elasticity of Demand – Types - Supply – Law of Supply – Factors affecting Supply - Elasticity of Supply – Determinants of Elasticity of Supply

Unit-IV	**Production and Cost Functions**	**12 Hours**

Production – Factors – Production Function – Iso-quants - Law of Variable Proportions –Economies of Scale – Break-Even Analysis. Cost and Revenue Functions – Types – Short Run – Long Run – Areas of Cost Control

Unit-V	**Profit Theories and National Income**	**12 Hours**

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

Books for study:

1. Sankaran S, Business Economics, Margham Publications, Chennai.
2. Ahuja H.L, Business Economics, S.Chand& Co. Ltd., New Delhi.
3. Ray, N.C, An introduction to Microeconomics, Macmillan Company of India Ltd: New Delhi.
4. ManabAdhikary, Anurag , Business Economics, Jain Publishers, New Delhi, 2008.
5. Datt, R. and K.P.M. Sundharam , “Indian Economy”, S. Chand & Company Ltd., New Delhi

Books for Reference:

1. Agarwal M.D, and Som Deo, Business Economics, Ramesh Book Depot, New Delhi.
2. Mehta P.L, Managerial Economics, Sultan Chand & Sons., New Delhi
3. Mithani, D.M, Managerial Economics – Theory and Application, Himalaya Publishing House Pvt. Ltd., Mumbai.
4. Varian H.R, Intermediate Microeconomics: A Modern Approach , East West Press Pvt., Ltd, New Delhi, Eighth Edition, 2015.
5. Ahluwalia, I.J. and I.M.D. Little (Eds.) (1999), India’s Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New

Delhi
E-Resources: **https://www.icsi.edu/media/webmodules/BUSINESS%20ECONOMICS.pdf** **https://www.geektonight.com/business-economics-notes-pdf/**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the discipline of business economics, micro and macroeconomic aspects.	**K2**
CO2	Explain law of diminishing marginal utility and law of equi–marginal utility.	**K1,K2**
CO3	Comprehend demand, supply, types and factors that influence of demand and supply.	**K2,K3**
CO4	Evaluate the production and cost analysis, law of variable of proportions and break-even analysis.	**K2,K3**
CO5	Develop the skills to use theories of profit and provide an idea regarding national income and its welfare.	**K2,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 = 25					**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
UBBANM31	Other Elective Course (to choose 1 out of 3)	BUSINESS ORGANIZATION	4	2

Course Objectives

1. 1. Impart knowledge of Business Organisation.
2. Enlighten the students with various forms of Business Organization.
3. Teach the student how to Establishment of Firms.
4. Educate students how to procurement and raising of Finance

Unit-I	Introduction of Business	12 Hours

Meaning, Nature, Scope, Objectives of Business – Essentials of successful Business –Functional Areas of Business – Concepts of Business Organization – Evolutions of Business Organization

Unit-II	*Forms of Business Organization*	12 Hours

Sole Proprietorship: Definition, Merits & Demerits – Partnership: Meaning, Features and Limitations, Partnership Deed- Joint Stock Company Meaning, Merits & Demerits – Co-operatives: Functions, Scope and Nature

Unit-III	Establishment of Firms	12 Hours

Business Unit- Establishing a new Business unit – Meaning of Promotion – Features of Business -Plant location – Plant layout and Size of Business unit

Unit-IV	Procurement and raising of Finance	12 Hours

Business Finance - Financial needs - Sources of Finance – Security Market – Money Market – Study of Stock Exchange

Unit-V	Ethical Obligation	12 Hours

Corporate Social Responsibility– Meaning - Business Ethics – Unethical Practices in Business activities – Recent Trends in Corporate Social Responsibility

Books for study:

1. C.D.Balaji & Dr.G.Prasad, Business Organisation, Margham Publications, Chennai.
2. Dr.N.Mishra, Business Organisation ,Sanjay Publication, New Delhi.
3. M.C.Shukla, Business Oranisation and Management, S.Chand , New Delhi.

Books for Reference:

1. R.Padmakar Asthana, Dr.I.M.Sahai, Business Organisation and Administration, Sathiya Bhawan Publication, Agra.
2. Dr. F.C.Sharma, Business Organization, Sathya Bhawan Publication, Noida.
3. Dr.Ajay Shukla, Dr.Shashi Kant Tripathi, Business Organization, Word Press Publishers, Pune

E-Resources:

1. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBAA1104.pdf
2. https://ncert.nic.in/textbook/pdf/kebs102.pdf
3. https://web.sol.du.ac.in/my_modules/type/cbcs-41/data/root

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts of Business Organisation.	K2
CO2	Describe the various forms of Business.	K1
CO3	Acquire knowledge on Establishment of Firms.	K1
CO4	Able to design the modes of acquiring and raising of Finance.	K2
CO5	Understand ethical practices in Business.	K2
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 = 37					Correlation = Very High			

<u>Mapping Correlation Benchmark</u>

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**
UBBANM32	**OTHER ELECTIVE COURSE**	**CUSTOMER RELATIONSHIP MANAGEMENT**	**4**	**2**

Course Objectives

1. Impart knowledge about the importance of CRM.
2. Instruct the concepts, customer satisfaction and customer loyalty of CRM.
3. Communicate the procedure of developing CRM strategies.
4. Educate CRM in services institution.
5. Deliver the methodology of CRM implementations.

Unit-I	**Introduction**	**12 Hours**

CRM- Definition, Emergence of CRM Practice, Factors responsible for CRM growth, CRM process, framework of CRM, Benefits of CRM, Types of CRM, Scope of CRM, Customer Profitability, Features, Trends in CRM , CRM and Cost-Benefit Analysis, CRM and Relationship Marketing

Unit-II	**CRM Concepts**	**12 Hours**

Customer Value, Customer Expectation, Customer Satisfaction, Customer Centricity, Customer Acquisition, Customer Retention, Customer Loyalty, Customer Lifetime Value. Customer Experience Management, Customer Profitability, Enterprise Marketing Management, Customer Satisfaction Measurements, Web based Customer Support

Unit-III	**Developing CRM Strategy**	**12 Hours**

Role of CRM in business strategy, Understanding Service Quality: Technical, Functional, and dimensions of service quality, Managing Customer communications

Unit-IV	**CRM in Services**	**12 Hours**

Status of Customer Relationship Management in service industry in India; Relevance of CRM for Hospital Services; Customer Relationship Management in Banking and Financial Services; CRM in Insurance Sector, Supply-Demand Mismatches and their impact on CRM; The Past, Present and Future of CRM

Unit-V	**Technological Tools for CRM and Implementation**	**12 Hours**

Data Mining for CRM - Some Relevant Issues ; Changing Patterns of e-CRM Solutions in the Future; Structuring a Customer Focused IT Organization to Support CRM; Organizational Framework for Deploying Customer Relationship; measuring profitability CRM implementation –set by step process.

Books for study:

1. Francis Buttle, Stan Maklan, Customer Relationship Management: Concepts and Technologies, 3rd edition, Routledge Publishers, 2015
2. Kumar, V., Reinartz, Werner Customer Relationship Management Concept, Strategy and Tools, 1st edition, Springer Texts, 2014

Books for Reference:

1. Jagdish N.Sheth, Atul Parvatiyar & G.Shainesh, “Customer Relationship Management”, Emerging Concepts, Tools and Application”, 2010, TMH.
2. Dilip Soman & Sara N-Marandi,” Managing Customer Value” 1st edition, 2014, Cambridge.
3. Alok Kumar Rai, “Customer Relationship Management: Concepts and Cases”, 2008, PHI.
4. Ken Burnett, the Handbook of Key “Customer Relationship Management”, 2010, Pearson Education.

E-Resources:
https://www.himpub.com/documents/Chapter2556.pdf
https://www.measimba.ac.in/pdf/course-materials/PMF16.pdf
https://ebooks.lpude.in/management/bba/term_6/DMGT308_CUSTOMER_RELATIONSHIP_MANAGEMENT.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Recognize why Customer Relationship Management is essential.	K1
CO2	Understand basic concepts, customer satisfaction and customer loyalty of CRM.	K2
CO3	Develop customer relationship management strategies by understanding customers' preferences for the long-term sustainability of the Organizations.	K1
CO4	Formulate and assess the Customer Relationship Management in various services institution.	K1
CO5	Implement various technological tools for data mining and also successful implementation of CRM in the Organizations	K3
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 = 30					**Correlation = Very 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**
UBBANM33	**OTHER ELECTIVE COURSE**	**SUPPLY CHAIN MANAGEMENT**	**4**	**2**

Course Objectives

1. Develop an understanding of basic concepts and role of supply chain management in business.
2. Develop analytical and critical understanding & skills for planning, designing and operations of supply chain.
3. Educate how supply chain drivers play an important role in redefining value chain excellence of Firms.
4. To understand, appraise and integrate various supply chain strategies.

Unit-I	**Introduction**	**12 Hours**

Development of SCM concepts and Definitions – key decision areas – strategic. Supply Chain Management and Key components, External Drivers of Change. Dimensions of Logistics – The Macro perspective and the macro dimension – Logistic system analysis.

Unit-II	**Sourcing strategy**	**12 Hours**

Manufacturing management – make or buy decision – capacity management – Materials Management – choice of sources – procurement planning

Unit-III	**Distribution strategy**	**12 Hours**

Choice of Market – network design – warehouse designed operation and distribution planning – transportation – packaging

Unit-IV	**Inventory Strategy**	**12 Hours**

Demand forecasting – inventory planning – planning of stocking facilities – warehouse location allocation. Warehouse design and operations – inventory norms

Unit-V	**Channels of Distribution**	**12 Hours**

Customer Service Strategy: Identification of Service needs, cost of services – revenue Management.

Books for study:

1. Chase, R.B., Shankar, R. & Jacobs, F.R. -- Operations & Supply Chain Management (Tata McGraw Hill, 14th Edition)
2. Sunil Chopra, Peter Meindl, Supply Chain Management: Strategy, Planning, and Operation, Pearson 6th Edition, 2016

Books for Reference:

5. Martin Christopher Logistics and supply chain management 5th edition 2016.
6. F. Robert Jacobs, William Berry, D. Clay Whybark, Manufacturing Planning and Control for Supply Chain Management, ThomasVollmann, 6th edition 2010.
7. Shoshanah Cohen and Joseph Roussel, Strategic Supply Chain Management: The Five Core Disciplines for Top Performance, 2nd edition 2013.
8. Arjan J. Van Weele, Purchasing and Supply Chain Management: Analysis, Strategy, Planning and Practice, Nichole, 6th edition 2012.
9. Alan Rushton, John Oxley, Handbook of Logistics & Distribution Management, Kogan Page Publishers, 2006

E-Resources:

https://www.tutorialspoint.com/supply_chain_management/supply_chain_management

tutorial.pdf https://sjce.ac.in/wp-content/uploads/2021/10/jnu-Supply-Chain-Management.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of elements and functions of supply chain, role of drivers and demand forecasting.	K2
CO2	Apply various techniques of inventory management and their practical situations.	K1
CO3	Analyze how supply chain decisions related to facility location can be applied to various industries and designing the supply chain.	K1
CO4	How various warehousing management system and transportation can be practiced in various industries?	K2
CO5	Explain the supply chain channels of distribution.	K1
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 = 32					**Correlation = Very 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**
UBBCSEP3	**SKILL ENHANCEMENT LAB COURSE**	**TALLY – BASICS (PRACTICAL ONLY)**	**4**	**3**

Course Objectives

1. Educate students to work with well-known accounting software i.e. Tally ERP.9.
2. Student will learn to create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9.
3. Accounting with Tally course is not just theoretical program, but it also includes continuous practice, to make students ready with required skill for employability in the job market.

Unit-I		**10 Hours**

Introduction to Accounting Software - Tally Versions & Features - Create a Company – Name - Contact Information – Financial Features - Company – Display – Alteration

Unit-II		**15 Hours**

Direct and Indirect Expenditures & Incomes – Proforma
Liabilities and Assets – Proforma

Unit-III		**10 Hours**

Creation of Ledger - Creation of Multiple Ledger - Display and Alteration of Ledger

Unit-IV		**10 Hours**

Creation of Group - Creation of Multiple Group - Display and Alteration of Group

Unit-V		**15 Hours**

Trial Balance - Printing Options

Books for study:

1. Tally.ERP 9 with GST in Simple Steps, DT Editorial Services
2. Comdex Tally.ERP 9 Course Kit, Dr. Namrata Agrawal
3. Tally Essential Level 2, Tally Solutions Pvt Ltd

Books for Reference:

1. TALLY ERP 9 TRAINING GUIDE - 4TH REVISED & UPDATED EDITION, Asok K. Nadhani
2. Learn Tally Prime : with All New Feature, Rajesh U. Chheda
3. Mastering Tally PRIME: Training, Certification & Job, Asok K Nadhani

E-Resources:

1. https://drive.google.com/file/d/1iaRWstunPBNKIp1KOpFU0GjgV7r8F6ta/view
2. https://www.pdfdrive.com/pdf-tally-erp-9-notespdf-e42019223.html

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the applications of accounting with Tally.	K2
CO2	Enter the accounting transactions in computerized format and find the financial result concern.	K1
CO3	Acquire the skill of financial decision making in a systemized manner.	K2
CO4	Interpret the financial statements as well as evaluation of stock at the end.	K2
CO5	Students will possess required skill and can also be employed as Tally data entry operator.	K2
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 = 38					**Correlation = Very 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 - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBA4001	**DICIEPLINE SPECIFIC CORE COURSE**	**PRODUCTION & MATERIALS MANAGEMENT**	**5**	**4**

Course Objectives

1. Develop an understanding of how the productions, have strategic importance and can provide a competitive advantage in the workplace.
2. Understand the relationship between Productions and other business functions.
3. Impart the techniques of location and facility planning, line balancing, job designing and Capacity planning in production management.
4. Understand the Materials Management function starting from Demand Management through Inventory Management

Unit-I	**Production Management**	**15 Hours**

Production Management Meaning and Significance - Functions - - Types of Production- Job, Lot, Batch and Mass Production -. Process planning- plant capacity – Make (or) buy decisions Roles - Responsibility and Scope of Operational/ Production Managers

Unit-II	***Plant Location and Facilities***	**15 Hours**

Plant Location: Factors to be considered in plant location – choice of general region, particular community and site - multiplant location decision – plant location trends.

Physical Facilities: Physical Location – Meaning & Factors, Recent trends I the location of industries. Plant Building – Meaning, Factors considered in designing of plant building. Facilities Layout – Meaning, objectives, Factors, Types-Process Layout, Product Layout and Fixed Layout.

Unit-III	**Work Design and Time Study**	**15 Hours**

Work Design: Introduction and Techniques of Work Study Methods Study – Meaning, objectives, basic procedure, charts & diagrams, types of process charts

Time Study (work measurement): Meaning, objectives, basic procedure Equipment, Performance rating, computation of Standard time

Unit-IV	**Materials Management**	**15 Hours**

Introduction: Materials Management – Definition, Scope and Importance.; Integrated Materials Management – Concept, Need and Advantages;

Dynamic Purchasing: Purchasing function – selection of materials and vendors – purchasing organisation – concept of value analysis. Store-Keeping & **warehousing management. Cost control & cost reduction programmes**

Unit-V	**Inventory Control**	**15 Hours**

Inventory Control: Meaning, objectives, functions and importance; Procurement and carrying cost; Stock level- Maximum, Minimum, Recorder Point, Safety stock and stock out; EOQ- Assumptions and Derivation for quantity; Perpetual physical verification, ABC Analysis

Books for study:

1. Dr.Saravanavel and Dr.Sumathy, Production and Materials Management, Margham Publications, Chennai.
2. Dr.Chawdry, Production and Materials Management, S.Chand, Newdelhi.
3. M.Saravanan,Production and Materials Management, Kalyani Publishers, Coimbatore

Books for Reference:

1. Buffa, S.Elwood, "Modern Production Management".
2. Mayer, R. Raynold, "Production Management
3. Datta, A.K., "Integrated Materials Management".
4. Gopalakrishnan, P. and Sundaram M., "Materials Management – An Integrated Approach".

E-Resources:

1. https://backup.pondiuni.edu.in/storage/dde/dde_ug_pg_books/BBA%20III%20-%20BBA%203004%20Production%20and%20Materials%20Management.pdf
2. https://www.geektonight.com/material-management-pdf/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Identify the elements of Production management and various transformation processes to enhance productivity and competitiveness.	K1
CO2	Analyze and evaluate various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments	K1
CO3	Develop aggregate capacity plans and MPS in operation environments.	K2
CO4	Plan and implement suitable materials handling principles and practices in the operations.	K2
CO5	Plan and implement suitable quality control measures in Quality Circles to TQ	K2
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 = 38					**Correlation = Very 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 - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBA4002	**Discipline Specific Core Course**	**COMPANY LAW**	**4**	**4**

Course Objectives

1. To make the students understand the concepts and contents of Indian Companies Act, 2013.
2. To disseminate knowledge on types of Companies, Memorandum of Association and Articles of Association.
3. To teach the students about the Qualification of Directors, Powers and their Duties

Unit-I	**Introduction to the Companies Act, 2013**	**12 Hours**

Company – Meaning - Definition - Characteristics – Advantages – Limitations – Types – Private Company Vs Public Company – One Person Company (OPC) - Limited Liability Partnership (LLP)

Unit-II	***Memorandum, Articles of Association and Prospectus***	**12 Hours**

Formation of a Company – Promotion – Functions of a Promoter – Memorandum of Association – Meaning – Contents – Purpose – Articles of Association – Contents – Distinction between Memorandum and Articles of Association - Prospectus – Contents - Statement in Lieu of Prospectus

Unit-III	**Shares and Debentures**	**12 Hours**

Share Capital - Kinds of Shares - Sweat Equity Shares and ESOPs - Rights Issue and Bonus Shares- Buyback of Securities – Debentures – Types - Differences between Shares and Debentures

Unit-IV	**Directors and Shareholders**	**12 Hours**

Members of a Company – Members Vs Shareholders – Shareholders' Democracy - Powers - Directors of a Company – Definition – Qualification – Disqualification - Number of Directorships – Appointment of Directors – Removal of Directors – Independent Directors – Rights - Duties and Responsibilities

Unit-V	**Meetings, Resolutions& Winding up of Company**	**12 Hours**

Meetings – Meaning – Kinds – Resolutions – Types - Resolution requiring Special Notice – Winding-up – Meaning - Modes of Winding-up - Powers and Consequences

Books for study:

1. N.D. Kapoor, Company Law and Secretarial Practice, Sultan Chand
2.Vijay Gupta, K.G. Garg, Company Law, Kalyani Publishers, New Delhi.
3. M.C. Shukla and S.S. Gulshan - Principles of Company Law-S. Chand & Co.,
4.A.K. Mujumdar,Dr. G.K. Kapoor, Taxmann's Company Law & Practice, Taxmann Publications Pvt. Ltd., New Delhi.
5. L. Santhi, Company Law (As per Companies Act, 2013), Margham Publications.

Books for Reference:

1. Ganesan, Company Law and Secretarial Practice, Rainbow Publications.
2. Kathiresan & Radha, Company Law and Secretarial Practice, Prasana Chand & Co
3. Sherlekar, Secretarial Practice, Himalaya Publishers
4. Pattan Shetti, Company Law and Secretarial Practice, S. Chand and Co.
5. V. Balachandran & M. Govindarajan, A Student Handbook on Company Law and Practice, Vijay Nicole Imprints Pvt. Ltd

E-Resources:

1. http://www.clb.nic.in/
2. http://www.companiesact.in/
3. http://www.mca.gov

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts, characteristics and different kinds Companies.	**K2**
CO2	Create the Knowledge on the memorandum of Association, Articles of Association and Prospectus of a Company	**K6**
CO3	Knowledge on the types of Shares and Debentures	**K1**
CO4	Evaluate the qualifications, appointment of Directors and their rights, duties.	**K5**
CO5	Analyse the types of Meetings and Resolutions of a Company	**K4**
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 = 25				**Correlation = High**				

<u>Mapping Correlation Benchmark</u>

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 - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBA4003	**Discipline Specific Core Course**	**MODERN BANKING**	**4**	**4**

Course Objectives

1. To impart knowledge to students on different types of Banks in India.
2. To enlighten students about the functions of different Banks.
3. To create awareness among students about recent developments in Banking

Unit-I	Introduction to Banking	**12 Hours**

Banking – Definition – Importance – Role of Banks in Economic Development - Types of Banks – Functions of Commercial Banks

Unit-II	***Development Banks and Central Banks***	**12 Hours**

Development Banks – Functions of Development Banks – NABARD – Functions of NABARD – Cooperative Banks – Land Development Banks - Central Bank – Meaning – Functions – Reserve Bank of India – Functions – Credit Control Techniques – Quantitative Credit Control Techniques – Qualitative Credit Control Techniques

Unit-III	**Banker and Customer**	**12 Hours**

Relationship between Banker and Customer – Rights of Banker and Customer – Obligations of Bankers and Customers – Dishonour of Cheque – Causes - Garnishee Order – Know Your Customer (KYC)

Unit-IV	**E – Banking**	**12 Hours**

E-Banking – Benefits and Limitations – Mobile Banking – Fund Transfers – NEFT – RTGS – IMPS – UPI – e-Cheque – EFTPOS

Unit-V	**Payment Banks & Issues in Banking**	**12 Hours**

Payment Banks – Features – Functions - Advantages – Limitations – Different Payment Banks in India – Differences between Traditional Banks and Payment Banks - Contemporary Issues in Banking – Customer Grievances and Redressal – Banking Ombudsman

Books for study:

1. Santhanam, Banking and Financial Services, Margham Publications, Chennai
2. Natarajan S, Dr. R. Parameswaran, Indian Banking, S. Chand, New Delhi.
3. D. Muraleedharan, Modern Banking – Theory and Practice, Prentice Hall of India, New Delhi.
4. Gordon & Natarajan, Banking Theory, Law and Practice, Himalaya Publishing House, New Delhi.
5. S. Gurusamy, Banking Theory, Law & Practice, Vijay Nicole Imprints Private Limited, Chennai

Books for Reference:

1. Sundharam & Varshney, Banking Theory, Law & Practice, Sultan Chand & Sons, New Delhi.
2. R. Machiraju, Modern Commercial Banking, New Age International Publishers, Mumbai.
3. K.P.M. Sundaram, E.M. Sundaram, Modern Banking, Sultan Chand & Sons Ltd., New Delhi.
4. Dr. V. Balu, Banking and Financial System, Sri Venkateswara Publications, Chennai
5. Prof. D. Surya Chandra Rao, Banking Reforms in India, Regional Publications, New Delhi.

E-Resources:

www.rbi.org.in

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand different types of Banks and Analyse the role of banks	K1, K2, K4
CO2	Understand functions of Banks	K1, K2
CO3	Analyse the relationship between Banker and Customer	K2, K4
CO4	Assess the benefits of e-Banking	K2, K5
CO5	Evaluate the benefits of Payment Banks	K2, 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 = 17				**Correlation = Moderate**				

<u>Mapping Correlation Benchmark</u>

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 - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBAAL41	**OTHER ELECTIVE COURSE**	**Organisational Behaviour**	**4**	**4**

Course Objectives

1. Enable the students to describe how people behave under different conditions and understand why people behave as they do.
2. Provide knowledge on Organizational Group Behaviour.
3. Describe specific theories related to leadership and Motivation
4. Impart students to synthesize related information about organizational change and development.
5. Teach students about the concepts of organizational culture and climate.

Unit-I	**Introduction**	**12 Hours**

Organizational Behavior - Meaning - Importance – Elements- Nature and Scope of Organizational Behavior- objectives- Factors Influencing Organizational Behavior - Environmental Factors - Constraints over Organization and Managerial Performance

Unit-II	*Group Behaviour*	**12 Hours**

Meaning of Group and Group Dynamics - Reasons for the Formation of Groups - Characteristics of Groups - Types of Groups in Organization –Stages of Group Development in the organization- Group Decision Making Process - Small Group Behavior

Unit-III	**Leadership and Motivation**	**12 Hours**

Leadership Concept - Characteristics – Functions of Leader- Qualities of a Leader- Leadership Effectiveness- Types of Leadership Styles.

Motivation - Importance - Motivators - Financial and Non-Financial - Theories of Motivation.(Maslow's & Herzberg's, McGregor's only)

Unit-IV	**Organizational Change and Development**	**12 Hours**

Management of Change: Meaning - Importance - Resistance to Change - Causes - Dealing With Resistance To Change - Factors Contributing to Organizational Change - Organizational Development – Meaning- Features- Process of Organizational Development

Unit-V	**Organizational Culture and climate**	**12 Hours**

Organizational Culture - Concept - Distinction between Organizational Culture and Organizational Climate - Factors Influencing Organizational Culture - Morale

Books for study:

1. Aswathappa . K. –Organizational Behavior, HPH, Mumbai
2. Sundar K & Srinivasan J- Organisational Behaviour, Vijay Nicole Imprints Pvt. Ltd., Chennai.
3. J. Jayasankar, S. S. Khanka- Organizational Behavior, Margham Publications

Books for Reference:

1. Rao, VSP and Narayana - Organizational Theory and Behavior,Konark Publisher (P) Ltd.
2. LM Prasad – Organizational Theory and Behavior ,Sultan Chand & Sons
3. Sekaran Uma - Organizational Behavior, John Wiley
4. Robbins, P. Stephen –Organizational Behavior-Concepts, Pearson Education, 2008
5. Luthans Fred- Organizational Behavior, Mc Graw Hill, 2001

E-Resources:

1. https://mdu.ac.in/UpFiles/UpPdfFiles/2021/Jul/4_07-01-2021_12-32-15_Organizational%20Behaviour.pdf
2. https://www.geektonight.com/organisational-behaviour-notes-pdf/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Explain organizational theory as it relates to management practices, employee relations, and structure of the organization to fit its environment and operation.	K1
CO2	Classify the techniques of organisational Group Behaviour.	K2
CO3	Analyze motivation strategies and leadership styles to determine their effectiveness in employee situations	K1
CO4	Discover the methods to resolve organizational problems	K3
CO5	Describe the impact of organisational culture and climate on employee behaviour	K1
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 = 36				Correlation = Very 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 - IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
UBBAAL42	OTHER ELECTIVE COURSE	Training and Development of Employees	4	3

Course Objectives

1. To familiarize the students with the concept and practice of training and development in the modern organizational setting.
2. To be able to develop an appropriate training strategy for today's organization – Using both on-the-job training and off-the-job training method.
3. Instruct career planning and development, Process and Methods.
4. Impart the concepts of MDP (Management Development Program).
5. Educate the role of Training Institutes in India

Unit-I	Introduction	12 Hours

Concepts of Training and Development – Identifying Training Needs – Characteristics of Training- Elements of organizational Training- Objectives of Training- Structure and Functions of Training Development – Evaluation of Training Programme – Duties, Role, Responsibilities and Challenges to Training Managers – Differences between Training and Development.

Unit-II	**Training Techniques**	12 Hours

On the Job Training Techniques – Induction- Coaching – Apprenticeship – Job Rotation – Refresher Training – Training by Supervisors – Off the Job Training Techniques – Seminars and conferences- Case study- Management Games- Brain Storming- Group Discussion

Unit-III	Career Planning	12 Hours

Concept of Career – Career Stages – Career Planning and Development – Steps in Career Planning – Methods of Career Planning and Development- Career Choice- Career Anchors- Differences between career planning and manpower planning

Unit-IV	Management Development Program (MDP)	12 Hours

Concept of Management Development – Need and Importance – Process – Components of MDP – Management Development Institutes – Productivity Councils

Unit-V	Training Institutions	12 Hours

Need for Training in India – Government Policy on Training – Training Institutes in India

Books for study:

1. Manpower Planning, Selection, Training & Development – Aggarwala D V, Deep & Deep Publications.
2. Training for Development – Rolf Lynton &UdaiPareek, Sage Publication

Books for Reference:

1. Training and Development: Enhancing Communication and Leadership Skills, *by Steven A. Beebe, Timothy P. Mottet and K. David Roach, 2012.*
2. Employee Training & Development by Raymond Noe.
3. Training Organizations : Needs Assessment, Development, and Evaluation by Irwin L. Goldstein.
4. Training for Development, by R.K.Sahu, Excel Books India 2009.
5. Training that Works: A Guide to On-the-job Training Charles M. Cadwell

E-Resources:

1. http://www.mbaexamnotes.com/training-and-development-notes.html

2. https://backup.pondiuni.edu.in/sites/default/files/training-development-260214.pdf
3. https://www.iare.ac.in/sites/default/files/IARE_TAD%20LECTURE_NOTES.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts, principles and process of training and development	K2
CO2	Assess training needs and design training programme in an organisation.	K1
CO3	Understand career planning and development, Process and Methods.	K2
CO4	Gain knowledge on Management Development Programme.	K1
CO5	Understand the role of Training Institutes in India.	K2
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 = 36					Correlation = Very 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 - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBANM41	**OTHER ELECTIVE COURSE**	**INTERNATIONAL BUSINESS**	**4**	**2**

Course Objectives

1. Impart basic knowledge of International Business
2. Educate the students International Business Environment
3. Impart the knowledge of Foreign Direct Investment
4. Awareness about role of Government Institutions in promoting exports

Unit-I	**Introduction to International Business**	**12 Hours**

International Business: An Overview – Evolution of International Business - Stages of Internationalization - Differences between Domestic and International Business –Types of International Business – International Business Approaches – Advantages and Disadvantages

Unit-II	**International Business Environment**	**12 Hours**

Suppliers – customers – competitors – Environment: Demographic – Economic –Technological - Political and Cultural

Unit-III	**Foreign Direct Investment (FDI)**	**12 Hours**

Foreign Direct Investment – Factors Influencing FDI, Reasons for FDI, Costs and Benefits of FDI, Trends in FDI, Foreign Direct Investment in India.

Unit-IV	**Procedure - International Business**	**12 Hours**

Documentation - Proforma invoice, Commercial Invoice, GR 1 Form, Shipping Bill, Shipping Order, Vehicle Ticket, Bill of Lading, Mate Receipt, Airway Bill

Unit-V	**Government assistance - International Business**	**12 Hours**

Government Institutions assisting in promoting export -Ministry of Commerce, Directorate General Of Foreign Trade- Export Promotion Council- Indian Institute of Foreign Trade –India Trade Promotion Organization

Books for study:

1. Dr.S.Shankaran, International Trade, Margham Publications , Chennai.
2. Dr.P.Subba Rao, International Business, Himalaya Publishing House,Karnataka.
3. Dr.N.Venkateswaran, International Business Environment, New Age International (P) Ltd. Publishers, Noida.

Books for Reference:

1. Dr.C.B.Gupta, International Business, S.Chand,Delhi.
2. P.R.Khurana-International Business –Galgotia Publishing House, Delhi
3. D.C .Kapoor –International Business & Export Management-Vikas Publishing House

E-Resources:

1. **https://ebooks.lpude.in/commerce/mcom/term_3/DCOM501_INTERNATIONAL_BUSINESS.pdf**
2. **https://www.sscasc.in/wp-content/uploads/downloads/MCOM/International-Business.pdf**
3. **https://www.studocu.com/in/document/university-of-mumbai/bcom/international-business-notes-pdf/22508477**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basic concepts in International business.	K2
CO2	Able to evaluate the global business environment in terms of economic, social and legal aspects.	K1
CO3	Recognize the benefits of FDI.	K1
CO4	Understand the step by step procedure of International Business globally.	K2
CO5	Learns the procedure for export formalities.	K2
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 = 38				**Correlation = Very High**				

<u>Mapping Correlation Benchmark</u>

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 - IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
UBBANM42	OTHER ELECTIVE COURSE	LOGISTIC MANAGEMENT	4	2

Course Objectives

1. To understand the concept and role of logistics.
2. To be aware of culture and internationalization of supply chain.
3. To demonstrate packing.
4. To discuss emerging trends in retail logistics.

Unit-I	Logistics and Supply Chain Transformation	12 Hours

Retail Logistics and Supply Chain Transformation - Buyer / Seller Relationships - Role of Logistics Service Providers - Formats and associated Logistics functions

Unit-II	**The Internationalization of Supply Chain**	12 Hours

The Internationalization of the Retail Supply Chain - International Sourcing - Distribution strategies and associated infrastructure - Role of culture in international retail Markets - Internationalization of Logistics Practices

Unit-III	Packaging	12 Hours

Packaging Logistics and Fresh Food -Logistics service for food Locations
Packaging aspects of Logistics - Returnable Packaging

Unit-IV	Automotive Logistics	12 Hours

Automotive Logistics solutions - Fleet Management - Milk run concept - Optimal **Efficiencies in Automotive Logistics - Pricing aspects by Logistics Service Providers- Collaborating Strategies in Automotive Supply Chain**

Unit-V	Emerging aspects of Logistics	12 Hours

Emerging aspects in Logistics - Development of E-tail Logistics - Growth of E-commerce - Home Delivery Channel - impact of RFID Technology - Environmental aspects of Logistics -Logistics for managing waste within the Retail sector

Books for study:

1. Alan Rushton, (2007) International Logistics and Supply Chain Outsourcing: From Local to Global, 1st edition, Kogan Page Publishers.UK
2. Alan Rushton, Phil Croucher, Peter Baker (2014), the Handbook of Logistics and Distribution

   Management: Understanding the Supply Chain 5th edition, Kogan Page Publishers.UK
3. Herbert Kotzab, MogensBjerre (2005),Retailing in a SCM-perspective, 1st edition, Copenhagen Business School Press.

Books for Reference:

1.John Fernie, Leigh Sparks (2017), Logistics and Retail Management, 4th edition, Kogan Page.
2.Kerstin Gustafsson, GunillaJönson 0(2006), Retailing Logistics and Fresh Food Packaging: Managing Change in the Supply Chain,1st edition, Kogan PagePublishers.
3.Vinod.V.Sople (2007), Logistics Management –The Supply Chain Imperative, Pearson Education, New Delhi.

E-Resources:

1. https://www.academia.edu/42150982/LOGISTICS_MANAGEMENT_NOTES

2. https://backup.pondiuni.edu.in/sites/default/files/Logistics%20Supply%20Chain%20Mgt200813.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Enumerate the Role of Logistics Service Providers.	K1
CO2	Recognize the culture of international Markets.	K1
CO3	Classify the Pricing aspects and collaborative strategies in automotive logistics.	K2
CO4	Understand the Growth of E-commerce	K2
CO5	Explain environmental aspects of Logistics	K1
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 = 36				Correlation = Very 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 - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBANM43	**OTHER ELECTIVE COURSE**	**BRAND MANAGEMENT**	**4**	**2**

Course Objectives

1. To understand the concept and role of Brand.
2. To be aware of culture and internationalization of Brand.
3. To demonstrate Brand outcome.
4. To discuss emerging trends in Digital Brand.

Unit-I	**Brand History and Overview**	**12 Hours**

Summarize the evolution of the brand, including its past and present positioning. The summary should briefly describe the brand/organizational values, company/brand heritage and a company/brand SWOT analysis

Unit-II	**Key Challenges Facing Brand**	**12 Hours**

Key challenges facing the brand - foundation for the brand audit - focus - outcomes. - brand architecture - brand portfolio - brand extension - brand revitalization - repositioning,

Unit-III	**Brand Inventory**	**12 Hours**

a. Construct the brand architecture Graphically represent the brand hierarchy Discuss the roles of brands in the portfolio. Focus on your brand and others deemed important to your brand.
   Discuss the hierarchy of the brand.
b. **Analyze the firm's branding and marketing programs. How do they contribute to brand knowledge? Evaluate the consistency of the programs over time. Is there consistency between the brand and the marketing elements? Describe and evaluate the impact of any observed discrepancies.**

Unit-IV	**Brand Exploratory**	**12 Hours**

Assess brand associations at each level of the consumer-based brand equity pyramid. Critique the customer-based brand equity. What meanings are strong and dominant? Which are unique from the competition? Which are positive and negative? What meanings resonate with the target market?

Unit-V	**Case study: Coca Cola**	**12 Hours**

The Coca Cola case is relevant to understand how a worldwide company succeeded to boost its sales through the use of corporate social responsibility, brand beliefs and brand behavior.

Books for study:

1. **Brand Management: Principles and Practices, Kirti Dutta**
2. Brand Management – Dr. L.Natarajan

Books for Reference:

1. BRAND MANAGEMENT: PRINCIPLES AND PRACTICES, DUTTA & DUTTA
2. **Brand Management Text and Cases, Harsh V. Verma**

E-Resources:

1. https://www.studocu.com/in/document/srm-institute-of-science-and-technology/master-of-business-administration/brand-management-notes/5196794
2. **https://www.slideshare.net/versatileBschool/brand-management-full-notes**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Enumerate the Role of Brand.	K1
CO2	Understand the cultures of Brand.	K2
CO3	Interpret the Pricing aspects and collaborative strategies in Branding.	K2
CO4	Discover the Growth of Brand	K3
CO5	Understand the environmental aspects of Branding.	K2
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 = 36				**Correlation = Very 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 - IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBASEP4	**OTHER PRACTICAL COURSE**	**TALLY – ADVANCED (PRACTICAL ONLY)**	**4**	**3**

Course Objectives

1. Educate students to work with well-known accounting software i.e. Tally ERP.9
2. Student will learn to create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9.
3. Accounting with Tally course is not just theoretical program, but it also includes continuous practice, to make students ready with required skill for employability in the job market.

Unit-I		**12 Hours**
Voucher entries – Types & Usages - Voucher entries – Creation – Display – Alteration		
Unit-II		**12 Hours**
Maintain purchase and sales register - Trial Balance		
Unit-III		**12 Hours**
Trading Account, Profit and Loss Account and Balance Sheet.		
Unit-IV		**12 Hours**
Income & Expenditure Account		
Unit-V		**12 Hours**
Printing of Day Book – Ledger & Financial Statements - Stock – Cost Center – Cost Group – Stock categories - Configuration & Features of Tally - Explain how to create backup and restore the data.		

Books for study:

4. **Tally.ERP 9 with GST in Simple Steps, DT Editorial Services**
5. **Comdex Tally.ERP 9 Course Kit, Dr. Namrata Agrawal**
6. **Tally Essential Level 2, Tally Solutions Pvt Ltd**

Books for Reference:

4. **TALLY ERP 9 TRAINING GUIDE - 4TH REVISED & UPDATED EDITION, Asok K. Nadhani**
5. **Learn Tally Prime : with All New Feature, Rajesh U. Chheda**
6. **Mastering Tally PRIME: Training, Certification & Job, Asok K Nadhani**

E-Resources:

3. https://drive.google.com/file/d/1iaRWstunPBNKIp1KOpFU0GjgV7r8F6ta/view
4. https://www.pdfdrive.com/pdf-tally-erp-9-notespdf-e42019223.html

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquire reasonable hands on knowledge of accounting software.	K2
CO2	Prepare accounting vouchers, ledger and various reports.	K1
CO3	Acquire the skill of financial decision making in a systemized manner.	K2
CO4	Get exposed in maintenance of inventory features.	K2
CO5	Possess required skill and can also be employed as Tally data entry operator.	K1
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 = 38				**Correlation = Very 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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCO3001	**Discipline Specific Core Course**	**CORPORATE ACCOUNTING I**	**5**	**4**

Course Objectives

1. To impart knowledge on all aspects of corporate situation and requirement.
2. To enlighten the students about the Accounting for Issue of Shares, Redemption of Preference Shares.
3. To make the students to understand Preparation of Final Accounts of Company as per the provisions of Indian Companies Act, 2013 and Valuation of Goodwill and Shares.

Unit-I	**Accounting for Issue of Shares**	**15 Hours**

Issue of Shares – Guidelines for Issue of Shares - Forfeiture and Re-issue of Forfeited Shares – Concept and Process of Book Building – Employee Stock Ownership Plan (ESOPs) – Issue of Rights and Bonus Shares - Sweat Equity Shares – Buyback of Shares – Stock Split.

Unit-II	**Redemption of Preference Shares**	**15 Hours**

Redemption of Preference Shares – Guidelines for Redemption of Preference shares – Redemption at Par, Premium and Discount – Redemption out of Revenue Reserve and out of Fresh Issue.

Unit-III	**Underwriting of Shares andProfits Prior to Incorporation**	**15 Hours**

Underwriting of Shares - Profits Prior to Incorporation – Meaning – Calculation of Time Ratio, Sales Ratio and Weighted Ratio – Basis for Apportionment of Expenses – Steps involved in ascertaining Pre and Post Incorporation Profits.

Unit-IV	**Final Accounts of Company**	**15 Hours**

Final Accounts of company as per the provision of Indian Companies Act 2013 – Statement of Profit and Loss – Balance Sheet – Accounting Treatment of Certain items excluding Managerial Remuneration.

Unit-V	**Valuation of Goodwill and Shares**	**15 Hours**

Valuation of Goodwill – Meaning – Need for Valuation of Goodwill – Methods of Valuing Goodwill – Average Profit - Super Profit - Annuity and Capitalization Methods. Valuation of Shares – Need for Valuation of Shares – Methods of Valuation of Shares – Net Assets - Yield and Fair Value Methods.

Note: Weightage of Marks: Theory 30% and Problems 70%

Books for Study:

1. **Shukla M.C, Grewal T.S, Gupta S.C,** Advanced Accounts, S. Chand & Co. Ltd., New Delhi.
2. **Reddy T.S & Murthy A,** Corporate Accounting, Margham Publications, Chennai.
3. **Jain S.P & Narang K.L,** Advanced Accounting, Kalyani Publishers, New Delhi.
4. **Maheshwari S.N. & Maheshwari S.K,** Corporate Accounting, Vikas Publication, New Delhi.
5. **Gupta R.L &Radhaswamy M,** Advanced Accountancy, Sultan Chand & Sons, New Delhi.

Books for Reference:

1. **Radhika P & Anita Raman**, Advanced Corporate Accounting, Mc Graw Hill Education (India) Private Ltd., Chennai.
2. **Naseem Ahmed, Ashok Sharma &Rajender Kumar**, Corporate Accounting, Ane Book Pvt. Ltd., New Delhi.
3. **Palaniappan R & Dr. Hariharan N,** Corporate Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4. **Hanif M & Mukherjee A**., Corporate Accounting, Mc Graw Hill Education (India) Private Ltd. Chennai.
5. **Tulsian P.C. & Bharat Tulsian C.A**., Corporate Accounting, S. Chand & Co. Ltd. New Delhi

e-Resources:

1. https://www.drnishikantjha.com/booksCollection/Corporate%20Accounting%20.pdf
2. https://www.gacwrmd.in/learning/Commerce/Corporate%20Accounting1.pdf
3. https://www.pdfdrive.com/corporate-accounting-e33470244.html

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Pass Journal Entries for Issue of Shares.	**K2, K3**
CO2	Comprehend the Accounting Procedure for Redemption of Preference Shares.	**K2, K3**
CO3	Understand Under wiring of Shares and calculation of Profits Prior to Incorporation.	**K2, K3**
CO4	Prepare Final Accounts of Company in conformity with provisions of the Companies Act, 2013.	**K2, K3**
CO5	Calculate the Value of Goodwill and Shares	**K2, K3**
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 =30, Correlation: Very 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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCO3002	**Discipline Specific Core Course**	**BUSINESS REGULATORY FRAMEWORK**	**4**	**4**

Course Objectives

1. To provide basic knowledge to students on Business Legislations, Essential elements of a Valid Contract.
2. To enlighten the students about Capacity of Parties to Contract, Indemnity, Guarantee, Bailment & Pledge.
3. To make the students understand Sales of Goods Act, 1930, Competition Act, 2002 and Contract of Agency.

Unit-I	**Indian Contract Act, 1872**	**12 Hours**

Law–Meaning – Objectives- Nature and Sources of Business Law- Indian Contract Act, 1872 – Classification of Contracts – Essential Elements of Contract – Legal rules as to Offer – Acceptance – Revocation of Offer and Acceptance – Consideration - Essentials and Legal rules for a Valid Consideration.

Unit-II	**Capacity of Parties and Free Consent**	**12 Hours**

Capacity of Parties - Definition - Persons Competent to Contract - Free Consent –Coercion - Undue Influence – Fraud - Misrepresentation – Mistake. Discharge of Contract - Modes – Remedies for Breach of Contract - Quasi Contract – Features – Types.

Unit-III	**Indemnity & Guarantee, Bailment & Pledge**	**12 Hours**

Indemnity and Guarantee – Meaning – Kinds of Guarantee – Rights of Surety – Discharge of Surety - Bailment – Essentials – Kinds – Duties and Rights of Bailor and Bailee – Finder of Lost Goods – Rights and Duties of Finder of Lost Goods – Pledge – Essentials – Rights and Duties of Pawnor and Pawnee.

Unit-IV	**Sale of Goods Act,1930 and Competition Act, 2002**	**12 Hours**

Sale of Goods Act, 1930 – Essentials of Contract of Sale – Sale and Agreement to Sell – Competition Act,2002 – Salient features of Competition Act – Powers of Central Government under the Competition Act – Major Provisions of the Competition Act.

Unit-V	**Contract of Agency**	**12 Hours**

Law of Agency – Essentials of an Agency – Kinds of Agent - Irrevocable Agent - Duties and Rights of an Agent- Duties and Rights of Principal – Termination of Agency.

Books for study:

1. **Pillai, R.S.N. & Chand, S,** Business Law, S Chand & Co, Delhi.
2. **Ramaswamy, K.N**., Business Law, S Chand & Co, Delhi.
3. **Shukla, M.C**, Business Law, S. Chand & Co.
4. **S.S.Gulshan**,Mercantile Law, Excel Books.
5. **S. Thameemul Ansari,** Business Regulatory Framework, Mayura Publications.

Books for Reference:

1. **Balachandran. V &Thothadri.S,** Business Law, Vijay Nicole Imprints Pvt.Ltd. Chennai.
2. **Kapoor, N.D.** Business Laws, Sultan Chand and Sons.

3. **Sreenivasan, M.R.** Business Laws, Margam Publications.
4. **Dhandapani, M.V.** Business Laws, Sultan Chand and Sons.
5. **BadreAlam, S. &Saravanavel**, P. Mercantile Law.

e-Resources:

1. www.digitalbusinesslawgroup.com
2. http://swcu.libguides.com/buslaw
3. http://libguides.slu.edu/businesslaw

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend the basics of Business Regulatory FrameworkandtheIndian Contract Act, 1872.	**K1, K2, K3**
CO2	DescribeCapacity of Parties to enter into a Valid Contract.	**K1, K2**
CO3	Explain Indemnity, Guarantee, Bailment and Pledge.	**K1, K2**
CO4	Understand Sale of Goods Act and Competition Act.	**K2**
CO5	Comprehend the Law of Agency and discuss the Rights and Duties of Agent and Principal.	**K2**
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 25=, 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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCO3003	**Discipline Specific Core Course**	**MODERN MARKETING**	**4**	**4**

Course Objectives

1. To impart knowledge on various Concepts, Functions and Approaches of Marketing.
2. To enlighten students about Marketing Environment, Marketing Research, Sales Forecasting, Branding and Packaging.
3. To create awareness among students about recent developments in Marketing.

Unit-I	**Modern Marketing**	**12 Hours**

Marketing – Meaning – Definition – Features – Functions - Marketing vs Selling – Concepts of Marketing – Approaches – Features of Modern Marketing – Marketing Mix - Elements.

Unit-II	**Marketing Environment**	**12 Hours**

Marketing Environment – Meaning – Types - Demographic – Economic – Natural – Political – Legal and Socio-cultural Environment – Market Segmentation - Bases of Segmentation.

Unit-III	**Marketing Research and Sales Forecasting**	**12 Hours**

Marketing Research – Meaning – Benefits – Process – Challenges – Marketing Information System – Benefits of MIS – Sales Forecasting – Benefits – Methods – Sales Manager – Qualities of a Successful Sales Manager.

Unit-IV	**Branding and Packaging**	**12 Hours**

Branding – Meaning – Advantages – Disadvantages – Brand Positioning – Brand Image. Packaging– Objectives – Functions – Essentials of Good Packaging.

Unit-V	**Recent Trends in Marketing**	**12 Hours**

Digital Marketing – Meaning – Features – Advantages – Disadvantages – Traditional Marketing vs E-Marketing – Social Media Marketing - Mobile Marketing – Services Marketing – Green Marketing – Sustainability Marketing Strategies - Rural Marketing – Features – Challenges in Rural Marketing – Affiliate Marketing.

Books for study:

1. **R.S.N. Pillai &Bagavathi,** Modern Marketing, S. Chand & Co. Ltd., New Delhi.
2. **J. Jayasankar, Marketing,**Margham Publications, Chennai.
3. **Rajan Nair, Marketing,** Sultan Chand & Sons, New Delhi.
4. **C.B. Gupta,** Marketing Management – Text & Cases, Sultan Chand & Sons, New Delhi.
5. **Rajan Saxena,** Marketing Management, Tata McGraw Hill, Chennai.

Books for Reference:

1. **Philip Kotler & Gary Armstrong,** Principles of Marketing, Pearson Education, New Delhi.
2. **Roberto G. Mendia**, Principles of Marketing, Rex Printing Company.
3. **Dr. RL Varshney & Dr. SL Gupta,** Marketing Management, Sultan Chand & Sons, New Delhi.
4. **Kotler, Kartajaya and Setiawan,** Marketing 4.0: Moving from Traditional to Digital, Wiley, Canada.
5. **J.C. Gandhi,** Marketing Management, Tata McGraw Hill, Noida.

e-Resources:

1. www.study.com
2. www.investopedia.com
3. www.marketingstudyguide.com

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the features of Modern Marketing.	**K1, K2**
CO2	Analyse Marketing Environment.	**K1, K4**
CO3	Comprehend the process of Marketing Research and Forecast Sales.	**K2, K3, K4**
CO4	Appraisethevalue of Branding and Packaging.	**K2, K5**
CO5	Evaluate the significance of Digital Marketing.	**K2, 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 = 19, Correlation: Moderate								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCONM31	**Other Elective Course**	**BUSINESS AND PROFESSIONAL ETHICS**	**4**	**2**

Course Objectives

1. To provide insights of Business Ethics and Professional Ethics to the students.
2. To enlighten the Principles and Norms of Corporate Governance and Importance of Corporate Social Responsibility.
3. To impart knowledge on Business Ethics in HR and IT.

Unit-I	**Ethics and Business Ethics**	**12 Hours**

Ethics - Meaning - Importance – Types. Business Ethics – Meaning - Characteristics – Importance - Factors Influencing Business Ethics - Principles - Approaches to the study of Business Ethics - Arguments for and against Business Ethics.

Unit-II	**Professional Ethics& Ethical Dilemma**	**12 Hours**

Professional Ethics - Concept - Emergence of Professional Ethics - Need for Professional Ethics - Ethical Dilemmas in Profession – Healthcare – Education - Corporate - Social Work - Reasons for the crisis of Professional Ethics (Nepotism, Favoritism etc.).

Unit-III	**Corporate Governance and Corporate Social Responsibility**	**12 Hours**

Corporate Governance – Meaning – Scope – Characteristics – Principles – Benefits – Limitations - Corporate Governance Norms - Changes in Corporate Governance issues as per the Companies Act, 2013 - Board of Directors - Appointment – Duties. Corporate Social Responsibility - Concept – Scope – Types - CSR Principles & Strategies - Importance of CSR in Contemporary Society - Various Models of CSR.

Unit-IV	**Ethical Practices in HRM**	**12 Hours**

Areas of HRM Ethics - Ethical issues in HR - Unethical Practices of HRM - Importance of Workplace Ethics - Role of Management in Inculcating Workplace Ethics - Factors Shaping Ethical Behavior at Work - Importance of Employee Code of Conduct - Ethical Leadership.

Unit-V	**Ethical Practices in Information Technology**	**12 Hours**

Ethical issues relating to Information Technology - Information Security - Security Policies & Procedures - Information Protection - Ethical codes in Information Technology and Media - Reducing threat to Information Systems. Objectives and Features of Cyber Laws in India - Objectives and Features of The Information Technology Act, 2000.

Books for study:

1. **Murthy CSV,** Business Ethics and Corporate Governance, HPH.
2. **R. R. Gaur, R. Sanghal, G. P. Bagaria;** Human Values and Professional Ethics.
3. **Bholananth Dutta, S.K. Podder** – Corporation Governance.
4. **H.R.Machiraju,** Corporate Governance
5. **K. Venkataramana,** Corporate Governance, SHBP.

Books for Reference:

1. **S Prabhakaran;** Business Ethics and Corporate Governance.

2. **C.V. Baxi,** Corporate Governance.
3. **B O B Tricker,** Corporate Governance; Principles, Policies and Practices.
4. **Michael, Blowfield,** Corporate Responsibility
5. **N.M.Khandelwal,** Indian Ethos and Values for Managers.

e-Resources:

1. https://backup.pondiuni.edu.in/storage/dde/dde_ug_pg_books/Business%20ethics.pdf.
2. https://ddceutkal.ac.in/Syllabus/BECG-MBA.pdf
3. https://www.slideshare.net/BelliPK/professional-ethics-module-1-notes

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Describe the different types of Ethics and Approaches to the study of Business Ethics	**K2,K4**
CO2	Comprehend the Professional Ethics in Healthcare and Education	**K1,K2**
CO3	Examine the Corporate Governance and Corporate Social Responsibility	**K2,K5**
CO4	Discuss theEthical Practices in HRM	**K1,K2**
CO5	Illustrate the Ethical Practices in Information Technology	**K1,K2**
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 =16, Correlation: Moderate								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCONM32	**Elective**	**MARKETING COMMUNICATIONS**	**4**	**2**

Course Objectives

1. To impart knowledge to students on different concepts in Marketing Communication and its Process.
2. To enlighten students about the Marketing Communication Strategy and making them realise the influence of Marketing Communication.
3. To create awareness among students about Integrated Marketing Communication.

Unit-I	**Introduction**	**12 Hours**

Marketing Communications (MarCom) – Concept – Objectives – Importance – Role – Approaches – Tools – Advertising – Sales Promotion – Direct Marketing – E-Compaigns – Personal Selling – Trade Show – Intearative Marketing.

Unit-II	**Marketing Communication Process**	**12 Hours**

Steps in Marketing Communication Process – The Relationship between Marketing and Communication – Tips for Effective Marketing Communication - Marketing Communication Mix – Concept and Elements.

Unit-III	**Marketing Communication Plans**	**12 Hours**

Developing Marketing Communication Plans – The Marketing Communication Planning Framework (MCPF) – Framework for Integrated Marketing Communication Plans – Budgeting for Marketing Communication.

Unit-IV	**Influence of Marketing Communication**	**12 Hours**

Role of Marketing Communication in Brand Building – Role of Communication in Value Creation and Delivery – The New Model of Marketing Communication and Strategy – Changing Attitudes with Marketing Communications.

Unit-V	**Marketing Communication Strategy**	**12 Hours**

Marketing Communication Strategy – Concept & Creation – Advertising & Marketing Communication Strategy – The 3 Ps of Marketing Communication Strategy.

Books for study:

1. **Richa Gaur,** Marketing Communication and Advertising, JCB Press.
2. **Murthy H.S.,** Advertising and Sales Promotion (An Indian Perspective), Anes Books Pvt. Ltd., 2011.
3. **Wells, Moriarty and Burnett, Pearson,** Advertising: Principles and Practice, Pearson Publications.
4. **Kenneth Clow, Donald Baack,** Integrated Advertisements, Promotion and Marketing Communication, 6th edition, 2013, Prentice Hall of India, New Delhi.
5. **George Belch, Michael Belch &KeyoorPurani,** Advertising & Promotion-An Integrated Marketing Communication Perspective, Tata McGraw Hill.

Books for Reference:

1. **JashriJethwaney& Shruti Jain,** Advertising Management, Oxford University Press.
2. **Kazmi S H & Sathish K Batra,** Advertising & Promotions, Excel Pulishers.
3. **Lynne Eagle, Stephen Dahl, Czarnecka& Jenny Lloyd,** Marketing Communications, Routledge, London.
4. **Chris Fill,** Marketing Communications: Interactivity, Communities and Content, Pearson Prentice Hall.

5. **Smith P.R. & Jonathan Taylor,** Marketing Communications-An Integrated Approach, Logan Page, London.

e-Resources:

1. https://www.pdfdrive.com/marketing-communication-books.html
2. https://www.pdfdrive.com/integrated-marketing-communications-e41011351.html
3. https://www.pdfdrive.com/marketing-communications-integrating-offline-and-online-with-social-media-e162044772.html

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand various concepts in Marketing Communication	**K1, K2**
CO2	Comprehend the Marketing Communication Process	**K1, K2**
CO3	Develop Marketing Communication Plans	**K2, K4**
CO4	Knowthe significance of Marketing Communication	**K2, K3, K4**
CO5	Analyze the Marketing Communication Strategy	**K2, K3**
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 =21, Correlation: Moderate								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCONM33	**Other Elective Course**	**CUSTOMER RELATIONSHIP MANAGEMENT**	**4**	**2**

Course Objectives

1. To enlighten the students about various concepts in Customer Relationship Management.
2. To make the students realise the significance of technological support in Customer Relationship Management.
3. To make the students realise CRM's role in Marketing Strategy and to teach thm about CRM implementation.

Unit-I	**Introduction**	**12 Hours**

Customer Relationship Management (CRM) – Concept – Emergence – Goals – Benefits – Types – Scope – Framework – Dimensions – Factors Responsible for CRM Growth – The CRM Cycle – CRM Process.

Unit-II	**CRM Concepts**	**12 Hours**

Customer – Customer Value – Concept - Types - Customer Relationship Styles – Customer Expectations –Management & Delivery –Customer Satisfaction – Customer Centricity – Customer Acquisition – Customer Retention – Importance - Stages - Measurement – Customer Loyalty – Customer Experience Management – Customer Profitability – Customer Lifetime Value – Base Profit Analysis - Value Chain Analysis – Customer Defection.

Unit-III	**Technology for CRM**	**12 Hours**

Technological Application in CRM – Database and Information Systems – Database Marketing Strategies – Datamining for CRM – Managing and Sharing Customer Data – Ethics and Legalities in Data Use – Contact Centre Technology – Web-based Customer Support – CRM Software Solutions for B2C and B2B – Customer Loyalty through Technology. e-CRM – Concept – Importance – Challenges - Strategies – e-CRM Vs e-Marketing.

Unit-IV	**CRM Implementation**	**12 Hours**

Planning for CRM – Concept - Steps – Elements of CRM Plan – CRM Strategy - Strategy Development Process – Customer Strategy Grid – Issues and Challenges in CRM Implementation.

Unit-V	**CRM and Marketing Strategy**	**12 Hours**

One-to-One Relationship Marketing – Cross Selling and Up Selling – Channel Optimization – Event Based Marketing – CRM Life Cycle – CRM Marketing Initiatives – Sales Force Automation – Campaign Management – Call Centers – CRM in Consumer Markets – CRM in Mass Markets - CRM in Service Sector - CRM in Manufacturing Sector.

Books for study:

1. **Kaushik Mukherjee,** Customer Relationship Management, Prentice Hall of India Pvt. Ltd., New Delhi.
2. **Ken Burnett**, the Handbook of Customer Relationship Management, Pearson Education, 2010.
3. **Kumar V & Werner J,** Customer Relationship Management, Willey India, 2008.
4. **Francis Buttle, Stan Maklan,** Customer Relationship Management: Concepts and

Technologies, 3rd edition, Routledge Publishers, 2015.
5. **Kumar V, Reinartz& Werner,** Customer Relationship Management Concepts, Strategy and Tools, 1st edition, Springer Texts, 2014.

Books for Reference:
1. **Alok Kumar Rai,** Customer Relationship Management – Concept & Cases, Prentice Hall of India Pvt. Ltd., New Delhi.
2. **Shanmugasundaram S,** Customer Relationship Management, Prentice Hall of India Pvt. Ltd., New Delhi.
3. **Mukesh Chaturvedi,** Abhinav Chaturvedi, Customer Relationship Management – An Indian Perspective, 2nd edition, Excel Books, 2010
4. **DilipSoman& Sara N Marandi,** Managing Customer Value, 1st edition, Cambridge, 2014.
5. **Peeru Mohamed M,** Customer Relationship Management, Prentice Hall of India.

e-Resources:
1. https://www.pdfdrive.com/customer-relationship-management-customer-relationship-management-e38359745.html
2. https://www.researchgate.net/publication/37146880_Building_better_customer_relationships_Case_studies_from_Malta_and_the_UK
3. https://www.google.co.in/books/edition/Electronic_Customer_Relationship_Managem/Q55hCQAAQBAJ?hl=en&gbpv=1&dq=e+book+on+customer+relationship+management&printsec=frontcover

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the Customer Relationship Management Cycle and Process.	**K2**
CO2	Comprehend the important concepts in Customer Relationship Management.	**K2, K4**
CO3	Realise the technological support in CRM.	**K2**
CO4	Describe theCRMStrategy Development Process.	**K2**
CO5	Assess the role of CRM in Marketing.	**K2, K3,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 = 15, Correlation: Moderate								

Mapping Correlation Benchmar

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCOAL31	**Other Elective Course**	**BUSINESS STATISTICS & OPERATIONS RESEARCH- I**	**5**	**4**

Course Objectives

1. To make the students understand techniques of Data Collection, Organisation and Presentation.
2. To enable students to use statistical tools and techniques for Business Decision-making.
3. To acquaint students to the applications of Operations Research and Linear Programming Problems in Business Decision-making.

Unit-I	**Introduction to Statistics & Data Collection**	**15 Hours**

Statistics – Features - Functions – Limitations – Scope in Business – Stages in a Statistical Survey – Collection of Data – Census and Sampling modes of Enquiries – Sampling Methods – Primary Data – Advantages & Disadvantages – Methods of collecting Primary Data – Secondary Data – Advantages& Disadvantages – Sources of Secondary Data.

Unit-II	**Data Organisation & Presentation**	**15 Hours**

Classification – Bases - Tabulation – Types of Tables – Parts of a Table – Formation of Frequency Distribution - Graphical and Diagrammatic presentation of data using Bar Diagram, Pie Diagram, Histogram and Frequency Polygon.

Activity: Presenting data through Diagrams in Spreadsheet

Unit-III	**Measures of Central Value**	**15 Hours**

Measures of Central Value – Arithmetic Mean - Weighted Arithmetic Mean – Median– Mode – Geometric Mean – Harmonic Mean.

Activity: Computing Averages using Spreadsheets

Unit-IV	**Measures of Dispersion, Skewness, Moments & Kurtosis**	**15 Hours**

Measures of Dispersion – Range - Standard Deviation – Variance – Coefficient of Variation. Measures of Skewness – Karl Pearson's Coefficient of Skewness – Concept of Kurtosis.

Activity: Computing Dispersion using Spreadsheets

Unit-V	**Operations Research**	**15 Hours**

Operations Research – Objectives- Characteristics – Scope – Phases – Models – Linear Programming Problem – Formulation – Solution by Graphic Method.

Activity: Solving LPP using Online tools

Note: Weightage of Marks: Theory 40 % and Problems 60%

Books for Study:

1. **S.P. Gupta, P.K. Gupta and Manmohan,** Business Statistics and Operations Research,

Sultan Chand & Sons, New Delhi.
2. **P.R. Vittal,** Business Statistics and Operations Research, Margham Publications, Chennai.
3. **R.S.N. Pillai and Bagavathi**, Statistics – Theory and Practice, S. Chand, New Delhi.
4. **V.K. Kapoor,** Statistics – Problems and Solutions, Sultan Chand & Sons, New Delhi.
5. **Joseph Anbarasu,** Business Statistics, Vijay Nicole Imprints Pvt. Ltd.

Books for Reference:

1. **S.P. Gupta,** Statistical Methods, Sultan Chand & Sons, New Delhi.
2. **Morris Hamburg,** Statistical Analysis for decision making, Harcourt Trade publishers.
3. **Hamdy A. Taha,** Operations Research: An Introduction, Pearson Education India.
4. **C.R. Kothari**, Quantitative Techniques, Vikas Publishing House
5. **David M. Levine, David F. Stephan et.al.,** Business Statistics – A First Course, Pearson Education

e-Resources:

Related MOOCs for Advanced Learners

1. [Link] Business Mathematics and Statistics by Dr. Anupriya Pandey and Prof. M.S.S. Raju at Swayam
2. [Link] statistics for Business Decisions by by Prof. Karunesh Saxena at Swayam
3. [Link] E-Book: S.C. Gupta & Indra Gupta, Business Statistics, Himalaya Publishing House, Delhi

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Define Statistics, Survey, Census, Sample, Sampling, Classification, Tabulation, Table, Variable, Frequency, Discrete Frequency Distribution, Continuous Frequency Distribution, Operations Research.	**K1, K2**
CO2	Classify Sampling Techniques and Discuss its merits, Limitations and Suitability conditions.	**K2, K3**
CO3	Discuss the methods of Collecting data, Bases of Classification, Types & Parts of a Table, Advantages, Limitations and Features of Statistics, Operations Research and LPP.	**K2, K3**
CO4	Create Frequency Distributions, Diagrams and calculate Central Values, coefficient of Dispersion, Skewness and Moments	**K4, K5, K6**
CO5	Define, Formulate and Solve a LPP	**K4, 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 = 25 , 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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCOAL32	**Other Elective Course**	**BUSINESS ECONOMICS**	**4**	**3**

Course Objectives

1. To familiarize students with basic concepts in Economics and market structure
2. To acquaint students with various laws of Economics, Demand ,Supply, and production functions.
3. To enlighten students on various application of economics Theories and National Income

Unit-I	**Introduction**	**12 Hours**

Business Economics – Definition – Characteristics –Importance – Scope – Differences between Micro Economics and Macro Economics – Roles and Responsibilities of a Business Economist – Economic System and its Types.

Unit-II	***Utility Analysis and Market Structure***	**12 Hours**

Utility - Meaning – Characteristics – Cardinal – Ordinal – 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.

Unit-III	**Demand and Supply**	**12 Hours**

Demand – Definition – Characteristics – Types of Demand - Factors determining Demand – Law of Demand - Elasticity of Demand – Types - Supply– Law of Supply – Factors affecting Supply - Elasticity of Supply – Determinants of Elasticity of Supply.

Unit-IV	**Production and Cost Functions**	**12 Hours**

Production – Factors – Production Function – Iso-quants - Law of Variable Proportions – Economies of Scale – Break-Even Analysis. Cost and Revenue Functions – Types – Short Run – Long Run – Areas of Cost Control.

Unit-V	**Profit Theories and National Income**	**12 Hours**

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.

Books for Study:

1. **Sankaran S,** Business Economics, Margham Publications, Chennai.
2. **Ahuja H.L,** Business Economics, S.Chand& Co. Ltd., New Delhi.
3. **Ray, N.C,** An introduction to Microeconomics, Macmillan Company of India Ltd: New Delhi.
4. **ManabAdhikary,**Anurag , Business Economics, Jain Publishers, New Delhi, 2008.
5. **Datt, R. and K.P.M. Sundharam ,** "Indian Economy", S. Chand & Company Ltd., New Delhi.

Books for Reference:

1. **Agarwal M.D, and Som Deo,** Business Economics, Ramesh Book Depot, New Delhi.
2. **Mehta P.L, Managerial Economics,** Sultan Chand & Sons., New Delhi
3. **Mithani, D.M,** Managerial Economics – Theory and Application, Himalaya Publishing House Pvt. Ltd., Mumbai.
4. **Varian H.R,** Intermediate Microeconomics: A Modern Approach‖, East West Press Pvt.,

Ltd, New Delhi, Eighth Edition, 2015.

5. **Ahluwalia, I.J. and I.M.D. Little** (Eds.) (1999), India's Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New Delhi.

e-Resources:

1.https://www.economicsdiscussion.net/

2.https://www.ilearnlot.com/

3.https://socialsci.libretexts.org/Bookshelves/Economics/Book%3A_Economics_(Boundless)/9%3A_Production/9.1%3A_The_Production_Function

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the discipline of business economics, micro and macro economic aspects.	**K2**
CO2	Explain law of diminishing marginal utility and law of equi–marginal utility.	**K1,K2**
CO3	Comprehendthe concept of Demand&Supply and also Analyse the factors influencing Demand & Supply.	**K2,K3, K4**
CO4	Discuss the production and cost analysis, law of variable of proportions and break-even analysis.	**K2,K3**
CO5	Describe the theories of profit and also Measure the National Income.	**K2, K3, 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 =25, 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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCOSEP3	**Skill Enhancement Lab Course**	**COMPUTERISED ACCOUNTING-I**	**3**	**3**

Course Objectives

1. To acquaint students to Computerised Accounting.
2. To impart skills related to creation and recording of Business Transactions in a Computerized Accounting Environment
3. To enable students to pass voucher entry and generate Financial Statements electronically.

Unit-I	**Introduction to Computerised Accounting**	**9 Hours**

Computerised Accounting – Fundamentals– Need - Salient Features – Advantages and Disadvantages– Manual Accounting Vs Computerized Accounting – Problems faced in Computerized Accounting System- Different Application Software used for Computerized Accounting in Business. Function Keys in Tally with its purpose. Preparation of Journal, Ledger and Trial Balance.

Unit-II	**Creation of Company & Enabling Features in Tally ERP 9**	**9 Hours**

Basics of Tally – Installing - Configuring Tally ERP9 -Creating Company – Data Path for Storing and Retrieving Tally Data – Altering Company Information and Deleting Company – Selecting Company from the List of Companies -Shutting a Company. Enabling Debit Note and Credit Note for Purchase and Sales Returns.

Unit-III	**Creating Accounting Ledgers and Groups**	**9 Hours**

Creating Accounting Ledgers - Predefined Ledgers in Tally - Creating Accounting Masters in Tally ERP 9 - Creating Ledgers – Single Ledger – Multiple Ledger – Altering and Deleting Ledgers. Creating Accounting Groups - Predefined Accounting Groups in Tally – Creating Groups – Altering and Deleting Groups.

Unit-IV	**Creating Inventory Items , Stock Groups and Godown Creation**	**9 Hours**

Creating Inventory Items - Creating different stock items for business– Selecting proper group for each stock item – Creating unit of measurement – Altering and Deleting Stock Item -Entering opening stock items – Fixing unit price of items. Creating Inventory Groups - Predefined Groups – Altering and Deleting Inventory Groups. Creating Godown/Location for stock maintenance.

Unit-V	**Voucher Entry& Report Generation**	**9 Hours**

Introduction to Vouchers -Accounting Vouchers - Predefined Accounting Vouchers – Creation and Alteration of Vouchers – Cancellation and Deletion of Vouchers -Recording of Business transactions using appropriate Accounting Vouchers. Generating Reports - Trial Balance - Profit and Loss Account - Balance Sheet - Invoices.

Books for Study:

1. **Dr. P. Rizwan,**Tally ERP 9, Margham Publications, Chennai.
2. **Asok K Nadhani,** Tally ERP 9 Made Simple: Basic Financial Accounting, BPB Publications, New Delhi.

3. **Vishnu P.Singh, —**Tally-ERP 9 -Computer, Publications Ltd, New Delhi.
4. **Soumya Ranjan Behera,** Learn Tally.ERP 9, BK Publications Pvt. Ltd, New Delhi.
5. **S. Palanivel,** Tally - Accounting Software, Margham Publications, Chennai.

Books for Reference:

1. Kogent Learning Solutions Inc., Tally ERP 9 in Simple Steps, DreamTech Press Inc. New Delhi.
2. **Shraddha Singh,** Navneet Mehra, Tally ERP 9 – Power of Simplicity, V & S Publishers, New Delhi.
3. DT Editorial ServicesTally.ERP 9 with GST in Simple Steps — Dream Tech Press – New Delhi.
4. **Shraddha Singh,** Tally ERP 9 (Power of Simplicity), V & S Publishers – New Delhi.
5. **A.K. Nadhani& K.K. Nadhani,** Tally 9, BPB Publications, New Delhi.

e-Resources:

1. https://www.academia.edu/40257337/INTRODUCTION_TO_COMPUTERIZED_ACCOUNTING
2. https://tallysolutions.com/tally/company-creation-in-tally-erp-9/
3. https://help.tallysolutions.com/article/Tally.ERP9/Creating_Masters/Inventory_Info/Stock_Items.htm

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of Computerised Accounting and various computerised accounting software's used in business.	**K1, K2**
CO2	Create Company, Ledgers and Alter Company details.	**K2, K3**
CO3	Create Inventory Items , Stock Groups and creation of Godown for stock maintenance.	**K2, K3**
CO4	Pass Voucher Entries of daily transactions in Business.	**K3, K4**
CO5	Generate Invoices and other Financial Statements.	**K2, K4**
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 = 26, 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCO4001	**Discipline Specific Core Course**	**CORPORATE ACCOUNTING-II**	**5**	**4**

Course Objectives

1. To make the students understand the Concepts and Accounting of Corporate Restructuring.
2. To familiarize the students about Alteration of Share Capital and Internal Reconstruction.
3. To equip the students with knowledge of Liquidation Accounting, Holding Company Accounts and Accounts of Banking Companies.

Unit-I	**Accounting for Corporate Restructuring**	**15 Hours**

Corporate Restructuring – Meaning of Amalgamation, Absorption, External Reconstruction and Merger (AS14) – Purchase Consideration – Computation of Purchase Consideration – Entries in the books of Transferee Company and Transferor Company – Preparation Amalgamated Balance Sheet (Excluding Inter-Company Holdings)

Unit-II	**Alteration of Share Capital and Internal Reconstruction**	**15 Hours**

Alteration of Share Capital of Company – Internal Reconstruction – Internal Reconstruction Vs External Reconstruction – Procedure for Reducing Share Capital – Accounting Entries – Capital Reduction Account – Preparation of Post Reconstruction Balance Sheet

Unit-III	**Liquidation Accounting**	**15 Hours**

Liquidation - Meaning – Modes of Winding up or Liquidation – Circumstances in which Company may be wound up by the Tribunal – Order of Payment – Secured Creditors – Preferential Creditors – Liquidator's Final Statement of Account - Statement of Affairs – Deficiency or Surplus Accounts.

Unit-IV	**Accounts of Banking Companies**	**15 Hours**

Accounts of Banking Companies – Meaning – Preparation of Profit and Loss Account and Balance Sheet with Relevant Schedules (New Method) – Non-Performing Assets (NPA).

Unit-V	**Accounting for Price Level Changes**	**15 Hours**

Meaning– Limitation of Historical Cost Accounting – Methods or Techniques of Price Level Accounting – Current Purchasing Power Technique (CPP) – Computation of Gain or Loss on Monetary Items – Valuation of Cost of Sale and Closing Inventory - Current Cost Accounting Technique (CCA)- Cost of Sales Adjustment (COSA) – Monetary Working Capital Adjustment (MWCA).

Note: Weightage of marks: Theory 30% and Problems 70%

Books for Study:

1. **Shukla M.C, Grewal T.S, Gupta S.C,** Advanced Accounts, S. Chand & Co. Ltd., New Delhi.
2. **Reddy T.S & Murthy A,** Corporate Accounting, Margham Publications, Chennai.
3. **Jain S.P & Narang K.L,** Advanced Accounting, Kalyani Publishers, New Delhi.
4. **Maheshwari S.N. & Maheshwari S.K,** Corporate Accounting, Vikas Publication, New Delhi.
5. **Gupta R.L &Radhaswamy M,** Advanced Accountancy, Sultan Chand & Sons, New Delhi.

Books for Reference:

1. **Radhika P & Anita Raman**, Advanced Corporate Accounting, Mc Graw Hill Education (India) Private Ltd., Chennai
2. **Naseem Ahmed, Ashok Sharma &Rajender Kumar**, Corporate Accounting, Ane Book Pvt. Ltd., New Delhi.
3. **Palaniappan R & Dr. Hariharan N**, Corporate Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4. **Hanif M & Mukherjee A**., Corporate Accounting, Mc Graw Hill Education (India) Private Ltd. Chennai.
5. **Tulsian P.C. & Bharat Tulsian C.A**., Corporate Accounting, S. Chand & Co. Ltd. New Delhi.

e-Resources:

1. https://www.drnishikantjha.com/booksCollection/Corporate%20Accounting%20.pdf
2. https://www.gacwrmd.in/learning/Commerce/Corporate%20Accounting1.pdf
3. https://www.pdfdrive.com/corporate-accounting-e33470244.html

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Compute Purchase Consideration and also Pass Journal Entries and Prepare Books of Accounts in the books of Transferee Company and Transferor Company.	**K2, K3**
CO2	Prepare accounts relating to Alteration of Share Capital and Reduction of Share Capital.	**K2,K3**
CO3	Prepare Statement of Affairs and Liquidator's Final Statement of Accounts.	**K2, K3**
CO4	Prepare Final Accounts of Banking Companies.	**K2, K3**
CO5	Describe the Concept and Techniques of Inflation Accounting.	**K2, K3**
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 =30 , Correlation: Very 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCO4002	**Discipline Specific Core Course**	**COMPANY LAW**	**4**	**4**

Course Objectives

1. To make the students understand the concepts and contents of Indian Companies Act, 2013, Memorandum& Articles of Association and Prospectus.
2. To disseminate knowledge on Share, Debentures, Directors and Shareholders.
3. To teach the students about the Meetings, Resolutions and Winding up of Company.

Unit-I	**Introduction to the Companies Act, 2013**	**12 Hours**

Company – Meaning - Definition - Characteristics – Advantages – Limitations – Types – Private Company Vs Public Company –One Person Company (OPC) - Limited Liability Partnership (LLP).

Unit-II	**Memorandum, Articles of Association and Prospectus**	**12 Hours**

Formation of a Company – Promotion – Functions of a Promoter – Memorandum of Association – Meaning – Contents – Purpose – Articles of Association – Contents – Distinction between Memorandum and Articles of Association-Prospectus – Contents - Statement in Lieu of Prospectus.

Unit-III	**Shares and Debentures**	**12 Hours**

Share Capital - Kinds of Shares- Sweat Equity Shares and ESOPs-Rights Issue and Bonus Shares-Buyback of Securities – Debentures – Types-Differences between Shares and Debentures.

Unit-IV	**Directors and Shareholders**	**12 Hours**

Members of a Company – Members Vs Shareholders – Shareholders'Democracy- Powers - Directors of a Company – Definition – Qualification –Disqualification- Number of Directorships – Appointment of Directors – Removal of Directors – Independent Directors – Rights - Duties and Responsibilities.

Unit-V	**Meetings, Resolutions& Winding up of Company**	**12 Hours**

Meetings – Meaning – Kinds – Resolutions –Types- Resolution requiring Special Notice– Winding-up –Meaning - Modes of Winding-up- Powers and Consequences

Books for study:

1. **N.D. Kapoor,** Company Law and Secretarial Practice, Sultan Chand
2. **Vijay Gupta, K.G. Garg,** Company Law, Kalyani Publishers, New Delhi.
3. **M.C. Shukla and S.S. Gulshan,** Principles of Company Law-S. Chand & Co.,
4. **A.K. Mujumdar,Dr. G.K. Kapoor,**Taxmann's Company Law & Practice, Taxmann Publications Pvt. Ltd., New Delhi.
5. **L. Santhi**, Company Law (As per Companies Act, 2013), Margham Publications.

Books for Reference:

1. **Ganesan,** Company Law and Secretarial Practice, Rainbow Publications.
2. **Kathiresan& Radha,** Company Law and Secretarial Practice, Prasana Chand & Co
3. **Sherlekar,** Secretarial Practice, Himalaya Publishers
4. **PattanShetti,** Company Law and Secretarial Practice, S. Chand and Co.

5. **V. Balachandran & M. Govindarajan,** A Student Handbook on Company Law and Practice, Vijay Nicole Imprints Pvt. Ltd.

e-Resources:

1. http://www.clb.nic.in/
2. http://www.companiesact.in/
3. http://www.mca.gov

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Identify the characteristics of Companies and Explain different kinds of Companies.	K2, K3
CO2	ExplaintheMemorandum of Association, Articles of Associationand Prospectus of a Company.	K2, K3
CO3	Analysethe different types of Shares and Debentures.	K1, K2, K4
CO4	Comprehend the Qualifications, Appointment of Directors and their Rights&Duties.	K5
CO5	Illustrate different types of Meetings and Resolutions of a Company.	K4
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 25=, 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCO4003	**Discipline Specific Core Course**	**MODERN BANKING**	**4**	**4**

Course Objectives

1. To impart knowledge to students on different types of Banks in India& their Functions.
2. To enlighten students about the Rights and Obligations of Bankers and Customers.
3. To create awareness among students about issues and recent developments in Banking.

Unit-I	***Introduction to Banking***	**12 Hours**

Banking – Definition – Importance – Role of Banks in Economic Development - Types of Banks – Functions of Commercial Banks.

Unit-II	***Development Banks and Central Banks***	**12 Hours**

Development Banks – Functions of Development Banks – NABARD – Functions of NABARD – Cooperative Banks – Land Development Banks - Central Bank – Meaning – Functions – Reserve Bank of India – Functions – Credit Control Techniques – Quantitative Credit Control Techniques – Qualitative Credit Control Techniques.

Unit-III	**Banker and Customer**	**12 Hours**

Relationship between Banker and Customer – Rights of Banker and Customer – Obligations of Bankers and Customers – Dishonour of Cheque – Causes - Garnishee Order – Know Your Customer (KYC).

Unit-IV	**E – Banking**	**12 Hours**

E-Banking – Benefits and Limitations – Mobile Banking – Fund Transfers – NEFT – RTGS – IMPS – UPI – e-Cheque – EFTPOS.

Unit-V	**Payment Banks& Issues in Banking**	**12 Hours**

Payment Banks – Features – Functions - Advantages – Limitations – Different Payment Banks in India – Differences between Traditional Banks and Payment Banks - Contemporary Issues in Banking – Customer Grievances and Redressal – Banking Ombudsman.

Books for study:

1. **Santhanam,** Banking and Financial Services, Margham Publications, Chennai
2. **Natarajan S, Dr. R. Parameswaran,** Indian Banking, S. Chand, New Delhi.
3. **D. Muraleedharan,** Modern Banking – Theory and Practice, Prentice Hall of India, New Delhi.
4. **Gordon & Natarajan,** Banking Theory, Law and Practice, Himalaya Publishing House, New Delhi.
5. **S. Gurusamy,** Banking Theory, Law & Practice, Vijay Nicole Imprints Private Limited, Chennai.

Books for Reference:

1. **Sundharam& Varshney,** Banking Theory, Law & Practice, Sultan Chand & Sons, New Delhi.
2. **R. Machiraju,** Modern Commercial Banking, New Age International Publishers,

Mumbai.
3. **K.P.M. Sundaram, E.M. Sundaram,** Modern Banking, Sultan Chand & Sons Ltd., New Delhi.
4. **Dr. V. Balu,** Banking and Financial System, Sri Venkateswara Publications, Chennai
5. **Prof. D. Surya Chandra Rao,** Banking Reforms in India, Regional Publications, New Delhi.

e-Resources:

1. **www.rbi.org.in**
2. **https://study.com**
3. **https://www.icsi.edu/media/webmodules/Banking_Law&_Practice.pdf**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand different types of Banks and Analyse the role of banks.	**K1, K2, K4**
CO2	Understand functions of Banks.	**K1, K2**
CO3	Analyse the relationship between Banker and Customer.	**K2, K4**
CO4	Assess the benefits of e-Banking	**K2, K5**
CO5	Examine the benefits of Payment Banks.	**K2, K4**
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 = 17, Correlation: Moderate								

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCONM41	**Other Elective Course**	**PROJECT MANAGEMENT**	**4**	**2**

Course Objectives

1. To familiarize the students with the theoretical knowledge of Project Formulaiton and Design.
2. To enlighten the students about to start a project and to help them execute the project successfully.
3. To enable the students to evolve a suitable framework for the project preparation, appraisal, prepare report and project finance.

Unit-I	**Introduction**	**12 Hours**

Project – Meaning – Definition – Characteristics– Stages of Project – Classification of Project - Project Management – Scope –Benefits of Project Management - Project Management Methodologies – Project Management Tools - Project Manager - Role of Project Manager.

Unit-II	***Project Formulation& Project Design***	**12 Hours**

Project Formulation –Concept -Need - Significance – Elements of Project Formulation - Techniques of Project Formulation - Project Design – Uses of Project Design.

Unit-III	**Project Feasibility&Project Appraisal**	**12 Hours**

Project Feasibility – Concept–Importance – Benefits - Types of Feasibility Study - Technical Feasibility – Locational Feasibility –Legal Feasibility - Managerial Feasibility - Pre-Feasibility Study vs Feasibility Study -Project Appraisal - Concept - Methods - Risk and Uncertainty – Modern Techniques – Network Planning.

Unit-IV	**Project Execution**	**12 Hours**

Project Execution – Meaning –Stages in Project Execution – Execution Gaps – Strategies in Project Execution –Project Monitoring and Control - Problems in Project Execution – Project Closure.

Unit-V	**Project Report and Project Finance**	**12 Hours**

Project Report – Content of Project Report. Project Finance - Financial Planning - Project Capital Structure - Sources of Funds - Bank Finance - Loans and Advances - Venture Capital Finance – Seed Capital – Working Capital Financing - Lease Financing.

Books for Study:

1. **C.B. Gupta,** Project Management, A.P.H Publishing Corporation, New Delhi, 2000.
2. **Judith Dwyer, Pauline Stanton,** "Project Management", Valerie Thiessen, First Edition, 2004.
3. **K.Nagarajan**, Project Management, New Age International(P) Ltd. Publisher, New Delhi.
4. **Khanna R. B,** Project Managemnt, Prentice-Hall of India Pvt.Ltd, New Delhi
5. **K.V. Subba Rao,** Project Management, Adhyayan Publishers and Distributors, New Delhi.

Books for Reference:

1. **Prasanna Chandra,** "Project Preparation Appraisal Budgeting and Implementation", TATA Mc. Graw Hill Publishing Company Ltd. New Delhi.
2. **S. Choudhury,** Project Managemnt,TATA Mc. Graw Hill Publishing Company ltd. New Delhi.
3. **Karmaraju Ramakrishna, Essentials of Prjoect Management,** Project Managemnt, Prentice-Hall of India Pvt.Ltd, New Delhi
4. **Sanjiv Marwah,** Project Managemnt ,Dreamtech Publishers, New Delhi
5. **Beena Agarwal, Shyam Agarwal,** Project Management, Vayu Education of India**,** New Delhi**.**

e – Resource

1. https://www.yourarticlelibrary.com/project-management/project-definition-characteristics-and-objectives/94592
2. https://www.simplilearn.com/feasibility-study-article
3. http://atimysore.gov.in/wp-content/uploads/chapter-2-project-formulation-mod.pdf

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend the concepts of Project and Project Management	**K1, K3**
CO2	Understand the Project Formulation and Project Design	**K2, K5**
CO3	Study the Project Feasibility and Appraise the Project	**K2, K3, K5**
CO4	Execute the Project	**K2, K5**
CO5	Know the sources of Project Financing& Prepare Project Report	**K2, K3**
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 = 25, 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCONM42	**Other Elective Course**	**RETAIL MANAGEMENT**	**4**	**2**

Course Objectives

1. To impart knowledge to students on retailing.
2. To make the students understand the retail formats and develop a retail strategy.
3. To enlighten the students about retail merchandising, retail pricingand information technology in retailing.

Unit-I	**Retailing**	**12 Hours**

Retailing – Meaning –Characteristics – Scopes - Functions– Principles –Types – Benefits –Retailing Environment– Ethics in Retail – Changing Trends in Retailing – Retail Management.

Unit-II	**Retailing Formats**	**12 Hours**

Retailing Formats – Concept – Store Based Retail Format – Retail Sales by Ownership, Independent Retailer – Chain Stores –Franchising – Leased Department Stores – Vertical Marketing System – Consumer Cooperatives –Basis of Merchandise Offered – Convenience Store – Conventional Super Markets – Food Based Super Stores – Combination Store – Emerging Retail Formats.

Unit-III	**Retail Strategy**	**12 Hours**

Retail Strategy Concept–Importance –Trading Market and Retail Location – Retail Site Selection – Site Analysis – Demand Density– Site Availability – Common Errors – Recent Trends in Store Location – Retail Segments.

Unit-IV	**Retail Merchandising & Pricing**	**12 Hours**

Merchandising – Concept –Types – Principles – Functions –Process of Merchandising – Retail Pricing – Factors Affecting Retail Price – Pricing Strategies – Types of Pricing – Price Discrimination.

Unit-V	**Information Technology in Retailing**	**12 Hours**

Non Store Retailing (e-Retailing) – Concept – Factors Affecting Internet Buying Decisions– Traditional Retailing & Non Traditional Retailing - Impact of Information Technology in Retailing – Integrated System and Networking – EDI – Bar Coding – Electronic article surveillance – Elctronic shelf labels – Customer database management system

Books for study:

1. **Swapna Pradhan,** Retailing Management- Text and Cases, Tata McGraw-Hill,Noida
2. **Dr. Harjit Singh**, Retail Management – Text and Cases, S. Chand, New Delhi.
3. **Levy Michael,Weitz Barton**, Retailing Management, Tata McGraw Hill, New York.
4. **Chetan Bajaj, Rajnish Tuli, Nidhi Varma Srivastava**, Retail Management, Oxford higher, education, Oxford University Press.
5. **Michael Levy , Barton Weitz, Dhruv Grewal,**Retail Management, McGraw-Hill Education.

Books for Reference:

1. **Gibson G. Vedamani,** Retail Management, Jaico Publishing House,Chennai

2. **Joachim Zentes, Dirk Morschett, Hanna & Schramm-Klein,** Strategic Retail Management, Springer Gabler, Wiesbaden
3. **U.C. Mathur,** Retail Management: Text and Cases, I K International Publishing House.
4. **Dr. RamkrishnaDikkatwar,** Retail Management, NiraliPrakashan.
5. **Barry R Berman, Joel R Evans,** Retail Management: International Edition, Pearson Education Limited.

e– Resources

1. https://www.economicsdiscussion.net/marketing-2/retail/retail/32390
2. https://www.marketing91.com/formats-of-retailing/
3. https://www.yourarticlelibrary.com/retailing/general-merchandise-retailers/48026

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend the concepts of Retailing and changing trends in Retailing.	**K1**
CO2	Analyse the different Retail Formats.	**K2, K4**
CO3	Comprehend and Analyse the Retail Strategy	**K2, K3, K4**
CO4	Examine the role and responsibility of Retail Merchandising& Pricing	**K2, K4**
CO5	Analyse the recent developments in retailing	**K2, K4**
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 = 25, 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCONM43	**Other Elective Course**	**CONSUMER PROTECTION ACT**	**4**	**2**

Course Objectives

1. To familiarize the students with Consumer Rights and legal framework of protecting Consumers 'Rights.
2. To enlighten students about the Consumer Grievance Redressal Mechanism
3. To highlight the role of Industry Regulators in Consumer Protection

Unit-I	**Introduction**	**12 Hours**

Concepts of Buyer, Customer and Consumer – Need for Awareness on Consumer Rights - Consumer Movement in India – Evolution - Formation of consumer organizations and their role in consumer protection - National Consumer Helpline - Citizens Charter - The Consumer Protection Act, 2019 - Objectives – Improvements over The Consumer Protection Act, 1986.

Unit-II	***The Consumer Protection Act, 2019***	**12 Hours**

The Consumer Protection Act, 2019 - Definitions – Advertisement – Appropriate Laboratory – Complainant – Complaint – Consumer – Consumer Disputes – Consumer Rights – Defect – Deficiency – Direct Selling – E-Commerce – Electronic Service Provider – Endorsement – Establishment – Goods - Injury – Harm – Manufacturer – Misleading Advertisement – Product – Product Liability – Product Liability Action – Product Manufacturer – Product Seller – Restrictive Trade Practice - Service - Spurious Goods–Unfair Trade Practice

Unit-III	**Central Council and Central Authority**	**12 Hours**

Central Consumer Protection Council – Procedure for Meetings – Objectives – State Consumer Protection Councils – Objectives – District Consumer Protection Councils – Objectives. Central Authority – Central Consumer Protection Authority – Powers and Functions – Search & Seizure - Accounts and Audit – Annual Reports – Investigation Wing – Powers of District Collector – Complaints

Unit-IV	**Consumer Disputes Redressal Commission**	**12 Hours**

District Consumer Disputes Redressal Commission – Establishment – Jurisdiction – Manner of Complaint – Procedure on admission of Complaint – Findings of District Commission – Review – Appeal – State Consumer Disputes Redressal Commission – Jurisdiction – Transfer of Cases – Procedure – Review – Appeal to National Commission – Hearing – National Consumer Disputes Redressal Commission – Composition – Jurisdiction – Powers – Service of Notice – Administrative Control - Enforcement of Orders - Penalties – Appeals.

Unit-V	**Mediation, Product Liability, Offences & Penalties**	**12 Hours**

Mediation – Consumer Mediation Cell – Empanelment of Mediators – Duties of Mediators – Procedure for Mediation – Settlement – Passing of Order. Product Liability – Product Liability Action – Exceptions - Liability of Product Manufacturer – Liability of Product Service Provider – Liability of Product Sellers. Offences and Penalties.

Books for Study:

1. Taxmann's Consumer Protection Act, 2019 with Rules, TaxmannPublications,Chennai.
2. Taxmann's Consumer Protection Law and Practice – A Comprehensive Guide to New Consumer Protection Law, Taxmann Publications, Chennai.
3. **R.K. Bangia,** A Hand book of Consumer Protection Laws & Procedure, Allahabad Law Agency.

4. **Mohammed Kamalun Nabi ,** Mohammed Irshadun Nabi, Kishore C. Raut, Consumer Rights and Protection in India, Ingram Short Title.
5. **P.K. Majumdar & R.P. Kataria,**Law of Consumer Protection in India, Orient Publishing Company.

Books for Reference:

1. **Nicolette Parisi& Marc Robinson,**Understanding Consumer Rights (Essential Finance), DK Publishers.
2. **Claire Andrews,**Enforcement of Consumer Rights and Protections, LexisNexis
3. **RajyalakshmiRao,**Nabankur Gupta, Consumer Rights and You: Cases, Corporate Concerns and Handy Tips, Pearson Education India.
4. **Pushpa Girimaji,**The Penguin Guide to Consumer Rights, Penguin Random House India.
5. **David Bryan,**The Rights of the Consumers (Straightforward Guide), Straightforward Publishing

e-Resources:

1. https://blog.ipleaders.in/consumer-protection-act-2019-2/
2. http://ncdrc.nic.in/
3. https://consumeraffairs.nic.in/acts-and-rules/consumer-protection

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Analyse the need for Consumer Legislation and Consumer Organizations to protect Consumer Rights	**K2, K4**
CO2	Understand the terms used in The Consumer Protection Act, 2019	**K2**
CO3	Discuss the Powers & Functions of Central Council and Central Authority	**K1, K2**
CO4	Comprehend the procedure of Consumer Disputes Redressal	**K2, K3**
CO5	Understand the Mediation procedure, Product Liability, Offence and Penalties	**K2**
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 = 25, 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCOSEP4	**Skill Enhancement Lab Course**	**COMPUTERISED ACCOUNTING - II**	**3**	**3**

Course Objectives

1. To enable students in preparing final accounts, maintaining Suppliers' and Customers' transactions in computerized accounting.
2. To assist students in preparing and generating GST Invoices using Tally ERP 9 Software.
3. To help students in preparing Payroll of Employees.

Unit-I	**Preparation of Computerised Final Accounts**	**9 Hours**

Preparation of Trial Balance – Income Statements – Balance Sheet – Adjusting Entries in Final Accounts for Outstanding and Prepaid Expenses – Depreciation - Closing stock.

Unit-II	**Receivables and Payables Management**	**9 Hours**

Receivables and Payables Management - Introduction – Activating Bill Wise Details – Sales Entries- Purchase Entries - Activating Debit Note and Credit Note for passing entries - Entries for Discount Allowed and Discount Received - Purchase Returns and Sales Returns- Entries for Receipt of Money from Credit Customers and Payment to Suppliers. Passing Contra Entry for deposits and withdrawals from Bank.

Unit-III	**Payroll Management**	**9 Hours**

Introduction – Salient features of Tally ERP 9's Payroll – Enabling Payroll in Tally – Payroll Configuration - Create Pay Heads – Create Employee Masters – Employee Group Creation.

Unit-IV	**Creating GST Ledgers & Passing of GST Voucher Entries**	**9 Hours**

Creating GST Ledgers – Creating of CGST Account, SGST Account, IGST Account andUTGST Account under Duties & Taxes – Passing GST Voucher Entries for Purchases and Sales. Entries for Local Purchase and Inter State Purchase – Entries for Local Sales and Inter State Sales - Entries for Return Inwards and Outwards.

Unit-V	**Generating Invoice & Statutory Reports**	**9 Hours**

Display and Generate GST Bill/Invoice for Purchases and Sales – Displaying and Generating Reports – GSTR 1 – Generating Inter State Sales and Purchase Reports – Generating Intra State Sales and Purchase Reports.

Books for study:

1. **Dr. P. Rizwan,** Tally ERP 9, Margham Publications, Chennai.
2. **Asok K Nadhani,** Tally ERP 9 Made Simple: Basic Financial Accounting, BPB Publications, New Delhi.
3. **Vishnu P.Singh**, **—**Tally-ERP9‖-Computer, Publications Ltd, New Delhi.
4. **Soumya Ranjan Behera**, Learn Tally.ERP 9, BK Publications Pvt. Ltd, New Delhi.
5. **S. Palanivel,** Tally - Accounting Software, Margham Publications, Chennai.

Books for Reference:

1. **Kogent Learning Solutions Inc**., Tally ERP 9 in Simple Steps, DreamTech Press Inc. New Delhi.
2. **Shraddha Singh, Navneet Mehra**, Tally ERP 9 – Power of Simplicity, V & S Publishers, New Delhi.

3. **DT Editorial Services**Tally.ERP 9 with GST in Simple Steps — Dream Tech Press – New Delhi.
4. **Shraddha Singh**, Tally ERP 9 (Power of Simplicity), V & S Publishers – New Delhi.
5. **A.K. Nadhani& K.K. Nadhani**, Tally 9, BPB Publications, New Delhi.

e-Resources:

1. https://www.icsi.edu/media/webmodules/ATL_Practice_Manual.pdf
2. https://help.tallysolutions.com/article/Tally.ERP9/Tax_India/gst/creating_gst_ledgers.htm
3. https://tallysolutions.com/tally/payroll-management-in-tally-erp-9/

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Prepare and maintain Bills Receivables and Payables in Tally ERP 9	K1, K2
CO2	Create GST Ledgers for Purchases and Sales (Local and Inter-State)	K2, K3
CO3	Create and Maintain Payroll of Employees in Tally ERP 9	K2, K3
CO4	Pass entries for GST Local and Inter-State Purchases and Sales	K2, K3
CO5	Generate Reports: Invoices, Final Accounts and GSTR 1	K2, K3
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 = 27, 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCOAL41	**Other Elective Course**	**BUSINESS STATISTICS & OPERATIONS RESEARCH- II**	**5**	**4**

Course Objectives

1. To enable students to use statistical tools and techniques for Business Decision-making.
2. To familiarize students to the statistical techniques used in Production Quality Control
3. To acquaint students to the applications of Transportation and Assignment Problems in Business Decision-making

Unit-I	**Correlation & Regression Analysis**	**15 Hours**

Correlation – Uses – Types – Karl Pearson's Correlation coefficient – Spearman's Rank Correlation coefficient – Concurrent Deviation method. Regression Analysis – Uses – Distinction between Correlation and Regression – Obtaining Regression Equations using Actual Mean Method - Concept (theory only) of Standard Error of Estimate.

Activity: Obtaining Correlation Coefficient and Regression Equation using Spreadsheets.

Unit-II	***Index Numbers***	**15 Hours**

Index Numbers – Uses – Methods of Constructing Index Numbers – Simple Aggregate Method – Simple Average of Relatives Method – Weighted Aggregative Index Numbers – Laspeyres' Method – Paasche's Method – Fisher's Ideal Method – Weighted Average of Relatives method - Time Reversal Test – Factor Reversal Test – Consumer Price Indices - Concept (theory only) of Chain Index Numbers, Base Shifting, Deflating and Splicing.

Unit-III	**Time Series Analysis**	**15 Hours**

Time Series – Utility – Components – Methods of determining Trends – Free Hand Method – Method of Semi Averages – Method of Moving Averages – Method of Least Squares – Measurement of Seasonal Variations using Method of Simple Averages.

Activity: Using Spreadsheets to obtain trend values and prediction

Unit-IV	**Introduction to Statistical Quality Control &Business Forecasting** (Theory only)	**15 Hours**

Statistical Quality Control - Need - Advantages – Limitations – Methods - Control Chart – Meaning – Uses - Overview of different types - Acceptance Sampling –Role. Business forecasting – Role – Limitations - Steps – Overview of various methods.

Activity: Using Spreadsheets for SQC

Unit-V	**Transportation & Assignment Problems**	**15 Hours**

Transportation Problems – Obtaining IBFS using North West Corner Rule, Least Cost Method and VAM – Unbalanced Transportation Problems (Degeneracy, Maximisation and Optimality problems excluded). Assignment Problems – Hungarian Assignment Method – Unbalanced Assignment Problems (Maximisation problems excluded) - Restricted or Prohibited Assignments.

Activity: Obtaining IBFS for Transportation Problems and Optimal Solutions to Assignment problems using Online tools

Note: Weightage of Marks: Theory 30 % and Problems 70%

Books for study:

1. **S.P. Gupta, P.K. Gupta and Manmohan,** Business Statistics and Operations Research, Sultan Chand & Sons, New Delhi.
2. **P.R. Vittal,** Business Statistics and Operations Research, Margham Publications, Chennai.
3. **R.S.N. Pillai and Bagavathi**, Statistics – Theory and Practice, S. Chand, New Delhi
4. **V.K. Kapoor,** Statistics – Problems and Solutions, Sultan Chand & Sons, New Delhi
5. **Joseph Anbarasu,** Business Statistics, Vijay Nicole Imprints Pvt. Ltd.

Books for Reference:

1. **S.P. Gupta,** Statistical Methods, Sultan Chand & Sons, New Delhi.
2. **Morris Hamburg,** Statistical Analysis for decision making, Harcourt Trade publishers.
3. **Hamdy A. Taha,** Operations Research: An Introduction, Pearson Education India.
4. **C.R. Kothari**, Quantitative Techniques, Vikas Publishing House
5. **David M. Levine, David F. Stephan et.al.,** Business Statistics – A First Course, Pearson Education

e-Resources:

Related MOOCs for Advanced Learners

1. [Link] Business Mathematics and Statistics by Dr. Anupriya Pandey and Prof. M.S.S. Raju at Swayam
2. [Link] statistics for Business Decisions by by Prof. Karunesh Saxena at Swayam
3. [Link]Excel for Statistical Analysis in Business & Economics Free Course at YouTube (75 Videos), ExcellsFun
4. [Link] E-Book: Thomas J. Quirk, Excel 2016 for Business Statistics: A Guide to Solving Practical Problems, Springer
5. [Link] E-Book: Charles Zaiontz, Statistics using Excel, SyncFusion

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Discuss the concept, Significance and Limitations of Correlation, Regression, Index Numbers, Time Series, Statistical Quality Control, Control Charts, Acceptance Sampling, Business Forecasting Transportation Problems and Assignment Problems.	**K1, K2**
CO2	Distinguish Correlation Analysis from Regression Analysis and Describe the Properties of Correlation Coefficient, Components of Time Series Analysis, Steps involved in construction of an Index number, Techniques and Steps in Business Forecasting.	**K2, K3**
CO3	Compute Correlation Coefficient, Construct Regression Equations, Index Number and Evaluate whether an Index Number satisfies Time Reversal Test, Factor Reversal Test	**K3, K4, K5**
CO4	Ascertain the presence of Trend or Seasonality, draw a Trend Line and Compute Seasonal Index for given data	**K3, K4, K5**

CO5	Obtain an Initial Basic Feasible Solution to Transportation problem and an Optimal Solution to the Assignment problem	**K3, K4, 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 = 25 , 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCOAL42	**Other Elective Course**	**GOODS AND SERVICES TAX**	**4**	**3**

Course Objectives

1. To get the students familiarized with Taxation System in India.
2. To make the students familiarize with Goods and Services Tax and E-Way Bill and List out the Exempted Goods and Services.
3. To elucidate the Input Tax Credit and highlight the Administration of GST and Types of Assessment

Unit-I	**Introduction**	**12 Hours**

Tax – Meaning and Definition – Objectives – Canons of Taxation – Features of Taxation System – Direct Tax – Merits and Demerits – Indirect Tax – Merits and Demerits – Differences between Direct Tax and Indirect Tax – Direct Taxes and Indirect Taxes in India.

Unit-II	***Goods & Services Tax (GST)***	**12 Hours**

GST – Meaning – Definition – Objectives – Scope – Salient Features – Advantages – Limitations – Impact of GST and its Implications on Indian Economy – Impact of GST on Central and State Governments – SWOT Analysis on GST – GST Structure - CGST – SGST – IGST – UTGST.

Unit-III	**E-Way Bill and Exempted Goods & Services**	**12 Hours**

E-Way Bill – Persons authorized to generate E-Way Bill – Documents required for E-Way Bill Generation – Cancellation of E-Way Bill – Goods exempt from GST – Services exempt from GST – Exemption by issue of Notification u/s11(1) – Exemption by Special Order u/s11(21).

Unit-IV	**Input Tax Credit and Documents under GST**	**12 Hours**

Input Tax Credit (ITC) - Eligibility -Conditions for taking Input Tax Credit - Apportionment of ITC - Blocked Credit. Various Documents under GST- Tax Invoice, Bill for Supply, Debit Note, Credit Note, Payment Voucher, Receipt Voucher, E-way bill, HSN Code and SAC Code.

Unit-V	**Administration of GST & Types of Assessment**	**12 Hours**

Assessment and Administration of GST - Types of GST Returns, Types of Assessment & Assessment Procedures, Role and Functions of GST Council, Tax Authorities and their powers; Tax deduction at Source & Tax Collection at Source, Refund of Tax.

Books for Study:

1. **T.S. Reddy and Y. Hari Prasad Reddy,** Business Taxation (Goods & Services Tax), Margham Publications, Chennai.
2. **Nitesh Kumar & Anuj Harshwardhan Sharma,** Goods and Services Tax (GST) Law & Practice, Second Edition, Bharat Law House Pvt. Ltd. New Delhi.
3. **CA. Rohini Aggarawal& Dr. Neelam Goel,** Goods and Services Tax and Customs Law, Sultan Chand Publishers, New Delhi.
4. **Ashok Batra, GST Acts, Rules & Forms with Referencer,** Wolters Kluwer (India) Pvt. Ltd., Mohali.
5. **H.C. Mehrotra & V.P. Agarwal,** Goods and Services Tax (GST), Sahitya Bhawan Publications, Agra.

Books for Reference:

1. **Dr. Girija Ahuja & Dr. Ravi Gupta,** Practical Approach to Direct & Indirect Taxes, Wolters Kluwer (India) Pvt. Ltd., Mohali.
2. **C.A. Rajat Mohan,** Illustrated Guide to GST: Vol. I & II, Bharat Law House Pvt. Ltd.,
3. Dr. Sanjiv Agarwal & CA. Sanjeev Malhotra, Goods and Services Tax: Laws, Concepts and Impact Analysis of Select Industries, Bloomsbury India.
4. **Vishal Thakkar,** GST for the Layman, CNBC Pub. Co. Ltd. New Delhi.
5. **V.S. Datey, CA (Dr.) K.M. Bansal & CA (Dr.) Mahesh Gour,**Taxmann's Crackers – Indirect Tax Laws – Taxmann Publications (Pvt.) Ltd. New Delhi.

e-Resources:

1. https://icmai.in/upload/Students/Syllabus2016/Inter/Paper-11-NEW-GST-Revised.pdf
2. https://cbic-gst.gov.in/explanatory-notes.html
3. https://cleartax.in/s/gst-law-goods-and-services-tax

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend the Taxation System in India	K1, K2
CO2	Understand the Impact of GST on Central and State Governments and Apply the SWOT on GST	K2,K4
CO3	Evaluate the Generation of E-Way Bill and Analyse the Goods and Services Exempt from GST	K2, K4, K5
CO4	Apply the Input Tax Credit and Create the documents under Input Tax Credit	K2,K3
CO5	Understand the Administration of GST and Filing of Return under GST	K1, K2
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 =20, Correlation: Moderate								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCO3001	**Discipline Specific Core Course**	**ADVANCED ACCOUNTING**	**6**	**4**

Course Objectives

1. To enlighten the student about Corporate Restructuring and Internal Reconstruction.
2. To impart knowledge to the students about Holding Company Accounts.
3. To familiarize the students with the Banking and Insurance Company Accounts.

Unit-I	**Accounting for Corporate Restructuring**	**18 Hours**

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) – External Reconstruction.

Unit-II	**Alteration of Share Capital and Internal Reconstruction**	**18 Hours**

Alteration of Share Capital – Internal Reconstruction – Internal Reconstruction Vs External Reconstruction – Procedure for Reducing Share Capital – Accounting Entries – Capital Reduction Account – Preparation of Post Reconstruction Balance Sheet.

Unit-III	**Holding Company Accounts**	**18 Hours**

Holding Company Accounts – Holding Company and Subsidiary Company – Associate Company and Joint Venture– Legal Definition and Requirements – Calculation of Goodwill or Cost of Control – Minority Interest –Treatment of Unrealised Profit – Consolidated Balance Sheet as per AS 21.

Unit-IV	**Accounts of Banking Companies**	**18 Hours**

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-V	**Insurance Company Accounts**	**18 Hours**

Insurance – Concept - Types of Insurance – IRDA Regulations – Accounts of Life Insurance Business – Accounts of General Insurance Business – Preparation of Final Accounts.

Note: Weightage of Marks - Theory 30% and Problems 70%

Books for Study:

1. **Shukla M.C, Grewal T.S, Gupta S.C,** Advanced Accounts, S. Chand & Co. Ltd., New Delhi.
2. **Reddy T.S & Murthy A,** Corporate Accounting, Margham Publications, Chennai.
3. **Jain S.P & Narang K.L,** Advanced Accounting, Kalyani Publishers, New Delhi.
4. **Maheshwari S.N. & Maheshwari S.K,** Corporate Accounting, Vikas Publication, New Delhi.
5. **Gupta R.L &Radhaswamy M,** Advanced Accountancy, Sultan Chand & Sons, New Delhi.

Books for Reference:

1. **Radhika P & Anita Raman**, Advanced Corporate Accounting, Mc Graw Hill Education (India) Private Ltd., Chennai.
2. **Naseem Ahmed, Ashok Sharma &Rajender Kumar**, Corporate Accounting, Ane Book Pvt. Ltd., New Delhi.
3. **Palaniappan R & Dr. Hariharan N,** Corporate Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4. **Hanif M & Mukherjee A**., Corporate Accounting, Mc Graw Hill Education (India) Private Ltd. Chennai.
5. **Tulsian P.C. & Bharat Tulsian C.A**., Corporate Accounting, S. Chand & Co. Ltd. New Delhi

e-Resources:

1. https://www.icai.org/post.html?post_id=16961
2. https://vipss.yolasite.com/resources/PCC_BOOKS/Advanced%20Accounting%20Vol.%201.pdf
3. https://www.pdfdrive.com/advanced-accounting-and-financial-reporting-e33449351.html

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the Concepts in Corporate Restructuring, Compute Purchase Consideration and Prepare Books of Accounts during Corporate Restructuring.	**K2, K3, K4**
CO2	Prepare Accounts related to Alteration of Share Capital and Reduction of Share Capital.	**K2, K3, K4**
CO3	Understand concepts and Prepare Consolidated Balance Sheet in Holding Company Accounts.	**K2, K3**
CO4	Draft Profit & Loss Account and Balance Sheet of Banking Companies.	**K2, K3, K4**
CO5	Prepare Final Accounts of Insurance Companies.	**K2, K3, K4**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create F		

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	1-30%	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	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCO3002	Discipline Specific Core Course	INDIRECT TAXES	6	4

Course Objectives

1. To impart knowledge on principles of Indirect Taxation ,Customs and Excise Duty.
2. To familiarise students about Goods and Services Tax.
3. To enlighten the student about Procedure relating to levy, Assesment, Returns and Reverse Charge Mechansism.

Unit-I	Introduction to Taxation	18 Hours

Tax – Meaning and Definition – Characteristics –Objectives – Canons of Taxation – Classification – Direct Tax – Merits and Demerits – Indirect Tax – Merits and Demerits – Direct Tax vs. Indirect Tax – Single Tax System & Multiple Tax System – Concept – Merits – Limitations and Differences.

Unit-II	Customs Duty and Excise Duty	18 Hours

Customs Duty – Introduction – Nature – Types –Objectives of levying Customs Duty – Collection – Offences under the Customs Act –Prohibition of Import and Export of Goods – Exemption from Customs Duties – Provisions regarding Notified and Specified Goods – Excise Duty – Concept – Differences between Customs Duty and Excise Duty – State Excise Duty – Central Excise Duty.

Unit-III	Goods and Services Tax (GST)	18 Hours

Goods and Services Tax – Meaning and Definition– Objectives – Salient Features –Evolution and Implementation of GST in India – Subsuming of Taxes under GST – Benefits on implementing GST- GST Council – Structure – Powers – Functions– Structure of GST – Central GST – State GST – Integrated GST – Union Territory GST – Procedure for Registration – Persons liable for Registration – Persons not liable for Registration – Compulsory Registration - GST Exemption by Issue of Notification u/s 11(1) – Exemption by Special Order u/s 11(21) – Goods and Services exempt from GST .

Unit-IV	Procedures Relating to Levy, Assessment and Returns	18 Hours

Procedures relating to Levy of CGST & SGST – Scope of Supply – Tax Liability on Mixed and Composite Supply – Time of Supply of Goods and Services – Furnishing details of Outward Supplies and Inward Supplies –E-way Billing – Persons authorized to generate E-way Bill – Documents required for E-way Bill Generation – Cancellation of E-way Bill – Input Tax Credit – Eligibility – Apportionment – Input on Capital Goods – Distribution of Credit by Input Service Distributor – Assessment of GST – Types – Filing of Returns – Periodic (Monthly, Quarterly,

Annual) Returns – Stage of Returns.		
Unit-V	**Reverse Charge Mechanism, TDS,TCS, Composition Supply and Compensation Mechanism**	**18 Hours**
Reverse Charge Mechanism - Supplies notified under Reverse Charge Mechanism under Section 9(3) – Class of Goods & Class Service under Reverse Charge Mechanism – Tax Deduction at Source – Person Liable to deduct TDS under GST – Procedural Aspect – Tax Collection at Source – Procedural Aspect – Comparison between TCS and TDS Section (52) – Composition Scheme – Composition Scheme Section (9), Section (10) – State Compensation Mechanism under GST – Timing of Payment of compensation to the states – Source of money for paying compensation – GST Compensation Fund.		
Books for Study: 1. **T.S. Reddy and Y. Hari Prasad Reddy**, Business Taxation (Goods & Service Tax), Margham Publications, Chennai. 2. **L.J. Chaarlas, Essentials of Goods and Services Tax (GST)**, Vijay Nicole Imprints Pvt. Ltd., Chennai. 3. **CA. Rohini Aggarawal& Dr. Neelam Goel**, Goods and Services Tax and Customs Law, Sultan Chand Publishers, New Delhi. 4. **Ashok Batra**, GST Acts, Rules & Forms with Referencer, Wolters Kluwer (India) Pvt. Ltd., Mohali. 5. **H.C. Mehrotra& V.P. Agarwal**, Goods and Services Tax (G.S.T.), Sahitya Bhawan Publications, Agra		
Books for Reference: 1. **Dr. Girish Ahuja & Dr. Ravi Gupta,** Practical Approach to Direct & Indirect Taxes, Wolters Kluwer (India) Pvt. Ltd., Mohali. 2. **CA. Rajat Mohan**, Illustrated Guide to GST: Vol. I & II, Bharat Law House Pvt. Ltd.. 3. **Dr. Sanjiv Agarwal & CA. Sanjeev Malhotra,**Goods and Services Tax: Laws, Conepts and Impact Analysis of Select Industries, Bloomsbury India. 4. **Vishal Thakkar**, GST for the Layman, CNBC Pub. Co. Ltd. New Delhi. 5. **V.S. Datey, CA (Dr.) K.M. Bansal & CA (Dr.) Mahesh Gour**, Taxmann's Crackers – Indirect Tax Laws, Taxmann Publications (Pvt.) Ltd. New Delhi.		
e – Resource 1. https://www.bankbazaar.com/tax/indirect-tax.html 2. https://icmai.in/upload/Students/Syllabus2016/Inter/Paper-11-CA.pdf 3. https://www.bankbazaar.com/tax/gst-returns.html		

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Discuss the classifications of Taxes and Analyse its merits and demerits.	**K1,K2**
CO2	Describe Customs Duty, its Levy & Collection and Exemption from Customs Duties.	**K1,K2**
CO3	Explain the GST in terms of Structure, objectives, GST Council and Power	**K1,K2**
CO4	Describe the GST and procedures relating to Levy, Assessment and Returns.	**K2,K3**
CO5	Outline the Reverse Charge Mechanism, Composition Scheme & Compensation Mechanism.	**K3,K4**
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 = 22 , Correlation: Moderate								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCO3003	**Discipline Specific Core Course**	**SECURITY ANALYSIS & PORTFOLIO MANAGEMENT**	**5**	**4**

Course 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 Securitries and Portfolio Analysis.

Unit-I	**Introduction**	**15 Hours**

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 – Users and uses of Market Index.

Unit-II	**Security Analysis**	**15 Hours**

Security Analysis – Meaning – Scope – Significance – Approaches – Fundamental Security Analysis– Types - Economic Analysis – Industry Analysis -Company Analysis.

Unit-III	**Technical Analysis**	**15 Hours**

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**	**15 Hours**

Valuation of Securities – Equity Shares – Preference Shares – Bonds – Government Securities – Dividends – Gordon's Model – Walter's Model – Modigliani Miller's Model.

Unit-V	**Portfolio Management**	**15 Hours**

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.

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.

e– Resources

1. https://www.managementstudyguide.com/security-analysis-and-portfolio-management.htm
2. https://www.brainkart.com/subject/Security-Analysis-and-Portfolio-Management_79/
3. https://old.amu.ac.in/emp/studym/99993840.pdf

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Explain various concepts in Security Analysis & Portfolio Management	**K2, K3**
CO2	Comprehend Approaches to Security Analysis. Understand and Carryout Fundamental Security Analysis.	**K2, K3**
CO3	Comprehend and Carryout Technical Analysis.	**K2, K3**
CO4	Calculate & Assess the Value of Securities. Comprehend various Dividend Decisions.	**K2, K3, K4**
CO5	Discuss & Analyse various Models in Portfolio Management.	**K2, K3, K4**
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 = 20, Correlation: Moderate								

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	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCO3004	Discipline Specific Core Course	BUSINESS ANALYTICS	5	4

Course Objectives

1. To enlighten students the field of Business Analystics.
2. To assist the students, understand the applications of various statistical tools in Business Analytics.
3. To let the students to know the softwares and programmes used for Business Analytics.

Unit-I	Introduction	15 Hours

Business Analytics - Definition - Historical Overview - Scope & Applications - Significance - Limitations - Business Analytics vs. Data Science - Business Analytics vs. Business Intelligence - Types of Business Analytics

Unit-II	Descriptive Analytics	15 Hours

Descriptive Analytics - Data Types - Scales - Population - Sample - Averages - Dispersion - Moments - Kurtosis - Data Visualisation - Data Mining.

Unit-III	Predictive Analytics	15 Hours

Predictive Analytics - Regression Analysis - Time Series Analysis - Hypothesis Testing - Forecasting Accuracy

Unit-IV	Prescriptive Analytics	15 Hours

Prescriptive Analytics - LPP - ILP - Decision Trees - Optimisation Models - Stochastic Models - Six Sigma - Machine Learning & Artificial Intelligence.

Unit-V	Applications of Business Analytics	15 Hours

Softwares used for Business Analytics - Spreadsheets - Tableau - Power Bi - R. Data Ethics. Business Data Analyst - Skills - Functions

Books for study:

1. **U Dinesh Kumar,** Business Analytics: The Science of Data - Driven Decision Making, Wiley
2. **R.N. Prasad, Seema Acharya,** Fundamentals of Business Analytics, Wiley.
3. **R. Evans James,** Business Analytics, Pearson Education,New Delhi.
4. **Jay Liebowitz,** Business Analytics, Auerbach Publications, New Delhi
5. **Purba Halady Rao**, Business Analytics, PHI Learning, New Delhi.

Books for Reference:

1. **Regi Mathew,** Business Analytics for Decision Making | First Edition, Pearson
2. **James R. Evans,** Business Analytics, Methods, Models and Decisions, Pearson
3. **Ramesh Sharda,** Business Intelligence and Analytics: Systems for Decision Support, Pearson
4. **S. Christian Albright/Wayne L. Winston,** Business Analytics: Data Analysis and Decision Making with MindTap, Cengage Learning India Pvt. Ltd.
5. **Jeffrey D. Camm,** Essentials of Business Analytics, Cengage India Private Limited.

e – Resources:

1. [Link] Marc J. Schniederjans et. al., Business Analytics, Principles, Concepts and Applications, Pearson Education
2. [Link] Ger Koole, An Introduction to Business Analytics, MG books
3. [Link]Essentials of Business Analytics An Introduction to the Methodology and its Applications, Springer.
4. [Link]MOOC: Business Analytics For Management Decision, Rudra P Pradhan, by IIT Kharagpur at NPTEL
5. **[Link]MOOC: Introduction to Data Analytics for Managers by Universityof Michigan at EdX.org**
6. [link]MOOC: Introduction to Business Analytics: Communicating with Data by university of Illinois at Co

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Explain Business Analytics and realise its significance	**K1, K2**
CO2	Differentiate and comprehend the significance of Descriptive Analytics, Predictive Analytics and Prescriptive Analytics.	**K2, K3**
CO3	Enumerate the Applications of Business Analytics in various Industries/Sectors and in different functional areas of business.	**K2, K3**
CO4	Apply suitable tool of Business Analytics to study the problem and Assist in Business Decision Making.	**K3, K4, K5**
CO5	Understand the Applications of various softwares and programmes for Business Analytics.	**K2, K3**
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 = 25, 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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCOVB31	Value Based Course	RESEARCH METHODOLOGY AND ETHICS	3	3

Course Objectives

1. To develop research attitude among the students through conceptual strengthening.
2. To enable students to find solutions for social issues through the process of research.
3. To enhance report writing skills and to inculcate ethics in research process.

Unit-I	Introduction	9 Hours

Research – Meaning - Scope - Significance –Types – Steps – Scientific Research vs. Social Science Research - Stakeholders in Social Research - Significance of Research in Social Sciences – Research Gap – Formulation of Research Questions - Formulation of Research Problem - Research Design – Review of Literature - Hypothesis – Formulation – Types – Errors - Type I and Type II.

Unit-II	Sampling and Data Collection	9 Hours

Sampling - Meaning - Need - Types - Sampling Errors - Data Collection - Primary and Secondary Data – Primary Data Vs Secondary Data - Procedure for Data Collection - Tools of Data Collection - Questionnaire and Interview Schedule – Reliability and Validity Tests. Uses of Information Technology in Data Collection - Determination of Sample Size – Pilot Study - Scaling Techniques.

Unit-III	Data Processing & Data Analysis	9 Hours

Processing of Data - Editing - Coding – Tabulation – Diagrammatic and Graphical Presentation of Data – Bar Diagram – Pie Chart – Histogram. Data Analysis - Analysis of Quantitative Data - Descriptive statistics – Mean – Standard Deviation and Variance - Tests of Significance - Parametric Test – F-test - ANOVA - Non-Parametric Test - Chi-square Test – Rank Correlation Test – Applications of SPSS in Data Analysis.

Unit-IV	Report Writing	9 Hours
Report Writing - Significance - Different steps in writing Report - Layout of Research Report – Types - Mechanics of writing a Report – Requisites of a Good Report.		
Unit-V	**Research Ethics**	**9 Hours**
Research Ethics - Need – Moral Justification of Research – Responsibilities of Researcher – Areas of Research which raise Ethical Issues – Ethical Issues in the use of Information and Communication Technology – Code of Ethics – Plagiarism – Guidelines to Plagiarism - Open Source & Free Anti-Plagiarism Softwares – Plagiarism Checker – Duplicate Checker – Copy Checker.		
Note: Weightage of marks: Theory 80% Problems 20%		

Books for study:

1.**C.R.Kothari**, Research Methodology: Methods and Techniques, Wiley EasternLtd., New Delhi.

2.**Dr. S. Thameemul Ansari, Dr. D. Ravindran, & Dr. A. Noor Mohamed**, Research Methodology, Charulatha Publications, Chennai.

6. **Ravilochanan**, Research Methodology, Margham Publications, Chennai.
7. **Dipak Kumar Bhattacharyya**, Research Methodology, Excel Books, New Delhi.
8. **S. K. Mangal & Shubhra Mangal**, Research Methodology in Behavioural Sciences, PHI Learning, Delhi.

Books for Reference:

1. **D. Amarchand**, Research Methods in Commerce, Emerald Publishers, Chennai.
2. **Anderson,R.L., Berry H.D., Poole,M**, Thesis and Assignment Writing, Wiley Eastern Ltd., New Delhi.
3. **S.P.Gupta**, Statistical Methods, Sultan Chand & Sons, New Delhi.
4. **M. Thamilarasan**, Research Methodology for Social Sciences, New Century Publications, New Delhi.
5. **Dr. Vijay Upagade and Arvind Shende**, Research Methodology, S.Chand, New Delhi.

e-Resources:

1. https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf
2. https://www.pdfdrive.com/research-methodology-books.html
3.https://www.pdfdrive.com/writing-your-thesis-a-practical-guide-for-students-e188622050.html

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the important concepts in Research Methodology	**K2**
CO2	Comprehend various Sampling Methods and Data Collection process	**K2**
CO3	Analyse the Collected Data and evolve the Interpretations	**K2, K4**
CO4	Prepare Research Reports	**K2, K4**
CO5	Comprehend Ethical Standards in Research and apply software for Plagiarism Check	**K2, K3**
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 = 16, Correlation: Moderate								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCODE31	**Discipline Specific Elective**	**CONSUMER BEHAVIOUR**	**5**	**3**

Course Objectives

1. To help the students gain knowledge on individual consumer behaviour and group determinants of consumer behaviour.
2. To analyse the various factors influencing social and cultural consumer behaviour.
3. To impart knowledge on Consumerism and Consumer Protection Act, 2019.

Unit-I	**Introduction**	**15 Hours**

Consumer Behaviour –Meaning - Nature and Importance – Scope – Need – Factors –Consumer Behaviour and Market Strategy – Models of Consurmer Behaviour – Traditional, Learning, Psychoanalytical, Sociological, Economic and Contemporary Models – Consumer Research Process.

Unit-II	**Individual Consumer Behaviour**	**15 Hours**

Motivation – Needs – Motives and Goals – Dynamic nature of Motivation – Arousal of Motives – Self-concept – Psychographic and Life Style. Consumer Imagery – Perceived Risk. Consumer Attitude – Models – Theories – Functions – Consumer Perception.

Unit-III	**Group Determinants of Consumer Behaviour**	**15 Hours**

Group – Features – Types – Reference group influence – Types of consumer reference groups – Factors affecting group influence – Application of reference group – Reference group and Consumer conformity - Family – Concept – Functions of family – Family decision making – Family life cycle – Opinion leadership and personal influence – Diffusion of Innovation.

Unit-IV	**Social and Cultural Influences on Consumer Behaviour**	**15 Hours**

Social Class – Social Class and Consumer Behaviour – Measurement of Social Class - Culture – Characteristics – Factors affecting culture – Role of Customs, Values and Beliefs in Consumer Behaviour – Sub-Culture – Types of Sub-Culture – Cross-Cultural understanding of Consumer Behaviour – Cross-Cultural marketing problems in India – Strategies to overcome Cross-Cultural Problems.

Unit-V	**Consumerism and The Consumer Protection Act, 2019**	**15 Hours**

Consumerism Definition – Reasons for Consumerism – The COPRA 2019 - Objectives – Features – Provision of the Act – Rights of Consumer – Role of the Central Consumer Protection Authority – Consumer Disputes Redressal Commission – Appellate Process – Product Liability – Offences and Penalties.

Books for Study:

1. **S.L. Gupta & Sumitra Pal**, Consumer Behaviour an Indian Perspective, Sultan Chand, New Delhi.
2. **S. Ramesh Kumar**, Consumer Behaviour and Branding, Pearson Education, New Delhi.
3. **David L. Loudon and Albert J Della Bitta** , Consumer Behaviour, Tata McGraw Hill, New Delhi.

4. **Jim Blythe**, Consumer Behaviour, Sage Publication, New Delhi.
5. **Leon G. Schiffman and Leslie LasarKanuk**, Consumer Behaviour, Pearson Education, India.

Books for Reference:

6. **Nicolette Parisi& Marc Robinson,**Understanding Consumer Rights (Essential Finance), DK Publishers.
7. **Claire Andrews,**Enforcement of Consumer Rights and Protections, LexisNexis
8. **Rajyalakshmi Rao, Nabankur Gupta,** Consumer Rights and You: Cases, Corporate Concerns and Handy Tips, Pearson Education India.
9. **Pushpa Girimaji,**The Penguin Guide to Consumer Rights, Penguin Random House India.
10. **David Bryan,**The Rights of the Consumers (Straightforward Guide), Straightforward Publishing

e-Resources:

1. https://www.yourarticlelibrary.com/marketing/market-segmentation/consumer-behaviour-meaningdefinition-and-nature-of-consumer-behaviour/32301
2. https://www.managementstudyguide.com/cultural-factors-affecting-consumer-behaviour.htm
3. https://consumeraffairs.nic.in/acts-and-rules/consumer-protection

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend human behaviour and the basic factors that influence the consumers decision process.	**K2, ,K5**
CO2	Assess the impact of individual determinants on Consumer Behaviour and discuss strategies for favorable behaviour.	**K2, K4**
CO3	Analyse the impact of groups determinants on Consumer Behaviour	**K2, K4**
CO4	Identify the social and cultural factors influencingConsumerBehaviour	**K2, K4**
CO5	Understand Consumerism and the Consumer Protection Act, 2019	**K2,K3**
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 =25, 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	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCODE32	Discipline Specific Elective Course	PERFORMANCE & COMPENSATION MANAGEMENT	5	3

Course Objectives

1. To enlighten the students about various criteria of Job Performance and its significance.
2. To impart knowledge on various Methods of Performance Appraisal.
3. To let the students know about Compensation Structure & Management and Performance Based Rewards and Incentives.

Unit-I	Performance Management	15 Hours

Performance Management – Meaning – Purpose – Standards of Performance – Determinants of Performance – Factors influencing Determinants of Performance – Performance Dimensions - Causes of Poor Performance – Characteristics of an Ideal Performance Management System.

Unit-II	Performance Appraisal	15 Hours

Performance Appraisal – Meaning – Objectives - Benefits – Challenges - Methods of Performance Appraisal – Traditional Methods – Modern Methods – Requisites of Effective Appraisal System - Shift from Performance Appraisal to Potential Appraisal - Competency Mapping.

Unit-III	Compensation Management	15 Hours

Compensation Management – Meaning – Objectives – Compensation Management Process - Compensation – Classification – Factors affecting Compensation Policy – Concept of Minimum Wages, Fair Wages and Living Wages.

Unit-IV	Compensation Structure	15 Hours

Compensation Structure – Elements – Fixed Pay – Variable Pay – Cash Benefits –Concept of Social Security – Retirement Benefits – Superannuation - PF – ESI – Gratuity – Pension/CPS.

Unit-V	Performance Based Rewards and Incentives	15 Hours

Rewards – Reward Strategy – Competency Based Rewards – Performance Based Rewards – Equity Based Rewards – Team Rewards - Incentives - Advantages – Limitations - Types – Profit Sharing – Fringe Benefits - Prerequisites of an Effective Incentive System – Executive Compensation.

Books for study:

1. **L.M. Prasad,** Human Resource Management, Sultan Chand & Sons, New Delhi.
2. **Dr. J.N.V. Naresh Babu,** Performance Evaluation and Compensation Management, Thakur Publication, Hyderabad.
3. **K. Aswathappa,** Human Resource Management – Text and Cases, McGraw Hill, New

Delhi.
4. **Prof. MamtaDahad& Dr. Parag Narkhede,** Performance and Compensation Management, Prashant Publications.
5. **Dewakar Goel,** Performance Appraisal and Compensation Management, Prentice Hall of India, New Delhi.

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCODE33	**Discipline Specific Elective Course**	**CORPORATE FINANCE**	**5**	**3**

Course Objectives

1. To enlighten the students about the key aspects and Sources of Corporate Finance.
2. To impart knowledge on Risk, Return and Valuation of Bonds and Shares.
3. To develop knowledge on Cash and Receivable Management and Project Fiance.

Unit-I	**Introduction**	**15 Hours**

Corporate Finance – Concept – Scope - Importance – Objectives - Principles of Corporate Finance – Role and Functions of a Corporate Financial Manager.

Unit-II	**Sources of Corporate Finance**	**15 Hours**

Sources of Finance - Short Term Sources - Long Term Sources – Internal and External Sources – Advantages – Disadvantages – Stability of the different sources of Finance – Problems of Industrial Finance in India.

Unit-III	**Risk & Return and Valuation of Bonds and Shares**	**15 Hours**

Concepts of Risk and Return – Types of Risk – Role of Risk in Valuation of Return - Diversifiable and Non-Diversifiable Risk - Risk & Return of Single Asset - Risk and Return of a Portfolio - Measurement of Market Risk for Single Asset and Portfolio - Risk and Return Trade Off – Valuation of Bonds – Methods to evaluate Return on Investment - Valuation of Shares.

Unit-IV	**Cash and Receivable Management**	**15 Hours**

Cash Management - Objectives – Principles of Cash Management – Functions of Cash Management - Benefits of Cash Management System - Motives for Holding Cash - Cash Management Strategies - Cash Management Techniques - Concept of Receivable Management - Credit Policy - Types of Credit Policy - Optimum Credit Policy - Credit Standard and Analysis - Credit Terms - Collection Policy and Procedures.

Unit-V	**Project Finance**	**15 Hours**

Project Finance – Role of Advisors in Project Finance – Project Development and Management – Project Feasibility Studies – Assessing Risk in Project Finance – Preparation of Project Report - Project Appraisal by Financial Institutions and Banks – Taxation and its impact on Corporate Financing.

Books for Study

1. **Brealey, Myers & Allen,** Principles of Corporate Finance, 9th edition, The Tata McGraw-Hill, New Delhi.
2. **Ashvarath Damodaran,** Corporate Finance, Wiley India, Latest Edition.

3. **Pawan Jhabak, Corporate Finance**, Himalaya Publishing House, New Delhi.
4. **Ross S A, Westerfield, R. W. & Jordan, B.D.** Fundamentals of Corporate Finance, Tata McGraw-Hill Education India Pvt. Ltd.
5. **Dr. Jaswant Saini,** Corporate Finance, University Book House Pvt. Ltd. Rajasthan

Books for Reference:

1. **Krishnamurti,** Advanced Corporate Finance, Prentice Hall India Learning Pvt. Ltd., New Delhi.
2. **Richard Bailey & Stewart Myers,** Principles of Corporate Finance, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. **Jonathan Berk & Peter DeMarzo,** Fundamentals of Corporate Finance, Pearson Educations.
4. **Pathak Bharti,** Indian Financial System, Pearson Education.
5. **Robert Parrino& David Kidwell,** Corporate Finance, Wiley India, Latest Edition.

e-Resources:

1. https://www.drnishikantjha.com/booksCollection/CoreCourseFinancialAccounting%20.pdf
2. https://people.brandeis.edu/~yanzp/Study%20Notes/Corporate%20finance_Ross.pdf
3. https://www.managementstudyguide.com/corporate-finance.htm

1. **Gary Dessler,** Human Resource Management, 12th ed., Prentice Hall of India, New Delhi.
2. **Bhattacharyya,** D.K.: Performance Management systems and strategies, Pearson Education, New Delhi.
3. **Armstrong,** M., Performance management: Key strategies and practical guidelines, Kogan Page, London.
4. **Richard Henderson,** Compensation Management in a Knowledge Based World, 10th ed. Prentice Hall.
5. **AnchalSoni,** Performance and Compensation Management, Thakur Publication Pvt Ltd, Jalandhar.

e-Resources:

1. www.economicsdiscussion.net
2. www.managementstudyguide.com
3. www.businessmanagementideas.com

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Analyze the factors determining performance	**K2, K4**
CO2	Evaluate various methods of Performance Appraisal	**K2, K5**
CO3	Comprehend the Compensation Management Process	**K1, K2**
CO4	Analyze the Compensation Structure	**K1, K2, K4**
CO5	Know the prerequisites of an Effective Incentive System	**K1, K2, K4**
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 = 16, Correlation: Moderate								

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

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the Concept, Objectives and Principles of Corporate Finance.	K2,K3
CO2	Analyse various sources of Corporate Finance.	K2,K3,K4
CO3	Assess Risk & Return and Evaluate Shares & Bond.	K2,K3
CO4	Understand Cash and Receivable Management.	K2,K3,K4
CO5	Prepare Feasibility Report and Project Report.	K2,K3,K4
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 =20, Correlation: Moderate								

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCO4001	**Discipline Specific Core Course**	**ADVANCED COST ACCOUNTING**	**6**	**5**

Course Objectives

1. To make the students understand various concepts inCost Accounting and Prepare Cost Sheet, Tenders and Quotations.
2. To enlighten the students to gain knowledge onJob, Batch, Contract, Process and Operating Costing.
3. To enable the students to acquire knowledge on Recent Developments in Cost Accounting.

Unit-I	**Introduction**	**15 Hours**

Cost Accounting – Definition – Objectives – Need and Significance- Functions - Advantages and Limitations – Cost Accounting Vs. Financial Accounting - Installation of Ideal Costing System –Elements of Cost – Preparation of Cost Sheet, Tenders and Quotations - Reconciliation of Cost and Financial Profit – Need for Reconciliation – Objectives – Reasons for Difference in Cost and Financial Accounts.

Unit-II	**Job, Batch and Contract Costing**	**15 Hours**

Job Costing – Batch Costing – Determination of EBQ - Contract Costing – Preparation of Contract Costing – Work Certified – Work Uncertified – WIP Valuation –Distinction between Job Costing and Contract Costing – Escalation clause – Cost-Plus Contract.

Unit-III	**Process Costing**	**15 Hours**

Process Costing – Meaning and Utility – Distinction between Process Costing and Job Costing – Costing Procedure – Process Account - Normal Loss – Abnormal Loss – Abnormal Gain – Inter Process Profits– Work-in-progress and Equivalent Production- Joint Products Costing – By-Product Costing.

Unit-IV	**Operating Costing**	**15 Hours**

Operating Costing in Service Industries – Meaning – Operating Cost Units – Operating Cost Statement - Transport Costing – Power House Costing – Hotel Industry Costing –Hospital Costing – Hotel Industry Costing

Unit-V	**Recent Development in Cost Accounting**	**15 Hours**

Product Life Cycle Costing – Cost Allocation and Activity Based Costing – Strategic Cost Management – Transfer Pricing – Target Costing – Backflush Accounting – Throughtput Accounting – Resource Consumption Accounting – Lean System.

Books for Study:

1. **Dr. Reddy & Hari Prasad Reddy,** Cost Accounting, Margham Publications, Chennai.
2. **Dr. A. Murthy & Dr. S. Gurusamy,** Cost Accounting, Vijay Nicole Publications, Chennai.
3. **S.P.Iyangar** ,Cost Accounting - Sultan Chand & Sons, New Delhi.
4. **S.N.Maheswari** , Principles of Cost Accounting - Sultan Chand & Sons, New Delhi

5. **Saxena V,**Advanced Cost & Management Accounting book – Sultan Chand &Sos, New Delhi

Books for Reference:

1. **S.P Jain & K.L Narang** – Cost Accounting, Kalayani Publishers, New Delhi.
2. **R.S.N Pillai & V. Bagavathi** – Cost Accounting, S.Chand& Co., New Delhi.
3. **Nigam & Sharma** – Cost Accounting –Principles and Application, Himalaya Publishers, Bengaluru.
4. **Manosh Dutta,** "Cost Accounting', Dorling Kindersley (India) Pvt. Ltd, 2010. Noida.
5. **Bhattacharyya, A. K.**Principles& Practice of Cost Accounting, PHI Learning Pvt Ltd, New Delhi.

e– Resources:

1. https://www.studocu.com/row/document/university-of-lusaka/cost-and-managerial-accounting/unit-7-job-and-batch-costing-and-contract-service-costing-and-process-costing/8324339
2. https://www.researchgate.net/publication/226814445_Current_developments_in_cost_accounting_and_the_dynamics_of_economic_calculation
3. https://www.investopedia.com/terms/o/operating-cost.asp

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Prepare Cost Sheet, Tender and Quotation.	**K2, K3**
CO2	Prepare Cost Sheets in Job, Batch and Contract Costing	**K2,K3,K4**
CO3	Prepare Process Accounts.	**K2,K3, K4**
CO4	Draft Operating Cost Statements.	**K2,K3, K4**
CO5	Comprehend recent developments in Cost Accounting.	**K2,K3,K4**
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 = 26, 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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCO4002	Discipline Specific Core Course	DIRECT TAXES	6	4

Course Objectives

1. To impart basic concepts in Income Tax, determination of residential status, salary and rental income computation.
2. To enable students to compute business income, professional income, capital gains, income from other sources.
3. To teach the students regarding the Total Income computation and filing of IT Returns.

Unit-I	Introduction to Direct Taxes	18 Hours

Basic Concepts – Residential Status – Individuals – HUFs – Firms – AOP – BOI - Companies – Incidence of Tax – Income Exempted from Tax.

Unit-II	Income from Salary & House Property	18 Hours

Computation of Income from Salary – Allowances – Perquisites – Deductions including Standard Deduction. Income from House Property – Annual Value – Self-Occupied House - Let-Out House – Deemed to be Let-Out House – Partly Self-Occupied and Partly Let Out – Deductions.

Unit-III	Income from Business & Profession and Capital Gains	18 Hours

Profits and Gains of Business and Profession – Admissible Deductions – Expenses Expressly Disallowed – Deemed Incomes – Depreciation – Block of Assets – Normal Depreciation – Additional Depreciation – Capital Gains – Short-term and Long-term Capital Gains – Exemptions in Capital Gains.

Unit-IV	Income from Other Sources and Computation of Total Income	18 Hours

Income from Other Sources – Aggregation of Income – Set-Off and Carry Forward of Losses – Deductions available from Gross Total Income – Computation of Total Income of Individuals.

Unit-V	Assessment Procedure, e-filing of Return and Tax Planning	18 Hours

Assessment Procedure – Methods – Assessment of Individuals – e-filing of Tax Return – Tax Planning – Meaning - Need and Limitations – Tax Evasion and Tax Avoidance. Tax Planning in Old Tax Regime and New Tax Regime.

Note: Weightage of marks: Theory 40% Problems 60%

Books for study:

1. **Gaur and Narang,** Income Tax Law & Practice, Kalyani Publishers, New Delhi.
2. **T.S. Reddy and Y. Hari Prasad Reddy,** Income Tax Law & Practice, Margham Publications, Chennai.
3. **H.C. Mehrotra & S.P. Goyal,** Income Tax Law & Practice, Sahitya Bhawan Publications, Agra.

4. **Dr. R.K. Jain,** Income Tax Law & Practice, SPBD Publications, Agra.
5. **G.S. Mitra,** Income Tax Law & Practice, Mahaveer Publications, Assam.

Books for Reference:

1. **Vinod K Singhania and Monica Singhania,** Students' Guide to Income Tax including GST, Taxmann, New Delhi.
2. **H.C. Mehrothra,** Income Tax including Tax Planning & Management, Sahithya Bhavan,
3. **R N Lakhotia and Subhash Lakhotia,** How to Save Income Tax through Tax Planning, Vision Books, New Delhi.
4. **Dr. H.C. Mehrotra & Dr. S.P. Goyal,** Direct Tax including Tax Planning and Management, Sahitya Bhawan Publications, Agra
5. **V. Rahul Agarwal,** Direct Tax Laws & International Taxation, Taxmann, New Delhi.

e-Resources:

1. incometaxindia.gov.in/pages/tutorials.aspx
2. indiabudget.gov.in
3. eportal.incometax.gov.in

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts of Income Tax	**K2, K3**
CO2	Calculate Income from Salary and House Property	**K2, K3**
CO3	Compute Income from Business and Profession and Calculate Capital Gain	**K2, K3**
CO4	Calculate Income from Other Sources and Compute Gross Total Income and Total Income	**K2, K3, K4**
CO5	Understand the Assessment Procedure in Income Tax	**K2, K3**
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 = 15, Correlation: Moderate								

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCO4003	**Discipline Specific Core Course**	**ENTREPRENEURIAL DEVELOPMENT & NEW VENTURE CREATION**	**5**	**4**

Course Objectives

1. To enlighten the students with various concepts in the area of entrepreneurship.
2. To highlight to the students the benefits and challenges of starting new ventures.
3. To provide insights to students on formation of project report, entrepreneurial finance and role of various Government agencies & policies in assisting entrepreneurs.

Unit-I	**Introduction**	**15 Hours**

Entrepreneurship – Meaning – Factors affecting Entrepreneurship Development – Role of Entrepreneurship in Economic Development – Entrepreneur –Types – Characteristics and Qualities of a good Entrepreneur – Functions – Entrepreneur Vs. Intrapreneur (Manager) – Entrepreneurial Competencies.

Unit-II	**Setting up a New Venture**	**15 Hours**

Identification and selection of New Business Opportunities – Generation of Business Ideas – Sources – Methods - Developing a Business Plan – Meaning - Importance - Process – Elements of a Business Plan – Feasibility analysis – Meaning – Aspects of Feasibility Analysis.

Unit-III	**Formation of Project Report**	**15 Hours**

Project report – Meaning – Objectives - Need & Importance – Uses – Contents of a Project report – Difference between Project Report and Feasibility Report.

Unit-IV	**Entrepreneurial Development Agencies**	**15 Hours**

District Industries Centre (DIC) – National Small Industries Corporation (NSIC) – Small Industries Development Organisation (SIDO) – Small Industries Development Corporation (SIDCO) – Financial Institutions – IDBI – IFCI – ICICI – SIDBI – SFC.

Unit-V	**Entrepreneurial Development Programs& Subsidies**	**15 Hours**

EDP – Meaning – Objectives – Phases of EDP – Role of Government in organising EDP – Objectives and Functions of National Skill Development Corporation (NSDC) – Entrepreneurship and Skill Development Programme centre (E–SDP) – Incentives & Subsidies – Incentives for development of backward areas – Incentives for SSI units in backward areas – Incentives for women entrepreneurs – Tax benefits and allowances to MSME.

Books for study:

1. **Khanka S. S,** Entrepreneurial Development, Sultan Chand Publications, 2003.
2. **Shaprio Alan C,** Multinational Financial Management, Prentice Hall of India, 4th Edn., 2002.
3. **Dr.L.Rangarajan,** Entrepreneurial Development –Sree Renga Publications, Rajapalayam.

4. **Dr. Gordon &Natarajan,**Entrepreneurial Development –Himalaya Publishing Pvt Ltd., Mumbai.

Books for Reference:

1. **Gupta C.B, & Srinivasan N.P,**Entrepreneurial Development, Sultan Chand & Sons, 2008.
2. **Suresh Jayasree,**Entrepreneurial Development, Margham Publications, Chennai.
3. **Raj Shankar,**Entrepreneurial Development –Vijay Nicole Imprints Pvt Ltd, Chennai-91.
4. **RenuArora,**Fundamentals of entrepreneurship and small business - S.K.Sooj, Kalyani Publishers, New Delhi.
5. **S.Anil Kumar, S.C.Poornima, Mini K.Abraham and K.Jayasri,**Entrepreneurial Development –New age international publishers.

e-Resources:

1. http://www.ediindia.org/
2. http://bbahome.blogspot.in/2013/02/entrepreneurship- development.html
3. https://www.hhrc.ac.in/ePortal/Commerce/I%20M.Com.%20-%2018PCO1%20-%20Dr.%20R.%20Sathru%20Sangara%20Velsamy%20&%20Dr.%20P.%20Sailaja.pdf

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Discuss the Role and Functions of an Entrepreneur	**K2, K3**
CO2	Analyse the business opportunities & marketing conditions and Develop a Business Plan.	**K2, K4**
CO3	Prepare Project Report and Feasibility Report	**K2, K3**
CO4	Understand the role of various Entrepreneurial Development Agencies	**K2, K3**
CO5	Analyse the Entrepreneurial Development Programs,Incentives& Subsidies	**K2, K4**
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 25=, 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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCO4004	Discipline Specific Core Course	BUSINESS ETHICS & CORPORATE GOVERNANCE	5	4

Course Objectives

1. To familiarize students with the concept and relevance of Business Ethics and Ethical Decision Making in the Modern Business Era.
2. To enlighten students about the issues involved in maintaining ethics.
3. To create awareness about Corporate Governance and its role in business.

Unit-I	Introduction to Business Ethics	15 Hours

Meaning and Nature of Ethics –Morals& Ethics – Morals & Values - Values &Ethics - Ethics – Types - Importance – Business Ethics – Nature–Need &Importance - Ethical Concepts and Theories - Ethical code of conducts in Business.

Unit-II	Ethical Decision Making	15 Hours

Ethical Decision Making – Characteristics of Ethical Decision Making - Types – Significance of Ethics in Management– Ethical Decision Making Frameworks – Factors affecting Ethical Decision Making – Steps in Ethical Decision Making – Ethical Dilemmas In Organization – Problems in Ethical Decision Making.

Unit-III	Ethical Values and Functional Areas of Business	15 Hours

Functional Areas of Business - Characteristics - Objectives – Different Functional Areas of Business - Production Management - Cost Management - Accounting & Financial Management - Office Management - HR Management - Marketing Management - Sales Management - Advertisement Management.

Unit-IV	Corporate Governance	15 Hours

Corporate Governance – Concept - Principles - Features of Good Governance - Differences between Corporate Governance and Management – Purpose of Good Governance – Benefits of Good Corporate Governance-Consequences of Poor Corporate Governance– Corporate Governance Models – The Anglo-US model – The Japanese Model.

Unit-V	Framework of Corporate Governance	15 Hours

Corporate Governance Vs. Corporate Excellence - Role of the Board of Directors in Corporate Governance – Responsibilities of the Board of Directors – Role and Responsibilities of Top Management in Corporate Governance - Corporate Governance Reforms - Initiatives in India-Corporate Governance and Issues Related to Scams - Insider Trading - Rating Agencies.

Books for study:

1. **Laura P Hartman Abha Chatterjee**, Business Ethics (Tata McGraw Hill), Noida.
2. **S.S. Iyer,** Managing for Value (New Age International Publishers)
3. **Nidhi Chandorkar& Tushar Agarwal**, Business Ethics and Corporate Governance, Himalaya Publishing House, New Delhi
4. **J. P. Sharma Corporate Governance,** Business Ethics & CSR, Ane Books Pvt. Ltd., New Delhi.
5. **Daniel Albuquerque,** Business Ethics, Principles and Practices (Indian Edition), Oxford University Press, New Delhi.

Books for Reference:

1. **Mruthyunjaya H. C**,Business Ethics and Value Systems -Publisher: PHI Learning
2. **Andrew Crane Dirk Matten,** Business Ethics (Indian Edition), Oxford University Press
3. **Mallian, Christine A,** Corporate Governance (Indian Edition), Oxford University Press, New Delhi.
4. **CSV Murthy,** Business Ethics (Text and Cases), Himalaya Publishing House, New Delhi
5. **John R. Beatright,** Ethics and the conduct of business, Pearson Education

e- Resources:

1. https://ddceutkal.ac.in/Syllabus/BECG-MBA.pdf
2. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBAA1503.pdf
3. https://mrcet.com/downloads/MBA/digitalnotes/Business%20Ethics%20&%20Corporate%20Governance.pdf

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand various concepts in Business Ethics	**K1, K2**
CO2	Comprehend the process Ethical Decision Making in Business and Analyse the factors affecting Ethical Decision Making	**K2, K3**
CO3	Discuss the importance of the ethical decision-making in various functional areas of business.	**K2, K3, K4**
CO4	Comprehend the relevance of corporate governance to organizations and society.	**K2, K3**
CO5	Discuss the Role of Directors in Corporate Governance.	**K2, K3**
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 =21, Correlation: Moderate								

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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCONM41	Other Elective Course	DATA ANALYSES USING SPSS	3	2

Course Objectives

1. To make the students familiarize with the Introduction to SPSS and Data Handling.
2. To teach the Diagrammatic Presentation of Data in SPSS.
3. To infuse knowledge of Descriptive Statistics and Inferential Statistics in the Students.

Unit-I	Introduction	9 Hours

SPSS – Meaning - Features - Open SPSS Data File – Data Entry – Saving Data File – Import from Other Data Source – Labelling for Dummy Numbers - Recode in to Same Variable – Recode in to Different Variable – Transpose of Data – Insert Variables and Cases – Merge Variables and Cases.

Unit-II	Data Handling	9 Hours

Split Cases – Select Cases – Compute Total Scores – Table Looks – Changing Column - Font Style and Sizes.

Unit-III	Diagrammatic Representation	9 Hours

Simple Bar Diagram – Multiple Bar Diagram – Sub-divided Bar Diagram - Percentage Diagram - Pie Diagram – Frequency Table – Histogram – Scatter Diagram – Box Plot.

Unit-IV	Descriptive Statistics	9 Hours

Mean – Median – Mode – SD – Skewness – Kurtosis - Cross-Tabulation

Unit-V	Inferential Statistics	9 Hours

One Sample t-Test - Independent Sample t-Test - Paired Sample t-Test - Correlation Analysis - Chi-Square Test - One-Way ANOVA.

Books for study:

1. **Clifford E.Lunneborg** (2000). Data Analysis by Resampling: Concepts and Applications. Dusbury Thomson Learning. Australia.
2. **Everitt, B.S and Dunn, G** (2001). Applied Multivariate Data Analysis. Arnold London.
3. **A.Rajathi and P Chandran** - SPSS for you.
4. **V. Gupta** - SPSS for Beginners, VJBooks Inc. Publishers, New Delhi.
5. **Lokesh Jasrai,** Data Analysis Using SPSS,SAGE Publications India Pvt Ltd

Books for Reference:

1. **Jeremy J. Foster (2001).** Data Analysis using SPSS for Windows. New Edition. Versions 8-10. Sage Publications. London.
2. **Michael S. Louis – Beck (1995).** Data Analysis an Introduction, Series: Quantitative Applications in the Social Sciences. Sage. Publications. London.
3. **Dr. Lalit Prasad and Dr. Priyanka Mishra,** DATA ANALYSIS USING SPSS, NiraliPrakashan, New Delhi.
4. **K. Kalyanaraman;Hareesh N. Ramanathan;P.N. Harikumar,**Statistical Methods for Research, Atlantic Publisher and Distributors Pvt. Ltd.
5. **Arun Sharma,** Data Analysis & Interpretation, McGraw Hill Education, New Delhi.

e-Resources:

1. **https://scholar.valpo.edu/cgi/viewcontent.cgi?article=1000&context=psych_oer**
2. **https://www.lboro.ac.uk/media/media/schoolanddepartments/mlsc/downloads/spss-and-statistics-guide.pdf**
3. **https://egyankosh.ac.in/handle/123456789/8782**

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand basic concepts/terminologies in the SPSS Software	**K2**
CO2	Understand the Data Handling in SPSS	**K2, K3**
CO3	Prepare Diagrams and Evaluate the Diagrammatic Data using SPSS	**K2, K3, K5**
CO4	Apply the Descriptive Statistics to Process the Data in SPSS	**K2, K3, K4**
CO5	Analyse Data through Inferential Statistics using SPSS	**K2, K3, K4**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓		✓		✓			✓
CO2	✓		✓					
CO3		✓	✓					
CO4			✓	✓		✓	✓	
CO5			✓		✓		✓	✓
Number of matches =16, Correlation: Moderate								

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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCODE41	Discipline Specific Elective Course	ORGANISATIONAL BEHAVIOUR	5	4

Course Objectives

1. To develop an understanding of the Individuals' and Groups' Behaviour inside Organisations.
2. To familiarize the students how to effectively modify their behaviour through Motivation and Leadership for enhanced Performance.
3. To impart skills for Managing and Changing Organisational Behaviour.

Unit-I	Introduction	15 Hours

Organisational Behaviour – Meaning – Need – Importance – Nature – Elements – Approaches to OB - Frame Work – Process – Models – Organisation and the Environmental Factors – Global Scenario.

Unit-II	Individuals in Organisation	15 Hours

Individuals in Organisation –Foundations of Individual Behaviour – Personality – Types – Factors influencing Personality – Theories – Learning – Types – Process – Theories – Attitudes – Characteristics – Components – Formation – Measurement. Values – Types of Values – Perceptions – Process – Factors influencing Perception – Interpersonal Perception – Stress – Causes of Stress – Stress Management – Coping Strategies of Stress.

Unit-III	Group Behaviour	15 Hours

Group Dynamics – Group Behaviour - Characteristic of Group - Types of Group – Stages of

Group Development – Group Decision Making – Techniques – Inter-Group Behaviour – Quality Circles – Organisational Conflicts – Stages – Sources – Types – Traditional and Modern Approaches to Conflict – Conflict Management.		
Unit-IV	**Motivation and Leadership**	**15 Hours**
Motivation – Theories of Motivation – Maslow's – Herzberg – McGregor – McClelland - Vroom - Stacy Adam's Equity Theory. Leader – Qualities – Leadership – Functions – Style – Theories – Leaders Vs Managers.		
Unit-V	**Organisational Structure and Organisational Change**	**15 Hours**
Organisational Structure – Concept – Design – Organisational Culture & Climate – Creating and Sustaining Culture – Factors affecting Organisational Climate – Organisational Change – Forces of Organisational Change – Resistance to Change – Organisational Development – Organisational Effectiveness – Emotional Intelligence – Social Intelligence – Transactional Analysis (TA).		

Books for study:

1. **S.S. Khanka,** Organisational Behaviour, S.Chand& Co. Ltd., New Delhi.
2. **Keith Davis,** Human Behaviour at work, McGraw Hill Publications, New Delhi.
3. **L.M. Prasad,** Organisational Behaviour, Sultan Chand and Sons, New Delhi.
4. **J.S. Chandan,** Organisational Behaviour, Vikas Publishing House Pvt Ltd., New Delhi.
5. **David A. Buchanan, Andrzej A Huczynski,** Organisational Behaviour, Pearson.

Books for Reference:

1. **K. Aswathapa,** Organisational Behaviour, Himalaya Publishing House, New Delhi.
2. **Margie Parikh and Rajen Gupta,** Organisational Behaviour, Tata McGraw Hill Education, New Delhi.
3. **Stephen P. Robbins, Timothy A Judge,** Essentials of Organisational Behaviour, Pearson.
4. **Jai B.P. Sinha,** Culture and Organisational Behaviour, Sage Publication, New Delhi.
5. **Stephen P. Robbins, Timothy A judge, Neharika Vohra,** Organisation Behaviour 16e, Pearson.

e – Resources

1. https://www.tutorialspoint.com/organizational_behavior/index.htm
2. https://www.studocu.com/in/document/mahatma-gandhi-university/organizational-behavior/organization-behaviour-full-note/30171477
3. https://www.pdfdrive.com/organisational-behaviour-d34435411.html

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend the nature of Organisational Behaviour	**K2, K3**
CO2	Examine the impact of Individuals' Behaviour in Organisation	**K2, K3, K4**
CO3	Analyse Group Behaviour and Sources of Conflict	**K2,K3, K4**
CO4	Discuss and Analyze various theories of Motivation and Leadership	**K2, K3, K4**
CO5	Understand various Organisational Structure and Analyse the Factors affecting Organisational Climate	**K2, K3, K4**
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 = 15, Correlation: Moderate								

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCODE42	**Discipline Specific Elective Course**	**INTEGRATED MARKETING COMMUNICATIONS**	**5**	**4**

Course Objectives

1. To acquaint the students with concepts and techniques of Integrated Marketing Communication
2. To make the students understand the various Integrated Marketing Communication tools and its effectiveness
3. To impart knowledge on planning and developing effective marketing communication programme.

Unit-I	**Introduction to Integrated Marketing Communications**	**15 Hours**

Introduction to IMC – Meaning and Role of IMC in the Marketing Process –One Voice Communication Vs. IMC, Introduction to IMC tools – Advertising, sales promotion, publicity, public relations, and event sponsorship - The role of advertising agencies and other marketing organizations providing marketing services.

Unit-II	**Understanding communication process**	**15 Hours**

Model of Communication – Analyzing the receiver – The response process: Traditional Response Hierarchy Models, Alternative Response Hierarchies, The FCB (The Foote, Cone and Belding) Planning Model, Source, Message and channel factors – Personal Vs Non-personal Channels, Communication response hierarchy- AIDA model, Hierarchy of effect model, Innovation adoption model, information processing model, The standard learning Hierarchy, The Elaboration Likelihood (ELM) model.

Unit-III	**Planning for Integrated Marketing Communication**	**15 Hours**

Establishing marketing Communication objectives and Budgeting for Promotional Programmes –Determining Integrated Marketing Communications Objectives –Marketing Vs Communication Objectives, Sales Vs Communications Objectives, DAGMAR (Defining Advertising Goals for Measured Advertising Results) an approach for setting objectives - Budgeting for Marketing Communication-Factors influencing budget, Theoretical approach to Budgeting viz. Marginal Analysis and Sales Response Curve, Method to determine marketing communication budget.

Unit-IV	**Developing the Integrated Marketing Communication Programme**	**15 Hours**

Development of creative strategy in implementation and evaluation of marketingcommunication. Creative strategies in advertising, sales promotion, publicity, event sponsorships etc. - Types of appeals and execution styles. Media Planning and Selection Decisions- steps involved and information needed for media planning. Measuring the effectiveness of all Promotional tools and IMC.

Unit-V	**International Advertising and Promotion**	**15 Hours**

The importance of International Markets – The Role of International Advertising and Promotion – The international Environment – Global Vs Localized Advertising – Decision areas in International Advertising – The roles of other promotional Mix Elements in International Marketing – Regulationof Advertising and Promotion by various regulatory Authorities.
Books for study: 1. **George Belch, Michael Belch &KeyoorPurani,**Advertising& Promotion- An Integrated Marketing Communications Perspective, TATA McGraw Hill, New Delhi 2. ,**KrutiShah,**Advertising and Integrated Marketing CommunicationMcGraw Hill, New Delhi 3. **Niraj Kumar,**Integrated Marketing Communication, Himalaya Publications, New Delhi 4. **S. N. Murthy, U. Bhojanna,**Advertising: An IMC Perspective, Excel Books, New Delhi 5. **Kenneth E. Clow, Donald Baack** – Integrated Advertising, Promotion and Marketing Communications - Pearson
Books for Reference: 1. **Kenneth E. Clow, Donald E. Baack,**Integrated Advertising, Promotion and Marketing Communications, Pearson Publisher. 2. **Terence A. Shimp, J. Craig Andrews, Cengage**Advertising Promotion and Other Aspects of Integrated Marketing Communications. 3. **George E. Belch, Michael A. Belch, KeyoorPurani,**Advertising and Promotion, McGrawh Hill, New Delhi. 4. **Don Schultz, Stanley Tannenbaum, Robert lauterborn** – Integrated Marketing Communications: Putting it together & Making it work – McGraw- Hill Education. 5. **Chunawalla S.A** – Advertising, Sales & Promotion Management – Himalaya Publishing House.
e-Resources: 1.https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_IMC_Lecture_Notes_E3.pdf 2. http://ddrcmt.com/INTEGRATED%20%20MARKETING%20COMMUNICATION.pdf 3. https://www.studocu.com/in/document/jamia-millia-islamia/mba/imc-notes-for-marketing/9075253

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend marketing communication theories and concepts.	**K1, K2**
CO2	Understand the Communication Process and Models	**K1, K2**
CO3	Analyse various factors in planning Integrated Marketing Communications	**K2, K5**
CO4	Explain Creative Strategies in Marketing Promotion	**K2, K4**
CO5	Analyse the role of International Advertising and Promotion	**K2, K5, K6**
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 =18 , Correlation: Moderate								

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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
PBCODE43	Discipline Specific Elective Course	MICROFINANCE MANAGEMENT	5	4

Course Objectives

1. To divulge the detailed knowledge on the Micro Finance and Self Help Group Movements in India.
2. To get the students well acquainted with Micro Credit Delivery Mechanism in India.
3. To provide insights into the Role and Management of Micro Finance Institutions and examine the Role of Micro Finance in Financial Inclusion.

Unit-I	Introduction to Microfinance	15 Hours

Microfinance – Meaning – Nature – Scope – Need - Microfinance and Poverty Alleviation - Principles of Microfinance - Micro Finance Products - Micro Credit - Micro Savings - Micro Insurance.

Unit-II	Self Help Groups Movement in India	15 Hours

Self Help Group (SHG) - Definitions - Concept – Importance - Features –Objectives – Functions - Formation –Bank Linkage Model - MFI Model.

Unit-III	Micro Finance Institutions	15 Hours

Micro Finance Institution (MFIs) - Characteristic - Objectives - Types - Models - Sources of Funds of MFIs - Credit Delivery Mechanism for Micro Credit - Non-Financial Services and MFIs.

Unit-IV	Management of Micro Finance Institutions	15 Hours

Fund Management for Micro Finance Institutions - Credit Risk Management for Micro Finance Institutions - Accounting & Reporting for Micro Finance Institutions.

Unit-V	Micro Finance and Financial Inclusion	15 Hours

Financial Inclusion - Meaning – Objectives – Need – Benefits - Process of Financial Inclusion - Reasons for Financial Exclusion - Financial Inclusion in India - Financial Inclusion Schemes in India - Role of Microfinance in Financial Inclusion.
Books for Study: 1. **Gianfranco A. Vento, Mario La Torre,** Microfinance, Palgrave Macmillan, UK, 2006 2. IIBF, Micro-Finance: Perspectives and Operations, 2008 3. **Navin Kumar Rajpal,** Microfinance and Tribal Women Entrepreneurs, Educreation Publishing, 2016. 4. **Dr. S. Thameemul Ansari, Dr. T. Mohamed Ilyas,** Self Help Group, Vijay Nicole Imprints, 2017. 5. **Sharma, P. R.** Impact of microfinance on women empowerment. Pokhara: Team Organizing Local Institution.
Books for Reference: 1. **Ledgerwood, J.** The new microfinance handbook**.** Washington, DC: The World Bank. 2. **Panda, D. K.** Understanding microfinance**.** New Delhi: Wiley India. 3. **Marguerite S. R.** The microfinance revolution. Washington, DC: The World Bank. 4. **Shah, R. K.** Microfinance in Nepal. New Delhi: Serials Publications. 5. **Agrawal, G. R.** Entrepreneurship development in Nepal. Kathmandu: MK Publishers and Distributors.
e-Resources: 1. https://www.bbau.ac.in/dept/RM/TM/Management%20of%20Microfinance%20Website%20copy.pdf 2. https://kkhsou.ac.in/eslm/ESLM_Main/5th%20Sem/Bachelor%20Degree/B.Com/English%20Medium/GCM-S5-04(FIN)%20MF/MF.pdf 3. https://www.bis.org/publ/bcbs175.pdf

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand Micro Finance and Micro Finance Products	**K2, K3**
CO2	Comprehend the detailed framework of Self-Help Groups in India	**K2, K3**
CO3	Analyse the Micro Finance Institutions and Services offered by them.	**K2, K4**
CO4	Evaluate the Credit Risk Management for Micro Finance Management and Apply the Reporting Pattern for Micro Finance Institutions	**K2, K5**
CO5	Analyse the framework for Financial Inclusion in India	**K2, K4**
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 =18, Correlation: Moderate								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCA3001	**Discipline Specific Core Course**	**CORPORATE ACCOUNTING I**	**5**	**4**

Course Objectives

1. To enable the students to acquire comprehensive knowledge on all aspects relating to corporate situation and requirement.
2. To enlighten the students to gain knowledge on accounting for share capital and preparation of final accounts of company as per the provisions of Indian Companies Act, 2013.
3. To make the students to understand the accounting concepts of valuation of Goodwill and Shares.

Unit-I	**Accounting for Issue of Shares**	**15 Hours**

Issue of Shares – Forfeiture and Re-issue of Forfeited Shares – Concept and Process of Book Building – Employee Stock Ownership Plan (ESOPs) – Issue of Rights and Bonus Shares - Sweat Equity Shares – Buyback of Shares – Stock Split.

Unit-II	***Underwriting of Shares and Redemption of Preference Shares***	**15 Hours**

Underwriting of Shares – Redemption of Preference Shares – Guidelines for Issue and Redemption of Preference shares – Redemption at Par, Premium and Discount – Redemption out of Revenue Reserve and out of Fresh Issue.

Unit-III	**Profits Prior to Incorporation**	**15 Hours**

Profits Prior to Incorporation – Meaning – Calculation of Time Ratio, Sales Ratio and Weighted Ratio – Basis for Apportionment of Expenses – Steps involved in ascertaining Pre and Post Incorporation Profits.

Unit-IV	**Final Accounts of Company**	**15 Hours**

Final Accounts of company as per the provision of Indian Companies Act 2013 – Statement of Profit and Loss – Balance Sheet – Accounting Treatment of Certain items excluding Managerial Remuneration.

Unit-V	**Valuation of Goodwill and Shares**	**15 Hours**

Valuation of Goodwill – Meaning – Need for Valuation of Goodwill – Methods of Valuing Goodwill – Average Profit - Super Profit - Annuity and Capitalization Methods. Valuation of Shares – Need for Valuation of Shares – Methods of Valuation of Shares – Net Assets - Yield and Fair Value Methods.

Note: Weightage of Marks: Theory 30% and Problems 70%

Books for Study:

6. **Shukla M.C, Grewal T.S, Gupta S.C,** Advanced Accounts, S. Chand & Co. Ltd., New Delhi.
7. **Reddy T.S & Murthy A,** Corporate Accounting, Margham Publications, Chennai.

8. **Jain S.P & Narang K.L,** Advanced Accounting, Kalyani Publishers, New Delhi.
9. **Maheshwari S.N. & Maheshwari S.K,** Corporate Accounting, Vikas Publication, New Delhi.
10. **Gupta R.L &Radhaswamy M,** Advanced Accountancy, Sultan Chand & Sons, New Delhi.

Books for Reference:

6. **Radhika P & Anita Raman**, Advanced Corporate Accounting, Mc Graw Hill Education (India) Private Ltd., Chennai.
7. **Naseem Ahmed, Ashok Sharma &Rajender Kumar**, Corporate Accounting, Ane Book Pvt. Ltd., New Delhi.
8. **Palaniappan R & Dr. Hariharan N,** Corporate Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
9. **Hanif M & Mukherjee A**., Corporate Accounting, Mc Graw Hill Education (India) Private Ltd. Chennai.
10. **Tulsian P.C. & Bharat Tulsian C.A**., Corporate Accounting, S. Chand & Co. Ltd. New Delhi

Online Resources :

https://corporatefinanceinstitute.com/
https://www.icai.org/
https://www.aicpa-cima.com/

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCA3002	**Discipline Specific Core Course**	**BUSINESS REGULATORY FRAMEWORK**	**4**	**4**

Course Objectives

1. To provide the basic knowledge on Business Legislations.
2. To highlight the essential elements of a valid Contract.
3. To enable the students to learn the concepts of Agency, Bailment & Pledge and Sale of Goods

Unit-I	**Indian Contract Act, 1872**	**12 Hours**

Law – Meaning – Objectives - Nature and Sources of Business Law - Indian Contract Act, 1872 – Classification of Contracts – Essential Elements of Contract – Legal rules as to Offer – Acceptance – Revocation of Offer and Acceptance – Consideration - Essentials and Legal rules for a Valid Consideration.

Unit-II	**Capacity of Parties and Free Consent**	**12 Hours**

Capacity of Parties - Definition - Persons Competent to Contract - Free Consent – Coercion - Undue Influence – Fraud - Misrepresentation – Mistake. Discharge of Contract - Modes – Remedies for Breach of Contract - Quasi Contract – Features – Types.

Unit-III	**Indemnity & Guarantee, Bailment & Pledge**	**12 Hours**

Indemnity and Guarantee – Meaning – Kinds of Guarantee – Rights of Surety – Discharge of Surety - Bailment – Essentials – Kinds – Duties and Rights of Bailor and Bailee – Finder of Lost Goods – Rights and Duties of Finder of Lost Goods – Pledge – Essentials – Rights and Duties of Pawnor and Pawnee.

Unit-IV	**Sale of Goods Act,1930 and Competition Act, 2002**	**12 Hours**

Sale of Goods Act, 1930 – Essentials of Contract of Sale – Sale and Agreement to Sell –Competition Act,2002 – Salient features of Competition Act – Powers of Central Government under the Competition Act – Major Provisions of the Competition Act.

Unit-V	**Contract of Agency**	**12 Hours**

Law of Agency – Essentials of an Agency – Kinds of Agent - Irrevocable Agent - Duties and Rights of an Agent- Duties and Rights of Principal – Termination of Agency.

Books for study:

1. Pillai, R.S.N. & Chand, S, Business Law, S Chand & Co, Delhi
2. Ramaswamy, K.N., Business Law, S Chand & Co, Delhi
3. Shukla, M.C, Business Law, S. Chand & Co.
4. S.S.Gulshan: Mercantile Law, Excel Books.
5. S.N.Maheswari: Business Laws, Himalaya Publications
6. S. Thameemul Ansari, Business Regulatory Framework, Mayura Publications.

Books for Reference:

1. Balachandran. V & Thothadri.S, Business Law, Vijay Nicole Imprints Pvt.Ltd. Chennai
2. Kapoor, N.D. Business Laws, Sultan Chand and Sons.
3. Sreenivasan, M.R. Business Laws, Margam Publications.
4. Dhandapani, M.V. Business Laws, Sultan Chand and Sons.
5. Badre Alam, S. & Saravanavel, P. Mercantile Law

E-Resources: www.cramerz.com www.digitalbusinesslawgroup.com http://swcu.libguides.com/buslaw http://libguides.slu.edu/businesslaw

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Evaluate the basics of Business Regulatory Framework and Indian Contract Act, 1872	**K2, K5**
CO2	Understand capacity of parties to enter into a valid contract.	**K1, K2**
CO3	Develop the knowledge on legalities of Indemnity, Guarantee, Bailment and Pledge	**K1, K2**
CO4	Understand Sale of Goods Act and Competition Act.	**K2, K3**
CO5	Comprehend the Law of Agency and discuss the Rights and Duties of Agent and Principal.	**K2, K3**
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	PSO9	PS10
CO1		✓	✓		✓	✓	✓			✓
CO2		✓	✓	✓	✓		✓			✓
CO3	✓		✓	✓	✓	✓	✓			✓
CO4		✓	✓		✓	✓	✓	✓		✓
CO5			✓	✓	✓	✓	✓	✓		✓
Number of matches 33=, Correlation: Very High										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCA3003	**Discipline Specific Core Course**	**MODERN MARKETING**	**4**	**4**

Course Objectives

1. To impart knowledge on various Functions, Concepts and Approaches of Marketing.
2. To enlighten students about Marketing Environment and its significance.
3. To create awareness among students about recent developments in Marketing.

Unit-I	**Modern Marketing**	**12 Hours**

Marketing – Meaning – Definition – Features – Functions - Marketing vs Selling – Concepts of Marketing – Approaches – Features of Modern Marketing – Marketing Mix - Elements.

Unit-II	***Marketing Environment***	**12 Hours**

Marketing Environment – Meaning – Types - Demographic – Economic – Natural – Political – Legal and Socio-cultural Environment – Market Segmentation - Bases of Segmentation.

Unit-III	**Marketing Research and Sales Forecasting**	**12 Hours**

Marketing Research – Meaning – Benefits – Process – Challenges – Marketing Information System – Benefits of MIS – Sales Forecasting – Benefits – Methods – Sales Manager – Qualities of a Successful Sales Manager.

Unit-IV	**Branding and Packaging**	**12 Hours**

Branding – Meaning – Advantages – Disadvantages – Brand Positioning – Brand Image. Packaging – Objectives – Functions – Essentials of Good Packaging.

Unit-V	**Digital Marketing**	**12 Hours**

Digital Marketing – Meaning – Features – Advantages – Disadvantages – Traditional Marketing vs E-Marketing – Social Media Marketing - Mobile Marketing – Services Marketing – Green Marketing – Sustainability Marketing Strategies - Rural Marketing – Features – Challenges in Rural Marketing.

Books for study:

1. R.S.N. Pillai & Bagavathi, Modern Marketing, S. Chand & Co. Ltd., New Delhi.
2. J. Jayasankar, Marketing, Margham Publications, Chennai.
3. Rajan Nair, Marketing, Sultan Chand & Sons, New Delhi.
4. C.B. Gupta, Marketing Management – Text & Cases, Sultan Chand & Sons, New Delhi.
5. Rajan Saxena, Marketing Management, Tata McGraw Hill, Chennai.

Books for Reference:

1. Philip Kotler & Gary Armstrong, Principles of Marketing, Pearson Education, New Delhi
2. Roberto G. Mendia, Principles of Marketing, Rex Printing Company
3. Dr. RL Varshney & Dr. SL Gupta, Marketing Management, Sultan Chand & Sons, New Delhi.
4. Kotler, Kartajaya and Setiawan, Marketing 4.0: Moving from Traditional to Digital, Wiley, Canada.
5. J.C. Gandhi, Marketing Management, Tata McGraw Hill, Noida.

E-Resources:

www.study.com, www.investopedia.com
www.cramerz.com www.digitalbusinesslawgroup.com
http://swcu.libguides.com/buslaw
http://libguides.slu.edu/businesslaw

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Case Study

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the features of Modern Marketing	K1, K2
CO2	Analyse Marketing Environment	K1, K4
CO3	Comprehend the process of Marketing Research and Forecast Sales	K1, K2, K3
CO4	Appraise significance of Branding and Packaging	K2, K5
CO5	Evaluate the significance of Digital Marketing	K2, 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**	**PSO 9**	**PS1O**
CO1	✓	✓	✓	✓			✓	✓		✓
CO2	✓	✓	✓				✓			✓
CO3	✓	✓	✓	✓	✓		✓	✓		✓
CO4	✓	✓	✓	✓		✓	✓	✓		✓
CO5	✓	✓	✓	✓		✓	✓	✓		✓
	Number of matches **= 36,** Correlation: **Very High**									

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	**1-12**	**13-24**	**25-28**	**29-50**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCAAL31	**Other Elective Course**	**STATISTICS WITH COMPUTER APPLICATIONS – I**	**5**	**4**

COURSE OBJECTIVES

1. To make the students learn basic concepts of statistics.
2. To develop computerized data presentation skills.
3. To familiarize the students with methods of computing Central Tendency.
4. To understand measures of Dispersion.
5. To understand measures of Skewness.

UNIT-I	**INTRODUCTION OF STATISTICS**	**15 Hours**

Introduction to Statistics: Origin, Meaning, Scope, Statistics as Science or Art - Functions – Sources of Statistical Data: Primary and Secondary data – Collection of Primary Data – Collection of Secondary Data - Data Collection by NSSO and CSO – **Online Data Collection:** Uses and Tools – Usage of Google Forms – **Classification and Tabulation of Data:** Meaning and Definition – Characteristics – Methods of Classification, Frequency Distribution, Simple and Manifold Tabulation.

UNIT-II	**COMPUTERIZED PRESENTATION OF STATISTICAL DATA**	**15 Hours**

Diagrammatic & Graphical Presentation of Data: Meaning, Importance and Limitations of Diagrams and Graphs – Types of Diagrams & Graphs – Preparation and Presentation of Line Diagrams, Bar Diagram, Multiple Bar Diagram and Pie Diagram, Histogram, Frequency Polygon and Ogives Using Ms – Excel.

UNIT-III	**MEASURES OF CENTRAL TENDENCY / AVERAGES**	**15 Hours**

Meaning and Definition – Objectives and Functions of Averages – Types of Averages – Calculation of Averages using Vital Statistics Data – Arithmetic Mean, Median and Mode – Weighted Arithmetic Mean – Excel Statistical functions for Averages.

UNIT-IV	**MEASURES OF DISPERSION**	**15 Hours**

Meaning and Definition – Objectives of Measuring Variation – Concepts – Requirements of Good Measures of Dispersion - Types of Dispersion – Range, Quartile Deviation, Mean Deviation and Standard Deviation – Excel functions for Measuring Deviations.

UNIT-V	**MEASURES OF SKEWNESS**	**15 Hours**

Meaning and Definition – Types of Skewness – Karl Pearson's Coefficient of Skewness – Bowley's Coefficient of Skewness – Excel Functions for Skewness.

Weightage of Marks: Theory 30% and Problems 70%

Books for Study:

1. R.S.N. Pillai and V.Bhagavathi, Statistic – S.Chand Publication.2019
2. S.L. Aggarwal & S.L. Bhardwaj, Business Statistics - Kalyani Publishers.2018
3. P.R. Vittal , Business Statistics - Margham Publications.2020
4. S.P. Gupta, Statistical Methods - Sultan Chand Publications.2021

Books for Reference :

1. S.P. Gupta, Statistical Methods - Sultan Chand Publications.
2. P.R. Vittal , Business Statistics - Margham Publications.

3. B.N.Asthana, Elements of statistics – Chaitanya Publishing House, Allahabad. **4.** Richard Levin & David Rubin, Statistics for Management – Prentice Hall.
E- Resources www.study.com, http://swcu.libguides.com/

Methodology of Teaching:

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

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Analyse the methods of data Collection and classification of Statistical Data.	**K2, K3**
CO2	Build, organize and administer databases using the Ms-Excel.	**K2, K3**
CO3	Present the data in the form of Diagrams and Graphs using Ms-Excel.	**K2, K3**
CO4	Summarize the data by using measures of Central Tendency and Dispersion	**K2, K3**
CO5	Compute the Measures of Skewness.	**K2, K3**
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**	**PSO9**	**PS10**
CO1					✓	✓	✓			✓
CO2	✓				✓	✓	✓	✓		✓
CO3	✓	✓			✓	✓	✓			✓
CO4			✓		✓	✓	✓			✓
CO5					✓	✓	✓			✓
Number of matches **= 25** , Correlation**: High**										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	**1-12**	**13-24**	**25-28**	**29-50**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCAAL32	**Other Elective Course**	**Allied - BUSINESS ECONOMICS**	**4**	**3**

Course Objectives

1.To familiarize students with basic concepts in Economics.
2.To acquaint students with various laws of Economics, Demand and Supply.
3.To enlighten students on various application of economics Theories and National Income

Unit-I	**Introduction**	**12 Hours**

Business Economics – Definition – Characteristics – Importance – Scope – Differences between Micro Economics and Macro Economics – Roles and Responsibilities of a Business Economist – Economic System and its Types.

Unit-II	***Utility Analysis and Market Structure***	**12 Hours**

Utility - Meaning – Characteristics – Cardinal – Ordinal – 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.

Unit-III	**Demand and Supply**	**12 Hours**

Demand – Definition – Characteristics – Types of Demand - Factors determining Demand – Law of Demand - Elasticity of Demand – Types - Supply – Law of Supply – Factors affecting Supply - Elasticity of Supply – Determinants of Elasticity of Supply.

Unit-IV	**Production and Cost Functions**	**12 Hours**

Production – Factors – Production Function – Iso-quants - Law of Variable Proportions –Economies of Scale – Break-Even Analysis. Cost and Revenue Functions – Types – Short Run – Long Run – Areas of Cost Control.

Unit-V	**Profit Theories and National Income**	**12 Hours**

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.

Books for study:

6. Sankaran S, Business Economics, Margham Publications, Chennai.2017
7. Ahuja H.L, Business Economics, S.Chand& Co. Ltd., New Delhi.2019
8. Ray, N.C, An introduction to Microeconomics, Macmillan Company of India Ltd: New Delhi.2021
9. ManabAdhikary, Anurag , Business Economics, Jain Publishers, New Delhi, 2008.
10. Datt, R. and K.P.M. Sundharam , “Indian Economy”, S. Chand & Company Ltd., New Delhi.2018

Books for Reference:

1. Agarwal M.D, and Som Deo, Business Economics, Ramesh Book Depot, New Delhi.
2. Mehta P.L, Managerial Economics, Sultan Chand & Sons., New Delhi

Mithani, D.M, Managerial Economics – Theory and Application, Himalaya Publishing House Pvt. Ltd., Mumbai.

3. Varian H.R, Intermediate Microeconomics: A Modern Approach‖, East West Press Pvt., Ltd, New Delhi, Eighth Edition, 2015.
4. Ahluwalia, I.J. and I.M.D. Little (Eds.) (1999), India's Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New Delhi.

E-Resources:
www.study.com, www.investopedia.com
www.cramerz.com www.digitalbusinesslawgroup.com
http://swcu.libguides.com/buslaw
http://libguides.slu.edu/businesslaw

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the discipline of business economics, micro and macro economic aspects.	**K2**
CO2	Explain law of diminishing marginal utility and law of equi–marginal utility.	**K1,K2**
CO3	Comprehend demand, supply, types and factors that influence of demand and supply.	**K2,K3**
CO4	Evaluate the production and cost analysis, law of variable of proportions and break-even analysis.	**K2,K3**
CO5	Develop the skills to use theories of profit and provide an idea regarding national income and its welfare.	**K2,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	PSO9	PS10
CO1	✓			✓	✓		✓			✓
CO2	✓			✓	✓		✓			✓
CO3	✓			✓	✓		✓	✓		✓
CO4	✓			✓	✓		✓	✓		✓
CO5	✓			✓	✓		✓	✓		✓
Number of matches =**28,** Correlation: **High**										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER – III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCANM31	**Other Elective Course**	**INDIAN CONSTITUTION**	**4**	**2**

COURSE OBJECTIVES

1. To understand origin and nature of Indian Constitution
2. To familiarize 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

Unit-I	**ORIGIN AND NATURE OF THE CONSTITUTION**	**12 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**	**12 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**	**12 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**	**12 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**	**12 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 Basu, D.D. Introduction to the Constitution of India, LexisNexis Butter worths2008. Pylee,M.V. India's Constitution, S.Chand & Company, New Delhi, 2005. 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
E-Resources: www.study.com, www.investopedia.com www.cramerz.com www.digitalbusinesslawgroup.com http://swcu.libguides.com/buslaw http://libguides.slu.edu/businesslaw

Methodology of Teaching:

- **Chalk and Talk, ICT Presentation, Video lectures, Assignments on Case Study**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Discuss the nature of Indian Constitution	**K2, K3**
CO2	Explain the functions of Union and State Executive	**K2, K3**
CO3	Describe the functioning of Union & State legislature	**K2, K3**
CO4	Elaborate the functions of Supreme Court and High Courts	**K2, K3**
CO5	Analyze the features of Local Self Government	**K2, K3**
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	PSO9	PS10
CO1					✓	✓	✓			✓
CO2					✓	✓	✓			✓
CO3					✓	✓	✓			✓
CO4					✓	✓	✓			✓
CO5					✓	✓	✓			✓
Number of matches **= 20 ,** Correlation: **Moderate**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER – III

COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
UBCANM32	Other Elective Course	INTERNATIONAL BUSINESS	4	2

Course Objectives

1. To Make the Students Acquaint with Basics of International Business.
2. To Make the Students Familiar with International Trade
3. To Give Awareness on International Finance.
4. To Familiarize the Operations of International Business & Trade.
5. To Understand the Contribution of India in International Trade & Business.

Unit-I	INTRODUCTION TO INTERNATIONAL BUSINESS	12 Hours

Introduction To International Business - Impact of Globalization – Comparison of International Business with Domestic Business - Modes of Entry into International Business. International Business Environment - Global Trading Environment – Recent Trends World Trade - Trends in India's Foreign Trade.

Unit-II	INTERNATIONAL TRADE AND ORGANIZATIONS	12 Hours

International Trade - Commercial Policy Instructions – Balance of Payment Account and Its Components - International Organizations and Arrangements – WTO – UNCTAD - WORLD BANK – IMF - ADB.

Unit-III	INTERNATIONAL FINANCE	12 Hours

Regional Economic Co-Operation - Forms of Regional Groupings - International Financial Environment - International Financial System and Institutions - Foreign Exchange Markets and Risk Management - Foreign Investments – Types and Flows - Foreign Investment in Indian Perspective; FDI – FII.

Unit-IV	INTERNATIONAL BUSINESS OPERATIONS	12 Hours

Organizational Structure for International Business Operations - Key Issues Involved in Making International Production, Finance Marketing, And Human Resource Decisions - Developments and Issues in International Business - Outsourcing and Its Potentials for India - Role of IT In International Business

Unit-V	**INTERNATIONAL BUSINESS AND INDIA**	**12 Hours**

International Business and Ecological Considerations - Foreign Trade Promotion Measures In India - And Foreign Trade Promotion Organizations In India - Special Economic Zones (SEZS) And 100% Export Oriented Units (EOUS) - Measures For Promoting Foreign Investments In India - Financing Foreign Trade And Payment Terms.

Books for Study.

1. International Business – Sonia Gupta, McGraw-Hill Education, New Delhi.2020
2. Fundamentals Of International Business –Sumati Varma – Pearson Education, Noida.2018
3. International Business – Nidhi Gautham, Vayu Education of India, New Delhi.2019
4. International Business & Environment - Dr. S. Sankaran, Margham Publications, Chennai.2021
5. International Business Dr. R. Chandran, Jaico Publishing House, Chennai.2021

Books for Reference.

1. International Business - Charles W. L. Hill, G.Tomas M.Hult, Rohit Mehtani, Mcgraw Hill Education, New Delhi.2019
2. **International Business - C.B. Gupta, S Chand & Co Ltd, New Delhi.2020**
3. **International Business – Aswathappa K,** Mcgraw-Hill Education, New Delhi.2019
4. **International Business Mangemnt -** F.L. Bascunan, Global Academic Publishers, New Delhi.2018
5. **International Business Mangemnt – N Venkateswaran New Age International Publishers,Chennai.2019**

e-Resources

https://www.internationalrelationsedu.org/

https://www.dgft.gov.in/

https://commerce.gov.in/

Methodology of Teaching:

- **Chalk and Talk, ICT Presentation, Video lectures, Assignments on Case Study**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Introduction to International Business	**K1, K2**
CO2	Explain International Trade	**K2**
CO3	Discuss International Finance.	**K3**
CO4	Describe Operations of International Business & Trade.	**K4**
CO5	Enumerate Contribution of India in International Trade & Business.	**K4**
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	PSO9	PS10
CO1	✓		✓	✓	✓	✓	✓			✓
CO2	✓		✓	✓	✓	✓	✓	✓		✓
CO3	✓		✓	✓	✓	✓	✓	✓		✓
CO4	✓		✓	✓	✓	✓	✓			✓
CO5	✓		✓	✓	✓	✓	✓	✓		✓
Number of matches **=38** , Correlation: **Very High**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER – III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCANM33	**Other Elective Course**	**DATA SCIENCE FOR BUSINESS**	4	2

Instructional objectives

1. To provide knowledge on DATABASE
2. To explore fundamentals of data science
3. To acquaint with Technologies of Data Science.
4. To familiarize with Business Applications of Data Science.
5. To disseminate knowledge on Business Data Science software Applications.

Unit-I	**INTRODUCTION TO DATABASE**	**15 Hours**

Data – Information – Database – Features Of Database – Structure Of Database – Data Models – Types Of Data Models – Hierarchical Model – Network Model – Relational Model – ER Model – DBMS – Features Of DBMS – Components Of DBMS.

Unit-II	**INTRODUCTION TO DATA SCIENCE**	**15 Hours**

Introduction To Data Science – Definition And Meaning Of Data Science – Features Of Data Science - Data Science In Various Fields - Impact Of Data Science – Data Warehousing – Data Mining – Cloud Services - SAAS

Unit-III	**DATA SCIENCE RELATED TECHNOLOGY**	**15 Hours**

Technologies Related to Data Science - Artificial Intelligence – Augmented Reality – Virtual Reality - Big Data – Machine Learning – Decision Intelligence – Block Chain – Internet of Things(IOT)

Unit-IV	**BUSINESS APPLICATIONS OF DATA SCIENCE**	**15 Hours**

Data Science Applications in Business – Business Analytics – Financial Analytics – Marketing Analytics – Manufacturing Analytics - Business Intelligence – Predictive Analytics

Unit-V	**DATA SCIENCE SOFTWARE USED IN BUSINESS.**	**15 Hours**

PYTHON - AWS – MATLAB – TABLEAU – SQL - MS EXCEL - Benefits of Data Science in Business and Management

Books for Study

1. Data Science for Business – Foster Provest and Tom Fawcett, Shroff Publications, Mumbai. 2020
2. Data Science – Chandrika Jaini Vedam, BPB Publications, Noida.2018
3. Data Science and Machine Learning - Dr. N Meenakshi, Repro Books Ltd, Mumbai2021
4. Data Science and Analytics – VK Jain, Khanna Publishing.2019
5. Data Science – Swetha Mittal, Goyal Brothers Prakashan, Noida 2021.

Books for Reference

1. Database System Concepts - Abraham Silberschatz, Henry FKorth, & S Sudasrhan, TMH, Chennai2021

2. Data Mining and Business Intelligence – Dr. Abhishek Swaroop, Bhavya Books, New Delhi.2020
3. Data Science Uncovering Reality – Pulkit Bansal, Notion Press, Chennai.2021
4. Business Analytics – James Evans, Pearson, New Delhi.2021
5. Business Analytics – Purba Halady Rao,PHI, New Delhi2019

E-Resources

https://www.ibm.com/

https://www.oracle.com/

https://www.datacamp.com/

Methodology of Teaching:

- **Chalk and Talk, ICT Presentation, Video lectures, Assignments on Case Study**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Introduced to DATABASE	**K1**
CO2	Familiarized with basics of Data Science	**K2,K3**
CO3	Understand Data Science Technologies.	**K2**
CO4	Learns Data Science Uses in Business.	**K3**
CO5	Discuss on Data Science Software Applications in Business	**K4**
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	PSO9	PS10
CO1			✓	✓	✓		✓			✓
CO2			✓	✓	✓		✓			✓
CO3			✓	✓	✓		✓			✓
CO4			✓	✓	✓	✓	✓	✓		✓
CO5			✓	✓	✓	✓	✓	✓		✓
Number of matches = **29,** Correlation: **Very High**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER – III				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
UBCASEP3	Skill Enhancement Lab	DATABASE MANAGEMENT SYSTEM – LAB	3	3

COURSE OBJECTIVES

1. The objective of the course is to present an introduction to database management systems, with an emphasis on hands-on experience in how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.
2. To disseminate knowledge of DBMS & System Analysis

LAB EXERCISE – 1	TABLE CREATION	5 Hours

1. The Structure of the Table is given below. Using that structure, create the ‘ emp’ table and insert 15 values in it (use SQL)

Name	Type	Constraint
EMPNO	NUMBER(4)	PRIMARY KEY
ENAME	VARCHAR2(10)	
JOB	VARCHAR2(9)	
MGR	NUMBER(4)	
HIREDATE	DATE	
SAL	NUMBER(7,2)	
COMM	NUMBER(7,2)	
DEPTNO	NUMBER(2)	FOREIGN KEY REFERENCES “dept”

LAB EXERCISE – 2	TABLE MANIPULATION	6 Hours

2. Create the 'dept' table and insert 5 values in it [using the following structure]

Name	Null?	Type
DEPTNO	NOTNULL	NUMBER(2)
DNAME		VARCHAR2(14)
LOC		VARCHAR2(13)

LAB EXERCISE – 3	WORKING WITH SQL QUERRIES	6 Hours

3. From the above [1 & 2], Execute the following Queries using 'emp' and 'dept' tables in SQL
   - Display all details of the employees
   - List the entire distinct job in employee
   - Find all the sales people in department 30 whose salary is greater than or equal to 1500
   - Find name, job, salary of employees whose job is manager or salary is greater than or equal to 3000
   - Find the employees earning between 1200 and 1300
   - List jobs and departments of employees whose name start with M
   - List the average salary in each dept
   - List the employees whose salary exceeds their manager

LAB EXERCISE – 4	USING DDL, DML, DQL COMMANDS	6 Hours

4. Create a table client-master with the following fields: client no, name, address, client state, pin code, remarks, bal due with suitable data types.
   a) Create another table supplier table from client master. Select all the fields a rename client no with supplier no and name with supplier name.
   b) Insert data into client master
   c) Insert data into supplier master from client master.
   d) Delete the selected row in the client master.

LAB EXERCISE – 5	TABLE CREATION WITH CONSTRAINTS ALTERAION	6 Hours

5. Create a table sales order with s_order_no and product no as primary key.
   Some other fields to store client number, delivery address, delivery date, order status.
   a) Add a new column for storing salesman number using ALTER Command.
   b) Set the s order no as foreign key as column constraints.
   c) Set the s order no as foreign key as table constraints.
   d) Enforce the integrity rules using CHECK.

LAB EXERCISE – 6	MASTER TABLE	5 Hours

6. Create a Table Student Master with the following fields- NAME, REG. NO. Department With suitable data types. Use Select Command to do the following.

i. Select the student's name column. **ii.** Eliminate the duplicate entry in table. **iii.** Sort the table using order by clause. **iv.** Select the student using group by clause.		
LAB EXERCISE – 7	**SQL BLOCKS**	**5 Hours**
7. Create a table of your own with essential fields and execute the following functions in SQL: **i.** Any 4 group functions **ii.** Any 4 numeric function		
LAB EXERCISE – 8	**SQL FUNCTIONS**	**5 Hours**
8. Create a table of your own with essential fields and execute the following functions in SQL: i. Any 4 string functions ii. Date functions and conversion functions		
Books for Study 1. Alexis lean, Mathews Leon, Essential of DBMS, Vijay Nicole .2014 2. Singh-Database systems: Concepts, Design & applications, Pearson Education.2010 3. Jhon Day, Craig Van Slyke "Starting with Oracle.2019		
Books for Reference 1. Database System Concepts - Abraham Silberschatz, Henry FKorth, & S Sudasrhan, TMH, Chennai 2017 2. Management Information system – Indrajith Chatterji, PHI, New Delhi 2016 **E Resources** **https://www.ibm.com/** **https://www.oracle.com/**		

Methodology of Teaching:

- **ICT Presentation,**
- **Video lectures**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Describe the fundamental elements of relational database management systems	**K2**
CO2	Explain the basic concepts of relational data model, entity-relationship model, Relational database design,	**K3**

	relational algebra and SQL.	
CO3	Design ER-models to represent simple database application scenarios.	**K4**
CO4	Convert the ER-model to relational tables, populate relational database and Formulate SQL queries on data.	**K4**
CO5	Improve the database design by normalization	**K4**
CO6	Familiar with basic database storage structures and access techniques: File and Page organizations, indexing methods including B tree, and hashing.	**K2**
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	PSO9	PS10
CO1			✓	✓			✓	✓		✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓		✓	✓		✓
CO4	✓	✓	✓	✓	✓		✓	✓		✓
CO5	✓		✓		✓		✓	✓		✓
Number of matches = **36 ,** Correlation: **Very High**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	**1-12**	**13-24**	**25-28**	**29-50**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCA4001	**Discipline Specific Core Course**	**CORPORATE ACCOUNTING II**	**5**	**4**

Course Objectives

1. To make the students understand the concepts of Accounting for Corporate Restructuring.
2. To familiarize the students about Alteration of Share Capital and Internal Reconstruction.
3. To equip the students with knowledge of Liquidation Accounting, Accounts of Banking Companies and Accounting for Price Level Changes.

Unit-I	**Accounting for Corporate Restructuring**	**15 Hours**

Corporate Restructuring – Meaning of Amalgamation, Absorption, External Reconstruction and Merger (AS14) – Purchase Consideration – Computation of Purchase Consideration – Entries in the books of Transferor and Transferee – Preparation Amalgamated Balance Sheet (Excluding Inter-Company Holdings)

Unit-II	**Alteration of Share Capital and Internal Reconstruction**	**15 Hours**

Alteration of Share Capital of Company – Internal Reconstruction – Internal Reconstruction Vs External Reconstruction – Procedure for Reducing Share Capital – Accounting Entries – Capital Reduction Account – Preparation of Post Reconstruction Balance Sheet

Unit-III	**Liquidation Accounting**	**15 Hours**

Liquidation - Meaning – Modes of Winding up or Liquidation – Circumstances in which Company may be wound up by the Tribunal – Order of Payment – Secured Creditors – Preferential Creditors – Statement of Affairs – Deficiency or Surplus Accounts – Liquidator's Final Statement of Account.

Unit-IV	**Accounts of Banking Companies**	**15 Hours**

Accounts of Banking Companies – Meaning – Preparation of Profit and Loss Account and Balance Sheet with Relevant Schedules (New Method) – Non-Performing Assets (NPA).

Unit-V	**Accounting for Price Level Changes**	**15 Hours**

Meaning– Limitation of Historical Cost Accounting – Methods or Techniques of Price Level Accounting – Current Purchasing Power Technique (CPP) – Computation of Gain or Loss on Monetary Items – Valuation of Cost of Sale and Closing Inventory - Current Cost Accounting Technique (CCA) - Cost of Sales Adjustment (COSA) – Monetary Working Capital Adjustment (MWCA).

Note: Weightage of marks: Theory 30% and Problems 70%

Books for Study:

6. **Shukla M.C, Grewal T.S, Gupta S.C,** Advanced Accounts, S. Chand & Co. Ltd., New Delhi.2018
7. **Reddy T.S & Murthy A,** Corporate Accounting, Margham Publications, Chennai,2020
8. **Jain S.P & Narang K.L,** Advanced Accounting, Kalyani Publishers, New Delhi.2019

9. **Maheshwari S.N. & Maheshwari S.K,** Corporate Accounting, Vikas Publication, New Delhi.2021
10. **Gupta R.L &Radhaswamy M,** Advanced Accountancy, Sultan Chand & Sons, New Delhi.2017

Books for Reference:

6. **Radhika P & Anita Raman**, Advanced Corporate Accounting, Mc Graw Hill Education (India) Private Ltd., Chennai
7. **Naseem Ahmed, Ashok Sharma &Rajender Kumar**, Corporate Accounting, Ane Book Pvt. Ltd., New Delhi.
8. **Palaniappan R & Dr. Hariharan N**, Corporate Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
9. **Hanif M & Mukherjee A**., Corporate Accounting, Mc Graw Hill Education (India) Private Ltd. Chennai.
10. **Tulsian P.C. & Bharat Tulsian C.A**., Corporate Accounting, S. Chand & Co. Ltd. New Delhi.

E-Resources:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand accounting for corporate restructuring.	**K2, K3**
CO2	Imbibe the techniques of recording transactions in the books of Transferor Company and Transferee Company.	**K2,K3**
CO3	Prepare accounts related to Alteration of Share Capital and Reduction of Share Capital.	**K2, K3**
CO4	Explain the concept of liquidation of companies.	**K2,K3**
CO5	Prepare statement of affairs and liquidator's final statement of accounts.	**K2,K3**
CO6	Draft final accounts of banking companies.	**K2, K3**
CO7	Describe the concept and techniques of inflation accounting.	**K2,K3**
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	PSO9	PS10
CO1	✓	✓		✓	✓	✓		✓		✓
CO2	✓	✓		✓	✓	✓		✓		✓
CO3	✓	✓		✓	✓	✓		✓		✓
CO4	✓	✓		✓	✓	✓		✓		✓
CO5	✓	✓		✓	✓	✓		✓		✓
Number of matches **=35 ,** Correlation: **Very High**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
UBCA4002	Discipline Specific Core Course	COMPANY LAW	4	4
Course Objectives				
1. To make the students understand the concepts and contents of Indian Companies Act, 2013. 2. To disseminate knowledge on types of Companies, Memorandum of Association and Articles of Association. 3. To teach the students about the Qualification of Directors, Powers and their Duties.				
Unit-I	**Introduction to the Companies Act, 2013**			**12 Hours**
Company – Meaning - Definition - Characteristics – Advantages – Limitations – Types – Private Company Vs Public Company – One Person Company (OPC) - Limited Liability Partnership (LLP).				
Unit-II	**Memorandum, Articles of Association and Prospectus**			**12 Hours**
Formation of a Company – Promotion – Functions of a Promoter – Memorandum of Association – Meaning – Contents – Purpose – Articles of Association – Contents – Distinction between Memorandum and Articles of Association - Prospectus – Contents - Statement in Lieu of Prospectus.				
Unit-III	**Shares and Debentures**			**12 Hours**
Share Capital - Kinds of Shares - Sweat Equity Shares and ESOPs - Rights Issue and Bonus Shares- Buyback of Securities – Debentures – Types - Differences between Shares and Debentures.				
Unit-IV	**Directors and Shareholders**			**12 Hours**
Members of a Company – Members Vs Shareholders – Shareholders' Democracy - Powers - Directors of a Company – Definition – Qualification – Disqualification - Number of Directorships – Appointment of Directors – Removal of Directors – Independent Directors – Rights - Duties and Responsibilities.				
Unit-V	**Meetings, Resolutions& Winding up of Company**			**12 Hours**

Meetings – Meaning – Kinds – Resolutions – Types - Resolution requiring Special Notice – Winding-up – Meaning - Modes of Winding-up - Powers and Consequences
Books for study: 1. N.D. Kapoor, Company Law and Secretarial Practice, Sultan Chand 2.Vijay Gupta, K.G. Garg, Company Law, Kalyani Publishers, New Delhi. 3. M.C. Shukla and S.S. Gulshan - Principles of Company Law-S. Chand & Co., 4. A.K. Mujumdar,Dr. G.K. Kapoor, Taxmann's Company Law & Practice, Taxmann Publications Pvt. Ltd., New Delhi. 5. L. Santhi, Company Law (As per Companies Act, 2013), Margham Publications.
Books for Reference: 1. Ganesan, Company Law and Secretarial Practice, Rainbow Publications.2017 2. Kathiresan & Radha, Company Law and Secretarial Practice, Prasana Chand & Co 2018 3. Sherlekar, Secretarial Practice, Himalaya Publishers,2020 4. Pattan Shetti, Company Law and Secretarial Practice, S. Chand and Co.2019 5. V. Balachandran & M. Govindarajan, A Student Handbook on Company Law and Practice, Vijay Nicole Imprints Pvt. Ltd.2021
E-Resources: 1. http://www.clb.nic.in/ 2. http://www.companiesact.in/ 3. http://www.mca.gov

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts, characteristicsand different kinds Companies.	**K2**
CO2	Create the Knowledge on the memorandum of Association, Articles of Associationand Prospectus of a Company	**K6**
CO3	Knowledgeon the types of Shares and Debentures	**K1**
CO4	Evaluate the qualifications, appointment of Directors and their rights, duties.	**K5**
CO5	Analysethe types of Meetings and Resolutions of a Company	**K4**
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	PSO9	PS10
CO1			✓	✓	✓	✓		✓		✓
CO2	✓	✓			✓	✓				✓
CO3		✓	✓		✓	✓	✓			✓
CO4	✓	✓		✓	✓	✓	✓	✓		✓
CO5	✓		✓		✓	✓				✓

Number of matches **= 29,** Correlation: **Very High**

Mapping Correlation Benchmark

Mapping	**1-30%**	**31-60%**	**61-70%**	**71-100%**
Matches	**1-12**	**13-24**	**25-28**	**29-50**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCA4003	**Discipline Specific Core Course**	**MODERN BANKING**	**4**	**4**
Course Objectives				
1. To impart knowledge to students on different types of Banks in India. 2. To enlighten students about the functions of different Banks. 3. To create awareness among students about recent developments in Banking.				
Unit-I	*Introduction to Banking*			**12 Hours**
Banking – Definition – Importance – Role of Banks in Economic Development - Types of Banks – Functions of Commercial Banks.				
Unit-II	*Development Banks and Central Banks*			**12 Hours**
Development Banks – Functions of Development Banks – NABARD – Functions of NABARD – Cooperative Banks – Land Development Banks - Central Bank – Meaning – Functions – Reserve Bank of India – Functions – Credit Control Techniques – Quantitative Credit Control Techniques – Qualitative Credit Control Techniques.				
Unit-III	**Banker and Customer**			**12 Hours**
Relationship between Banker and Customer – Rights of Banker and Customer – Obligations of Bankers and Customers – Dishonour of Cheque – Causes - Garnishee Order – Know Your Customer (KYC).				
Unit-IV	**E – Banking**			**12 Hours**
E-Banking – Benefits and Limitations – Mobile Banking – Fund Transfers – NEFT – RTGS – IMPS – UPI – e-Cheque – EFTPOS.				
Unit-V	**Payment Banks & Issues in Banking**			**12 Hours**
Payment Banks – Features – Functions - Advantages – Limitations – Different Payment Banks in India – Differences between Traditional Banks and Payment Banks - Contemporary Issues in Banking – Customer Grievances and Redressal – Banking Ombudsman.				
Books for study: 1. Santhanam, Banking and Financial Services, Margham Publications, Chennai 2. Natarajan S, Dr. R. Parameswaran, Indian Banking, S. Chand, New Delhi. 3. D. Muraleedharan, Modern Banking – Theory and Practice, Prentice Hall of India, New Delhi. 4. Gordon & Natarajan, Banking Theory, Law and Practice, Himalaya Publishing House, New Delhi. 5. S. Gurusamy, Banking Theory, Law & Practice, Vijay Nicole Imprints Private Limited, Chennai.				

Books for Reference: 1. Sundharam & Varshney, Banking Theory, Law & Practice, Sultan Chand & Sons, New Delhi. 2. R. Machiraju, Modern Commercial Banking, New Age International Publishers, Mumbai. 3. K.P.M. Sundaram, E.M. Sundaram, Modern Banking, Sultan Chand & Sons Ltd., New Delhi. 4. Dr. V. Balu, Banking and Financial System, Sri Venkateswara Publications, Chennai 5. Prof. D. Surya Chandra Rao, Banking Reforms in India, Regional Publications, New Delhi.
E-Resources: www.rbi.org.in www.study.com, http://swcu.libguides.com/ www.investopedia.com

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand different types of Banks and Analyse the role of banks	K1, K2, K4
CO2	Understand functions of Banks	K1, K2
CO3	Analyse the relationship between Banker and Customer	K2, K4
CO4	Assess the benefits of e-Banking	K2, K5
CO5	Evaluate the benefits of Payment Banks	K2, 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	PSO9	PS10
CO1		✓	✓			✓				✓
CO2		✓	✓			✓				✓
CO3		✓	✓	✓	✓	✓	✓			✓
CO4		✓	✓		✓	✓				✓
CO5		✓	✓	✓	✓	✓	✓			✓
Number of matches = **27,** Correlation: **High**										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	**1-12**	**1p3-24**	**25-28**	**29-50**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER – IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCAAL41	**Other Elective Course**	**STATISTICS WITH COMPUTER APPLICATIONS – II**	**5**	**4**

COURSE OBJECTIVES

1. To familiarize with Statistical Analysis Softwares
2. To understand and compute Correlation and Regression
3. To acquaint with Time Series Analysis
4. To know how to compute Index Numbers

UNIT-I	**COMPUTER APPLICATIONS IN STATISTICS**	**15 Hours**

Introduction to Statistical Analysis Software – **SPSS:** Introduction, Features and Uses, **Stata:** Introduction, Features and Uses, **MATLAB:** Introduction, Features and Uses, **R.:** – Meaning, Features and Uses **(Theory Only)**

UNIT-II	**CORRELATION ANALYSIS**	**15 Hours**

Meaning, Types, Merits and Limitations of correlation – Methods of studying correlation – Scatter Diagram – Karl Pearson's Coefficient of Correlation (Un grouped Data)– Spearman's Rank correlation – Usage of SPSS in Correlation Analysis.

UNIT-III	**REGRESSION ANALYSIS**	**15 Hours**

Meaning, Importance, Limitations – Differences between Correlation and Regression – Regression Equations – Deviation taken from Arithmetic Mean and Assumed Mean – Usage of SPSS and R. in Regression Analysis.

UNIT-IV	**TIME SERIES ANALYSIS**	**15 Hours**

Meaning, Need and Components of Time series – Different Methods of Measuring Trend – Free Hand Method, Semi-Average Method, Moving Average Method and Method of Least Squares – Seasonal Indices by Simple Average Method – Usage of SPSS and R. in Time Series Analysis.

UNIT-V	**INDEX NUMBERS**	**15 Hours**

Meaning, Uses and Methods of construction Index Numbers – Types – Unweighted and Weighted Index Numbers – Laspeyre's Method, Paasche's Method, Dorbish and Bowley's Method, Fisher's Ideal Index Method and Marshall Edge-worth Method – **Test of Consistency**: Time Reversal Test and Factor Reversal Test – Usage of SPSS and R. to compute Index Numbers.

Weightage of Marks: Theory 30% and Problems 70%

Books for Study:

1. R.S.N. Pillai and V.Bhagavathi, Statistic – S.Chand Publication.2018
2. S.L. Aggarwal & S.L. Bhardwaj, Business Statistics - Kalyani Publishers.2020
3. P.R. Vittal , Business Statistics - Margham Publications.2017
4. Jack Levin, James Alan Fox , Elementary Statistics in Social Research, Pearson Education2021.

Books for Reference :

5. S.P. Gupta, Statistical Methods - Sultan Chand Publications.2021
6. P.R. Vittal , Business Statistics - Margham Publications.2020
7. B.N. Asthana, Elements of statistics – Chaitanya Publishing house Allahabad.2019

8. Richard Levin & David Rubin, Statistics for Management – Prentice Hall.2018
E-Resources: www.study.com, www.investopedia.com www.cramerz.com www.digitalbusinesslawgroup.com http://swcu.libguides.com/buslaw http://libguides.slu.edu/businesslaw

Methodology of Teaching:

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

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Discuss the uses of Statistical Analysis Software's	**K2, K3**
CO2	Compute Co-efficient of Correlation	**K2, K3**
CO3	Construct Regression Equations	**K2, K3**
CO4	Estimates Trend Values	**K2, K3**
CO5	Compute Index Numbers	**K2, K3**
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**	**PSO9**	**PS10**
CO1	✓	✓	✓	✓	✓		✓			✓
CO2	✓	✓	✓	✓	✓		✓			✓
CO3	✓		✓	✓	✓		✓	✓		✓
CO4	✓	✓		✓			✓	✓		✓
CO5	✓		✓	✓	✓		✓			✓
Number of matches = 33 , Correlation: **Very High**										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	**1-12**	**13-24**	**25-28**	**29-50**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER – IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCAAL42	**Other Elective Course**	**MANAGEMENT INFORMATION SYSTEM (MIS)**	**4**	**3**

Instructional objectives

6. To provide knowledge on the fundamental aspects of Management Information System
7. To expose how MIS is supporting in management and decision making.
8. To acquaint with MIS subsystems.
9. To familiarize with Functional of MIS
10. To disseminate knowledge of DBMS & System Analysis

Unit-I	**Introduction To MIS**	**12 Hours**

Data – Information – Introduction to Management Information System (MIS) – MIS definition – Role of MIS - Features of MIS – Elements of MIS – Approaches to MIS development – Benefits of MIS – Limitations of MIS.

Unit-II	**MIS Subsystems**	**12 Hours**

Management Information Subsystems – Transaction Process System – Decision Support System – Executive Support System – Enterprise Resource Planning – Business Expert System – Office Automation System.

Unit-III	**Structure of MIS and Functional MIS**	**12 Hours**

Physical Structure of MIS – Functional Management Information Systems – Financial and Accounting Information System – Production Information Systems – Marketing Information System – Human Resource Information System.

Unit-IV	**System Analysis & Implementation.**	**12 Hours**

Definition of System Analysis – Need for System Analysis – System Analyst Definition – Roles of System Analyst – System Development Life Cycle – System Implementation – System Implementation Methods – System Implementation Steps.

Unit-V	**MIS Software**	**12 Hours**

POPULAR MIS SOFTWARES - SAP – ORACLE – MICROSOFT DYNAMICS – R SYSTEM – PEOPLESOFT – RAMCO ERP

Books for Study

6. Management Information Systems - P. Rizwan Ahmed, Margham Publications, Chennai.
7. Management Information Systems - Thomas Tharakan, Surabhi Books, Bangaluru.
8. Management Information Systems - Waman S Jawadekar, Tata McGraw Publishing, Chennai.
9. Management Information Systems - Davis and Olson, Tata McGraw Publishing Company,

Chennai.
10. Management Information Systems - Laudon & Laudon, Prentice Hall of India, New Delhi.

Books for Reference

3. Database System Concepts - Abraham Silberschatz, Henry FKorth, & S Sudasrhan, TMH, Chennai
4. Management Information system - Sahil Raj, Pearson Publications, New Delhi.
5. Management Information system – Nirmalya Bhagi, Vikas Publications, New Delhi
6. Management Information system – S Sadagopan, PHI, New Delhi.
7. Management Information system – Indrajith Chatterji, PHI, New Delhi

Methodology of Teaching:

- **Chalk and Talk,**
- **ICT Presentation,**
- **Video lectures,**
- **Assignments on Case Study**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Recognize the importance MIS	**K1,K2**
CO2	Describe MIS Subsystems.	**K2**
CO3	Discuss on Functional Components Of MIS.	**K3**
CO4	Elaborate on Database & DBMS.	**K4**
CO5	Execute System Analysis Implementation	**K4**
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**	**PSO7**	**PSO8**
CO1	✓	✓	✓		✓	✓	✓			✓
CO2	✓	✓	✓	✓	✓		✓	✓		✓
CO3	✓		✓	✓	✓			✓		✓
CO4	✓	✓			✓	✓	✓	✓		✓
CO5	✓		✓	✓	✓	✓	✓			✓
Number of matches = **35 ,** Correlation**: Very High**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER – IV				
COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
UBCANM41	Other Elective Course	INSURANCE IN DIGITAL ERA	4	2

COURSE OBJECTIVES

1. To impart functional knowledge of various types of Insurance.
2. To understand principles of Life Insurance.
3. To acquaint with features of Marine & Fire Insurance.
4. To familiarise with General Insurance.
5. To know IT Applications in insurance sector.

UNIT-I	INTRODUCTION OF INSURANCE	12 Hours

Introduction to Insurance: Meaning of Insurance – Definition – Functions of Insurance – Classification of Insurance – General principles Insurance contract – Role of Insurance Regulatory and Development Authority (IRDA)

UNIT-II	LIFE INSURANCE	12 Hours

Life Insurance: Meaning and Definition – Characteristics – Advantages of Life Insurance - Life insurance Vs. Non- Life Insurance – Procedure for effecting Life Insurance – Companies offering life insurance policies – Life Insurance in Digital Age.

UNIT-III	MARINE INSURANCE& FIRE INSURANCE	12 Hours

Marine Insurance: Definition – Fundamental Principles of Marine Insurance- Types of Marine Insurance– Companies offering Marine Insurance Policies – **Fire Insurance:** Meaning and Definition – Legal Provisions relating to Fire Insurance – Kinds of Fire Insurance – Companies offering Fire Insurance – Fire Insurance Coverage for Leather and ancillary Industries

UNIT-IV	GENERAL INSURANCE	12 Hours

General Insurance: Meaning and Definition – Types of General Insurance – Critical Illness, Medical Insurance-Special Insurance Products for Women- Vehicle Insurance-Burglary insurance – Livestock & Cattle Insurance – Crop Insurance – Case study of Crop and Livestock

insurance by the Farmers in the Tirupattur Dist Procedure for Claims.		
UNIT-V	**INFORMATION TECHNOLOGY IN INSURANCE SECTOR**	**12 Hours**
IT Trends in Insurance Sector – Insurance Aggregators – Online Insurance Portals – Scope of IT Applications in Insurance – Insurance Related Software – Advantages of IT In Insurance Industry.		

Books for Study

1. Principal and practice of insurance – Dr A Murthy, Margham Publications, Chennai.2021
2. Fundamentals of insurance – P Periyasamy, Vijay Nicole Publications, Chennai 2019
3. Insurance Principles & Practice - R.S. Sharma, GK Books. Bombay.2018
4. Risk Management & Insurance – Harrington,Tata McGraw Hill publications, New Delhi.2019
5. Insurance - Dr. B. Vardharajan, Margham Publications, Chennai.2019

Books for Reference

1. Principles of insurance – PK Gupta & Anil Kumar Meena, Himalaya Publishing House, Bengaluru2017.
2. Banking & Insurance – OP Gupta & Sudheer Kumar Sharma, Sahitya Bhawan Publications, Agra.2019
3. Insurance principles and practice – Mishra MN, Sultan Chand & Sons publication, New Delhi.2021
4. Elements of Insurance – Dr E Dharmaraj, SIMRES Publications, Chennai.2022
5. Theory and Practice of Insurance – M Arif Khan, Educational Book House, Aligarh.2018

E-Resources:

www.study.com, www.investopedia.com
http://swcu.libguides.com

Methodology of Teaching:

- **Chalk and Talk, ICT Presentation, Video lectures, Assignments on Case Study**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Define the Concept of Insurance.	**K1**
CO2	Discuss how Life Insurance Works.	**K2,K3**
CO3	Distinguish between Life and General Insurance.	**K4**
CO4	Describe the features of General Insurance.	**K4**
CO5	Discuss the Applications of Information Technology in Insurance Sector	**K4,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	PSO9	PSO10
CO1	✓					✓	✓			✓
CO2	✓					✓	✓	✓		✓
CO3	✓		✓		✓	✓	✓	✓		✓
CO4	✓		✓		✓	✓	✓	✓		✓
CO5	✓		✓		✓	✓	✓	✓		✓
Number of matches **=30** , Correlation: **Very high**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER – IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCANM42	**Other Elective Course**	**COMPUTERIZED FINANCIAL MANAGEMENT**	**4**	**2**

COURSE OBJECTIVES

1. To develop cognizance of the importance of Financial Management in corporate valuation
2. To analyze the corporate leverage under different conditions
3. To enable students to synthesize related information and evaluate Capital Structure
4. To evolve options for most logical and optimal solution to predict and control Debt Equity incurrence and improve results.

Unit-I	**Evolution, Scope and Functions of Finance Managers**	**12 Hours**

Introduction; Scope of Finance; Financial Management System; Finance Functions ; Role of a Finance Manager

Unit-II	**Financial Planning**	**12 Hours**

Introduction, Objectives, Benefits, Guidelines, Steps in Financial Planning, Factors Affecting Financial Planning, Estimation of Financial Requirements of a Firm, Capitalisation

Unit-III	**Time Value of Money and Valuation of Bonds and Shares**	**12 Hours**

Time Value of Money: Introduction, Rationale, Future Value, Present Value **Valuation of Bonds and Shares:** Introduction, intrinsic value, book value, Valuation of Bonds, Valuation of Shares

Unit-IV	**Cost of Capital and Leverage**	**12 Hours**

Cost of Capital: Introduction, Meaning of Cost of Capital, Cost of Different Sources of

Finance, Weighted Average Cost of Capital **Leverage:** Introduction, Operating Leverage, Application of operating leverage, Financial Leverage, Combined Leverage		
Unit-V	**Capital Budgeting Techniques using Spread sheet Model**	**12 Hours**
Introduction,Importance of Capital Budgeting, Identification of Investment Opportunities, Rationale of Capital Budgeting Proposals, Capital Budgeting Process, Investment Evaluation, Appraisal Criteria **Capital Budgeting Spreadsheet Model :**Payback Period model - Discounted Payback Period model -Net Present Value model -Accounting Rate of Return model -Internal Rate of Return model -Profitability Index		
(RATIO OF PROBLEMS AND THEORY = 30%: 70%)		
Books for Study **6.** 1.Pandey , I.M,(2015), "Financial Management", 11th Edition,Vikas Publication, New Delhi. **7.** 2.Sinha, Pradeep Kumar, (2009) ,"Financial Management", 5th Edition, The World Press, Calcutta.		
Books for Reference : **1**. Financial Planning using Excel :Forcasting Planning and Budgeting Techniques By Sue Nugus ELSEVIER **2**. Chandra, Prasanna, (2011),"Financial Management Theory and Practice", 8th Edition, TMH, **3.**Vanhorne, J, (2015)," Financial Management & Policy", 13th Edition, Pearson Education **4.** Brealey and Myers, (2017)," Principles of Corporate Finance", 10th Edition , McGraw Hill,		
E-Resources: **www.study.com,** **www.investopedia.com** **http://swcu.libguides.com**		

Methodology of Teaching:

- **Chalk and Talk, ICT Presentation, Video lectures, Assignments on Case Study**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Demonstrate the applicability of the concept of Financial Management	**K1,K2**
CO2	Appraise the managerial Decisions and Corporate Capital Structure	**K2,K3**
CO3	Apply the Leverage and EBIT EPS Analysis	**K4**
CO4	Analyze the complexities in the capital Structure	**K5**
CO5	Demonstrate how risk is assessed.	**K6**
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	PSO9	PS10
CO1	✓	✓	✓	✓		✓	✓	✓		✓
CO2	✓	✓	✓	✓		✓	✓	✓		✓
CO3	✓	✓	✓	✓			✓	✓		✓
CO4	✓	✓	✓	✓			✓	✓		✓
CO5	✓	✓	✓	✓			✓	✓		✓
Number of matches **= 37 ,** Correlation: **Very High**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER – IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCANM43	**Other Elective Course**	**OPERATIONS RESEARCH WITH COMPUTER APLICATIONS**	**4**	**2**

COURSE OBJECTIVES

1. To impart basic knowledge of Operation Research
2. To familiarise with Computer Applications in OR
3. To understand the concepts of Linear Programming
4. To get an insight on Assignment and Transportation Methods
5. To acquaint with the concept of Network Analysis

UNIT-I	**INTRODUCTION TO OPERATION RESEARCH**	**10 Hours**

Origin – Meaning and Definitions – Features of OR – Merits and Demerits – Stages in OR – Techniques and Tools of OR – Models in OR

UNIT-II	**COMPUTER APPLICATIONS IN OR**	**10 Hours**

Introduction to Computer Software's in OR – NCSS, SAS/OR, ORSTAT, GLPK – Meaning, Features and Uses **(Theory Only)**

UNIT-III	**LINEAR PROGRAMMING**	**12 Hours**

Introduction – Meaning and Definition – Assumptions of LP – Applications of LP Methods – Merits and Demerits

UNIT-IV	**ASSIGNMENT AND TRANSPORTATION**	**16 Hours**

Assignment: Introduction – Meaning and Definition – Methods of Assignment – Minimum & Maximum Methods – **(Balanced Simple Problems)** **Transportation:** Meaning and Definition – Methods for IBFS – North West Corner Method (NWCM) and Least Cost Method (LCM) **(Balanced Simple Problems)**

UNIT-V	**NETWORK ANALYSIS (PERT & CPM)**	**12 Hours**

Introduction – Meaning – Definition – Objectives – Applications of network Models – Terminology or Concepts Used – Activity Times & Critical Path – Merits & Demerits of PERT – Difference Between CPM and PERT **(Simple Problems – No Crashing)**

(Ratio of Problems and Theory = 50%: 50%)

Books for Study:

1. Business Statistics and Operations Research - S.L. Aggarwal & Vijay Gupta, Kalyani Publishers 2019
2. Business Statistics and Operations Research – P.R. Vittal, Margham Publication. 2019
3. P.K.Gupta & Man mohan, Problems in Operations Research – Sultan Chand & sons – New Delhi 2018
4. Hamdy A Taha, Operation Research – An Introduction prentice Hall of India- New Delhi.2018

Books for Reference:

1. P.R. Vittal & V.Malini, Operative Research – Margham Publications – Chennai – 17.2019
2. P.K.Gupta & Man mohan, Problems in Operations Research – Sultan Chand & sons – New Delhi 2018
3. V.K.Kapoor, Introduction to operational Research – Sultan chand & sons – New Delhi2019
4. Hamdy A Taha, Operation Research – An Introduction prentice Hall of India- New Delhi. 2019

E-Resources:
www.study.com,
http://swcu.libguides.com

Methodology of Teaching:

- **Chalk and Talk,**
- **ICT Presentation,**
- **Video lectures,**
- **Assignments on Case Study**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Define the concept of Operation Research	**K2, K3**
CO2	Discuss the Applications of Computer Software in OR	**K1, K2**
CO3	Describe the usage of L.P Methods	**K4,K5**
CO4	Solve Assignment and Transportation Problems	**K4,K5**
CO5	Distinguish between CPM and PERT	**K4,K6**
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	PSO9	PS10
CO1	✓	✓	✓	✓	✓		✓			✓
CO2	✓	✓	✓	✓	✓		✓	✓		✓
CO3	✓	✓	✓	✓	✓		✓	✓		✓
CO4	✓	✓	✓	✓	✓	✓	✓			✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓		✓
Number of matches =40 , Correlation: **Very High**										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

SEMESTER – IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCASEP4	**Skill Enhancement Lab**	**SPREAD SHEET APPLICATIONS – LAB**	**3**	**3**

COURSE OBJECTIVES

1. To acquaint with software's used for managing financial data.
2. To know applications of formulas and functions
3. To know how to develop professional-looking worksheets
4. To learn Creation of charts and graphs
5. To understand spreadsheet applications
6. To acquaint with use of data tables and scenario managers.

LAB EXERCISE – 1	**FUNDAMENTALS OF SPREADSHEET**	**5 HOURS**

Enter Text, Values, And Dates In Cells -Clear Cell Contents - Create Formulas Using Cell References - Use The Fill Handle To Copy Formulas To Nearby Cells -Rename A Worksheet Tab -Create A New Worksheet -Move A Worksheet -Delete A Worksheet -Make A Copy Of A Worksheet -Insert A Row - Delete A Row - Insert A Column - Delete A Column- Adjust Row Height - Adjust Column Width - Move A Row

LAB EXERCISE – 2	**TEXT FORMATTING**	**5 Hours**

Select A Range Of Cells -Copy And Paste A Range Of Cells -"Merge And Center" A Set Of Cells -Change Text Alignment Attributes And Wrap Text -Apply Different Number Formats: Currency, Percentage, Etc -Change The Number Of Decimal Places For Numeric Values -Apply Font Attributes, Borders And Fill Color -Indent Cell Contents -Set Page Orientation -Set Margin Options -Create A Header

LAB EXERCISE – 3	**WORKING WITH CELL REFERENCES AND FUNCTIONS**	**5 Hours**

Absolute, Relative, And Mixed Cell Addressing -Sum Function -Average Function -Median Function - Min Function -Max Function -Count Function -Today Function -Year Function -If Function - VLOOKUP Function

LAB EXERCISE – 4	**WORKING WITH RANGE**	**5 Hours**

Create A Range Name -Edit And Delete Range Names -Use A Range Name In A Formula -Insert A List Of Range Names.

LAB EXERCISE – 5	**WORKING WITH DATA AND CHARTS**	**5 Hours**

Creating A Chart -Selecting The Cells Containing The Data To Use in Creating A Chart -Select the Chart Type: Clustered Column, Bar, Pie, Etc – Move And / Or Resize A Chart -Change the Chart Type - Changing The Cells Containing The Data To Use In Creating A Chart -Add A Chart Title -Add A Title To The Chart's X-Axis -Add A Title To The Chart's Y-Axis -Add Or Remove The Chart's Data Labels.

LAB EXERCISE – 6	**MANAGING WORKSHEETS**	**4 Hours**

Freeze rows and columns -manage page breaks -set and clear a print area -print titles -create a table -add and delete fields -add records -remove duplicate rows -apply a table style -sort one field - sort

multiple fields -apply text filters -apply a number filter -apply a date filter.		
LAB EXERCISE – 7	**FORMULAS AND CONDITIONAL FORMATTING**	**4 Hours**
Create Structured References In Formulas -Add A Total Row -Convert A Table To A Range Highlight Cell Rules -Specify Top/Bottom Rules -Display Data Bars -Use A Formula In Conditional Formatting		
LAB EXERCISE – 8	**DATA AND PIVOT TABLE**	**4 Hours**
Sort Data -Subtotal Data -Create A Pivot Table – Modify the Source Data And Refresh The Pivot-Table -Apply A Pivot-Table Style -Create A Pivot-Chart		
LAB EXERCISE – 9	**LOGICAL FUNCTIONS AND SINGLE & MULTIPLE CONDITION**	**4 Hours**
Use Date Functions -Use Advanced Logical Functions -Use Functions To Evaluate One Condition -Use Functions To Evaluate Multiple Conditions		
LAB EXERCISE – 10	**MANIPULATING TEXT & GOOGLE WORKSHEETS**	**4 Hours**
Manipulate Text With Functions -Apply Advanced Filtering - Use Advanced Lookup Functions – Working with Google Sheets.		
Books for Study **1.** Excel 2019 All-in-One By Lokesh Lalwani BPB PUBLISHERS 2021 **2.** Data Analysis Using Microsoft Excel By Ash Narayan Sah Publisher :Excel Books 2018		
Books for References: **3.** Data Analysis By Ash Narayan Sah Publisher :Excel Books 2021 **4.** Excel for Beginners September2017 by M. L. Humphrey 2020		
https://www.ibm.com/ **https://www.study.com/**		

Methodology of Teaching:

- **Chalk and Talk, ICT Presentation, Video lectures, Assignments**

CO'S	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Demonstrate use of formulas and functions in spread sheet	**K1,K2**
CO2	Create professional-Looking worksheets	**K2**
CO3	Create charts and Graphs	**K4**
CO4	Demonstrate use of spreadsheet Applications	**K4**
CO5	Import Data from Other programs	**K3,K4,K6**
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	PS09	PS10
CO1	✓	✓	✓		✓		✓	✓		✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO4	✓	✓	✓	✓		✓	✓	✓		✓
CO5	✓	✓	✓		✓		✓	✓		✓
Number of matches **= 40 ,** Correlation: **Very High**										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-50
Correlation	Poor	Moderate	High	Very High

PROGRAMME OUTCOME FOR B.Com. (F&A)

PO1 Communicate ideas, thoughts & knowledge through English effectively with individuals, groups, and businesses using Verbal, Non-Verbal, and Digital modes of Communication. Develop linguistic skills in one Indian/Regional language.

PO2 Demonstrate knowledge of the concepts, principles, theories, and techniques related to various forms, facets, and functions of Business.

PO3 Synthesize learned knowledge and acquired skills to establish, organize, manage and/or develop a business/organisation effectively and efficiently in the capacity of an entrepreneur, businessman, or any other professional

PO4 Critically evaluate a problem/environment and take informed business decisions to solve problems

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

PO6 Use Computers, Software, Internet, and other ICT tools to maximize resource utilization and increase efficiency in day-to-day business operations

PO7 Plan, execute, and manage a Project after careful appraisal

PO8 Develop products, Frame Policies, and/or collaborate to help Society in increasing the living standards and towards building a Sustainable Environment

PO9 Discover a passion for Lifelong Learning through MOOCs, ODL, and Self -Learning techniques through optimum use of ICT.

PO10 Identify and assess various issues in Environment and suggest measures to overcome them. Exhibit Ethics and Values in professional, Social, and Personal spheres of life, caring for the underprivileged, leading to a better sustainable future

PSO: Program Specific Outcome

PSO1 Acquire the knowledge of principles of commerce in the context of finance and accounts.

PSO2 Understand the various accounting techniques and methods to adopt and practice these skills in various fields.

PSO3 Develop the comprehension skills in the area of tax, and finance to become an expert, consultant for business firms.

PSO4 Provide solutions for various economic issues in the field of agriculture, Industries, and other allied sectors.

PSO5 Understand the statistical methods and techniques to solve various problems relating to another interdisciplinary arena including research.

PSO6 Provide more exposure to modern aspects of HR and Marketing field so as to develop decision-making skills.

PSO7 Entrepreneurial exposure to become young entrepreneurs and corporate professionals.

PSO8 Equip with knowledge of legal framework in the context of the business, company, and various industries.

PSO9 Understand the importance of communication, and writing necessary reports in the daily routine of business.

PSO10 Computer applications and computerized accounting like e-filing and different tax return training will enable them to solve accounting problems.

Program Specific Outcomes PSOs	**Program Out Comes (POs)**									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
PSO1	√	√	√	√		√	√			√
PSO2	√	√	√	√	√	√	√			√
PSO3	√	√	√	√	√	√	√			
PSO4	√	√	√	√	√	√	√	√		√
PSO5	√	√	√	√	√	√	√			√
PSO6	√	√	√	√		√				√
PSO7	√	√	√	√	√	√	√	√		√
PSO8	√	√	√	√	√		√	√		√
PSO9	√	√	√	√		√		√	√	√
PSO10	√	√	√	√	√	√			√	√
Number of Matches 78, Correlation: Very high										

<u>Mapping Bench Mark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-30	31-60	61-70	71-100
Correlation	Poor	Moderate	High	***Very High***

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFA3001	**Discipline Specific Core Course**	**CORPORATE ACCOUNTING I**	**5**	**4**

Course Objectives

1. To enable the students to acquire comprehensive knowledge on all aspects relating to corporate situation and requirement.
2. To enlighten the students to gain knowledge on accounting for share capital and preparation of final accounts of company as per the provisions of Indian Companies Act, 2013.
3. To make the students to understand the accounting concepts of valuation of Goodwill and Shares.

Unit-I	**Accounting for Issue of Shares**	**15 Hours**

Issue of Shares – Forfeiture and Re-issue of Forfeited Shares – Concept and Process of Book Building – Employee Stock Ownership Plan (ESOPs) – Issue of Rights and Bonus Shares - Sweat Equity Shares – Buyback of Shares – Stock Split.

Unit-II	***Underwriting of Shares and Redemption of Preference Shares***	**15 Hours**

Underwriting of Shares – Redemption of Preference Shares – Guidelines for Issue and Redemption of Preference shares – Redemption at Par, Premium and Discount – Redemption out of Revenue Reserve and out of Fresh Issue.

Unit-III	**Profits Prior to Incorporation**	**15 Hours**

Profits Prior to Incorporation – Meaning – Calculation of Time Ratio, Sales Ratio and Weighted Ratio – Basis for Apportionment of Expenses – Steps involved in ascertaining Pre and Post Incorporation Profits.

Unit-IV	**Final Accounts of Company**	**15 Hours**

Final Accounts of company as per the provision of Indian Companies Act 2013 – Statement of Profit and Loss – Balance Sheet – Accounting Treatment of Certain items excluding Managerial Remuneration.

Unit-V	**Valuation of Goodwill and Shares**	**15 Hours**

Valuation of Goodwill – Meaning – Need for Valuation of Goodwill – Methods of Valuing Goodwill – Average Profit - Super Profit - Annuity and Capitalization Methods. Valuation of Shares – Need for Valuation of Shares – Methods of Valuation of Shares – Net Assets - Yield and Fair Value Methods.

Note: Weightage of Marks: Theory 30% and Problems 70%

Books for Study:

11. **Shukla M.C, Grewal T.S, Gupta S.C,** Advanced Accounts, S. Chand & Co. Ltd., New Delhi.
12. **Reddy T.S & Murthy A,** Corporate Accounting, Margham Publications, Chennai.
13. **Jain S.P & Narang K.L,** Advanced Accounting, Kalyani Publishers, New Delhi.
14. **Maheshwari S.N. & Maheshwari S.K,** Corporate Accounting, Vikas Publication, New Delhi.
15. **Gupta R.L &Radhaswamy M,** Advanced Accountancy, Sultan Chand & Sons, New Delhi.

Books for Reference:

1.Radhika P & Anita Raman, Advanced Corporate Accounting, Mc Graw Hill Education (India) Private Ltd., Chennai.

2.Naseem Ahmed, Ashok Sharma &Rajender Kumar, Corporate Accounting, Ane Book Pvt. Ltd.,

New Delhi.
3.Palaniappan R & Dr. Hariharan N, Corporate Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
4.Hanif M & Mukherjee A., Corporate Accounting, Mc Graw Hill Education (India) Private Ltd. Chennai.
5.Tulsian P.C. & Bharat Tulsian C.A., Corporate Accounting, S. Chand & Co. Ltd. New Delhi

E-Resources:
1.www. collegetutor.net
2.www. gkpad.com
3.www.icai.org

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the accounting for issue of shares.	**K1, K3**
CO2	Exhibit knowledge on underwriting of shares and redemption of preference shares.	**K2, K3**
CO3	Gain knowledge on profits prior to incorporation.	**K2,K3, K4**
CO4	Prepare final accounts of company in conformity with provisions of the Companies Act, 2013.	**K4, K5**
CO5	Calculate the value of goodwill and shares	**K4, K5, K6**
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	PSO9	PSO 10
CO1	✓	✓	✓	✓			✓	✓	✓	
CO2	✓	✓	✓	✓			✓	✓	✓	
CO3	✓	✓	✓	✓			✓	✓	✓	
CO4	✓	✓	✓	✓			✓	✓	✓	
CO5	✓	✓	✓	✓			✓	✓	✓	
Number of matches =35, Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFA3002	**Discipline Specific Core Course**	**BUSINESS REGULATORY FRAMEWORK**	**4**	**4**

Course Objectives

1. To provide the basic knowledge on Business Legislations.
2. To highlight the essential elements of a valid Contract.
3. To enable the students to learn the concepts of Agency, Bailment & Pledge and Sale of Goods

Unit-I	**Indian Contract Act, 1872**	**12 Hours**

Law – Meaning – Objectives - Nature and Sources of Business Law - Indian Contract Act, 1872 – Classification of Contracts – Essential Elements of Contract – Legal rules as to Offer – Acceptance – Revocation of Offer and Acceptance – Consideration - Essentials and Legal rules for a Valid Consideration.

Unit-II	**Capacity of Parties and Free Consent**	**12 Hours**

Capacity of Parties - Definition - Persons Competent to Contract - Free Consent – Coercion - Undue Influence – Fraud - Misrepresentation – Mistake. Discharge of Contract - Modes – Remedies for Breach of Contract - Quasi Contract – Features – Types.

Unit-III	**Indemnity & Guarantee, Bailment & Pledge**	**12 Hours**

Indemnity and Guarantee – Meaning – Kinds of Guarantee – Rights of Surety – Discharge of Surety - Bailment – Essentials – Kinds – Duties and Rights of Bailor and Bailee – Finder of Lost Goods – Rights and Duties of Finder of Lost Goods – Pledge – Essentials – Rights and Duties of Pawnor and Pawnee.

Unit-IV	**Sale of Goods Act,1930 and Competition Act, 2002**	**12 Hours**

Sale of Goods Act, 1930 – Essentials of Contract of Sale – Sale and Agreement to Sell – Competition Act,2002 – Salient features of Competition Act – Powers of Central Government under the Competition Act – Major Provisions of the Competition Act.

Unit-V	**Contract of Agency**	**12 Hours**

Law of Agency – Essentials of an Agency – Kinds of Agent - Irrevocable Agent - Duties and Rights of an Agent- Duties and Rights of Principal – Termination of Agency.

Books for study:

1. Pillai, R.S.N. & Chand, S, Business Law, S Chand & Co, Delhi
2. Ramaswamy, K.N., Business Law, S Chand & Co, Delhi
3. Shukla, M.C, Business Law, S. Chand & Co.
4. S.S.Gulshan: Mercantile Law, Excel Books.
5. S.N.Maheswari: Business Laws, Himalaya Publications
6. S. Thameemul Ansari, Business Regulatory Framework, Mayura Publications.

Books for Reference:

1. Balachandran. V & Thothadri.S, Business Law, Vijay Nicole Imprints Pvt.Ltd. Chennai

2. Kapoor, N.D. Business Laws, Sultan Chand and Sons.
3. Sreenivasan, M.R. Business Laws, Margam Publications.
4. Dhandapani, M.V. Business Laws, Sultan Chand and Sons.
5. Badre Alam, S. & Saravanavel, P. Mercantile Law

E-Resources:
www.cramerz.com www.digitalbusinesslawgroup.com
http://swcu.libguides.com/buslaw
http://libguides.slu.edu/businesslaw

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Evaluate the basics of Business Regulatory Framework and Indian Contract Act, 1872	**K2, K5**
CO2	Understand capacity of parties to enter into a valid contract.	**K1, K2**
CO3	Develop the knowledge on legalities of Indemnity, Guarantee, Bailment and Pledge	**K1, K2**
CO4	Understand Sale of Goods Act and Competition Act.	**K2**
CO5	Comprehend the Law of Agency and discuss the Rights and Duties of Agent and Principal.	**K2**
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	PSO9	PSO10
CO1	✓		✓	✓			✓	✓		
CO2	✓		✓	✓			✓	✓		
CO3	✓		✓	✓			✓	✓		
CO4	✓		✓	✓		✓	✓	✓		
CO5	✓		✓	✓		✓	✓	✓		
Number of matches = 27, Correlation: Moderate										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFA3003	**Discipline Specific Core Course**	**MODERN MARKETING**	**4**	**4**

Course Objectives

1. To impart knowledge on various Functions, Concepts and Approaches of Marketing.
2. To enlighten students about Marketing Environment and its significance.
3. To create awareness among students about recent developments in Marketing.

Unit-I	**Modern Marketing**	**12 Hours**

Marketing – Meaning – Definition – Features – Functions - Marketing vs Selling – Concepts of Marketing – Approaches – Features of Modern Marketing – Marketing Mix - Elements.

Unit-II	***Marketing Environment***	**12 Hours**

Marketing Environment – Meaning – Types - Demographic – Economic – Natural – Political – Legal and Socio-cultural Environment – Market Segmentation - Bases of Segmentation.

Unit-III	**Marketing Research and Sales Forecasting**	**12 Hours**

Marketing Research – Meaning – Benefits – Process – Challenges – Marketing Information System – Benefits of MIS – Sales Forecasting – Benefits – Methods – Sales Manager – Qualities of a Successful Sales Manager.

Unit-IV	**Branding and Packaging**	**12 Hours**

Branding – Meaning – Advantages – Disadvantages – Brand Positioning – Brand Image. Packaging – Objectives – Functions – Essentials of Good Packaging.

Unit-V	**Digital Marketing**	**12 Hours**

Digital Marketing – Meaning – Features – Advantages – Disadvantages – Traditional Marketing vs E-Marketing – Social Media Marketing - Mobile Marketing – Services Marketing – Green Marketing – Sustainability Marketing Strategies - Rural Marketing – Features – Challenges in Rural Marketing.

Books for study:

1. R.S.N. Pillai & Bagavathi, Modern Marketing, S. Chand & Co. Ltd., New Delhi.
2. J. Jayasankar, Marketing, Margham Publications, Chennai.
3. Rajan Nair, Marketing, Sultan Chand & Sons, New Delhi.
4. C.B. Gupta, Marketing Management – Text & Cases, Sultan Chand & Sons, New Delhi.
5. Rajan Saxena, Marketing Management, Tata McGraw Hill, Chennai.

Books for Reference:

1. Philip Kotler & Gary Armstrong, Principles of Marketing, Pearson Education, New Delhi
2. Roberto G. Mendia, Principles of Marketing, Rex Printing Company
3. Dr. RL Varshney & Dr. SL Gupta, Marketing Management, Sultan Chand & Sons, New Delhi.
4. Kotler, Kartajaya and Setiawan, Marketing 4.0: Moving from Traditional to Digital, Wiley,
5. J.C. Gandhi, Marketing Management, Tata McGraw Hill, Noida.

E-Resources:

www.study.com,
www.investopedia.com

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the features of Modern Marketing	K1, K2
CO2	Analyse Marketing Environment	K2, K4
CO3	Comprehend the process of Marketing Research and Forecast Sales	K3, K5
CO4	Appraise significance of Branding and Packaging	K3, K4, K6
CO5	Evaluate the significance of Digital Marketing	K2, K3, K6
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	PSO9	PSO10
CO1	✓			✓		✓	✓	✓		
CO2	✓			✓		✓	✓	✓		
CO3	✓			✓	✓	✓	✓	✓		
CO4	✓			✓	✓	✓	✓	✓		
CO5	✓			✓		✓	✓	✓		✓
Number of matches = 28 ,Correlation: Moderate										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFANM31	**Other Elective Course 1**	**INSURANCE AND RISK MANAGEMENT**	**4**	**2**

Instructional Objectives

1. To develop an understanding among students about identifying- analyzing and managing various types of risks.
2. Students will be in a position to understand principles of insurance andits usefulness in business along with its regulatory framework.

Unit-I	**Introduction**	**15 Hours**

Concept of risk- types- assessment and transfer- sources and measurement of risk- risk evaluation and prediction- disaster risk management- risk retention and transfer

Unit-II	**Principles of Insurance**	**10 Hours**

Concept of insurance- need for insurance- principles of utmost good faith- insurable interest-indemnity- economic function- proximate cause- subrogation and contribution.

Unit-III	**Types of Insurance**	**10 Hours**

Types of insurance: life and non-life insurance; features- need and policies of insurance; re- insurance and co-insurance: features- objectives and methods; bank assurance- features and merits.

Unit-IV	**Insurance & Risk Management**	**10 Hours**

Legal aspects of insurance contract- loss assessment and loss control- control of malpractices and mis-selling- exclusion of perils- actuaries- computation of insurance premium.

Unit-V	**Regulatory Framework**	**15 Hours**

Regulatory Framework of Insurance- IRDA act 1999: objectives of IRDA- composition of IRDA- duties- powers and functions of IRDA- role of IRDA- delegation of powers- establishment of Insurance Advisory Committee- powers to make regulations-Recent Regulatory Frame Works.

Books for Study:

1. Gupta .P.K- Insurance and Risk Management- Himalaya Publishing House- Mumbai.2019.
2. Mishra.M.N- Principles and Practices of Insurance- Sulthan Chand & Sons- New Delhi. 2019.
3. Dr. Premavathy- Principles & Practice of Insurance- Shri Krishana Publication- Chennai.2019.
4. Murthy. A- Elements of Insurance- Margham Publications- Chennai.2019.
5. Vaughan. E.J & Vaughan- Fundamentals of Risk and Insurance- Wiley Sons- NewJersy.2018.

Books for Reference:

1. George.E.Rejde- Principles of Risk Management and Insurance- Pearson Education- Delhi. 2016
2. Murthy .A - Principles & Practice of Insurance- Margham Publications- Chennai.2019.
3. Hansell. D.S- Elements of Insurance- Macdonalds Evans- Unites State America- 2017.
4. Crane.F- Insurnce Principles and Practices- John Wiley and Sons- New York. 2018.
5. Black. K & Skipper. H.D- Life & Health Insurance- Pearson Education- New Delhi. 2019

E-Resources:

1. www.irdai.gov.in
2. www.riskmanagement.com
3. www.theirm.org
4. www.insuranceinstituteofindia.com
5. www.licindia.com

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the Concept of Risk- its types- sources and measurements.	K2, K3
CO2	Learn the Concepts and Principles of Insurance and its operations.	K2, K3
CO3	Develop insights into various types of Insurance	K2, K3
CO4	Examine the Legal aspects of Insurance contract and Actuaries	K2, K3
CO5	Familiarize with the Regulatory Framework of Insurance	K2, K3
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	PSO9	PSO 10
CO1	✓	✓	✓	✓	✓			✓		
CO2	✓	✓	✓		✓			✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓		✓	✓	
CO4	✓	✓	✓	✓		✓		✓	✓	
CO5	✓		✓	✓				✓	✓	
Number of matches = 33, Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFANM32	**Other Elective Course 2**	**BUSINESS ETHICS**	**4**	**2**

Course Objectives

1. Understand the concept of business ethics
2. To know the role and impact of ethical practices in business
3. Gain a comprehensive knowledge on business ethics

Unit-I	**Business Ethics**	**12 Hours**

.Business ethics- An overview of business ethics- Concepts- Nature of Business ethics- Features- Globalisation and business ethics . relevance of ethics and values in business- theories of business ethics

Unit-II	**Organisational Ethics**	**14 Hours**

Organisational ethics- Introduction- corporate Behaviour- Development of ethical practices in Corporate culture-Ethical Leadership- Ethical decision making- Ethical dilemma in organisation

Unit-III	**Ethical behaviour in workplace**	**12 Hours**

Ethical behaviour at work place- factors influencing ethics in work place- honesty- interest, communication- discrimination, Harassment, Dissatisfaction, Importance of ethical behaviour at workplace- Benefits of ethical behaviour at workplace- gender ethics

Unit-IV	**Functional Ethics**	**10 Hours**

Ethical issues in managerial function areas- ethical practice during recruitment, selection and training of employees- ethics in marketing- ethics in finance- ethics in production – ethical issues in information technology- ethics in communication

Unit-V	Corporate Social Responsibilities and Business Ethics	**12 Hours**

Corporate social responsibilities- Meaning- objectives- characteristics – advantages- Ethics in implementing Corporate Social Responsibilities (CSR)

Books for Study:

1. Saurabh Agarwal " Business Ethics", SBPD Publising House, Agra – 2021
2. Dr.B.H Agalgatti, S. Krishna "Business Ethics", Nirali prakashan Educational Publishers, 2020.
3. Dr. Prashant Kumar & Annu Sehrawat, Notion Press- 2021
4. Jayadev Sahoo "Business Ethics", Adhyayan Publishers & Distributors, -2017.
5. Saurabh Agarwal "Business Ethics", SBPD Publishing House, Agra – 2022.

Books for Reference:

1. Joseph W. Weiss" Business Ethics- Concept and cases" Southern western Publishers- 2009.
2. Fernando, Muraleedharan & satheesh "Business Ethics- An Indian Perspective", Pearson- 2019
3. Shailaundra kumar" Business Ethics- Cangage India Pvt Ltd – 2020.
4. Dr. Rupa Jajoo Gilda" Business Ethics – Orange Books Publication – 2020.

E-Resources:

1. www.wallstreetmojo.com

2. www.studocu.com 3. www.openstax.org

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concept of business ethics	**K1, K2, K3**
CO2	Role of organisational ethics	**K2,K3, K4**
CO3	Comprehend knowledge on Ethical practices in workplace	**K1, K2, K3**
CO4	Familiarize the components of ethical practices in management functions	**K1, K2,K3,K6**
CO5	Obtain the knowledge of CSR and Business ethics	**K2, K3,K4,K6**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	✓			✓			✓	✓	✓	
CO2	✓			✓		✓	✓	✓	✓	
CO3	✓			✓		✓	✓	✓	✓	
CO4	✓			✓			✓	✓	✓	
CO5	✓			✓			✓	✓	✓	
Number of Matches = 27, Correlation: Moderate										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFANM33	**Other Elective Course 3**	**FINANCIAL SERVICES**	**4**	**2**

Course Objectives

1. To know about the importance of Financial services in India
2. To familiarize the students different financial products available in the market
3. To get a knowledge of financial derivatives and its kind.

Unit-I	**Introduction**	**12 Hours**

. Introduction- Financial services – Features – Importance- Classification- Scope of Financial service –Causes of Financial Innovation-Financial services and promotion of industries – New financial products and services- Innovative Financial Instruments- Challenges facing Financial sectors-Credit Rating – Meaning and Functions- Credit Card- Types -Facilities offered- Merits and Demerits of Credit Card.

Unit-II	**Merchant Banking, Hire Purchase and Leasing**	**14 Hours**

Introduction- definition, origin – Merchant Banking in India- Merchant Bank and Commercial Bank- Services of Merchant Bank-

Hire Purchase- Meaning and Features- Origin and Development- Banks and Hire purchase Business- Concept of Leasing – Steps involved in leasing transaction- Types of Leasing- Hire Purchase vs Leasing.

Unit-III	**Venture Capital and Mutual Funds**	**12 Hours**

Concept of Venture capital- features – Scope- Importance- Origin – Initiatives in India scenario- Suggestion for the growth of Venture capital –

Mutual Funds- Definition- Origin- Types – Classification – Risks- Operations- Facilities available for Investors- Net Assets Value- Investors rights- General guidelines- Mutual Funds in India and reasons for slow growth.

Unit-IV	**Discounting , Factoring and Forfaiting**	**12 Hours**

Introduction- Discount- Factoring- Meaning- Modes Operandi – Functions- Types of factoring- Factoring Vs Discounting –

For faiting – working of For faiting – Benefits- For faiting in India.

Unit-V	**Financial Derivatives**	**10 Hours**

Meaning- Features – Kinds- Features of Forward contract- Financial forward- Futures- Types of Futures- Forwards Vs Futures of contract- Advantages- Types – Features- Option contract- Benefits – Swaps- credit default swaps Vs Insurance- Types of credit default swaps- Advantages – important of derivatives – inhibiting factors- Recent developments in Indian scenario, Hedging.

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

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

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concept of Financial Services	**K1, K2**
CO2	Learn the concepts of Merchant Banking, Hire Purchase and Leasing.	**K1, K2**
CO3	Develop insights into the Venture Capital and Mutual Funds.	**K2, K3**
CO4	Examine the Discounting, Factoring and Forfaiting.	**K4, K5**
CO5	Familiarize with the Financial Derivatives.	**K4, K5,K6**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	✓						✓	✓		
CO2	✓						✓	✓		
CO3	✓		✓				✓	✓		
CO4	✓	✓	✓				✓	✓		
CO5	✓	✓	✓				✓	✓		✓
Number of Matches= 21,Correlation: Moderate										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFAAL31	**Other Elective Course**	**Allied-BUSINESS STATISTICS-I**	**5**	**4**

Course Objectives

1. To understand and apply statistics tools in business and economic problems.
2. To know the collection, classification and tabulation of data.
3. To familiarize the diagrammatic and graphical representations.
4. To know the role and measure of central tendency.
5. To analyse measures of dispersion and skewness.

Unit-I	**Introduction**	**15 Hours**

. Origin and growth of statistics – definition - functions and limitations of statistics- collection of data – primary and secondary data – classification and tabulation of data.

Unit-II	**Diagrammatic and Graphical**	**15 Hours**

Diagrammatic and graphical representation of data – bar diagrams – pie diagram - pictograms and cartograms- frequency distribution.

Unit-III	**Measures of Central Tendency**	**15 Hours**

Measures of central tendency – mean- median and mode- geometric mean and harmonic mean – advantages and limitations.

Unit-IV	**Measures of Dispersion**	**15 Hours**

Measures of dispersion – range- mean deviation- quartile deviation- standard deviation

Unit-V	**Skewness**	**15 Hours**

Skewness – Karl Pearson- Bowley's and Kelly's co-efficient of skewness- Lorenz curve.

Books for Study:

1. R.S.N. Pillai and Bhagavathi: Statistics - Theory & Practice- Sultan Chand & Company- New Delhi- 2012
2. P.R. Vittal- Business Statistics- Margham Publication-Chennai-2018.
3. S.Sankaran: Statistics- Margham Publication-Chennai-2018.
4. S.P. Gupta- Practical Statistics- S Chand & Co- New Delhi 2010.
5. Dr. H.Premraj- Business Statistics- Margham Publication-Chennai-2018.

. **Books for Reference:**

1. S Dr. S. P. Gupta- Statistical Methods- Sultan Chand & Sons- New Delhi- 2009.
2. Thukral J.K- Business Statistics, Taxmann Publication, New Delhi.
3. B.N.Asthana- Elements of statistics – Chaitanya Publishing house Allahabad.
4. Richard Levin & David Rubin- Statistics for Management – Prentice Hall.
5. Venkatachalapathy & Dr. Premraj- Statistical Methods- Margham Publication-Chennai-2018

E-Resources:

1. www.sas.com
2. www.scribbr.com
3. www.statisticshowto.com

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand and apply of statistical tools in business and economics.	**K1, K2,K3**
CO2	Prepare the collection, tabulate and classify various statistical data.	**K3, K4,K5**
CO3	Illustrate the data with diagrammatic and graphical representation.	**K3, K4, K6**
CO4	Assess the central tendency and their application in business.	**K4, K5**
CO5	Able to understand dispersion and skewness.	**K4, K5,K6**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	✓		✓	✓	✓		✓			
CO2	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓	✓		✓	✓	✓	
CO4	✓		✓	✓	✓		✓		✓	
CO5	✓		✓	✓	✓		✓		✓	
Number of Matches = 32, Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFAAL32	**Other Elective Course**	**Allied- BUSINESS ECONOMICS**	**4**	**3**

Course Objectives

1.To familiarize students with basic concepts in Economics.
2.To acquaint students with various laws of Economics, Demand and Supply.
3.To enlighten students on various application of economics Theories and National Income

Unit-I	**Introduction**	**12 Hours**

Business Economics – Definition – Characteristics – Importance – Scope – Differences between Micro Economics and Macro Economics – Roles and Responsibilities of a Business Economist – Economic System and its Types.

Unit-II	***Utility Analysis and Market Structure***	**12 Hours**

Utility - Meaning – Characteristics – Cardinal – Ordinal – 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.

Unit-III	**Demand and Supply**	**12 Hours**

Demand – Definition – Characteristics – Types of Demand - Factors determining Demand – Law of Demand - Elasticity of Demand – Types - Supply – Law of Supply – Factors affecting Supply - Elasticity of Supply – Determinants of Elasticity of Supply.

Unit-IV	**Production and Cost Functions**	**12 Hours**

Production – Factors – Production Function – Iso-quants - Law of Variable Proportions – Economies of Scale – Break-Even Analysis. Cost and Revenue Functions – Types – Short Run – Long Run – Areas of Cost Control.

Unit-V	**Profit Theories and National Income**	**12 Hours**

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.

Books for study:

11. Sankaran S, Business Economics, Margham Publications, Chennai.
12. Ahuja H.L, Business Economics, S.Chand& Co. Ltd., New Delhi.
13. Ray, N.C, An introduction to Microeconomics, Macmillan Company of India Ltd: New Delhi.
14. ManabAdhikary, Anurag , Business Economics, Jain Publishers, New Delhi, 2008.
15. Datt, R. and K.P.M. Sundharam , "Indian Economy", S. Chand & Company Ltd., New Delhi.

Books for Reference:

1. Agarwal M.D, and Som Deo, Business Economics, Ramesh Book Depot, New Delhi.
2. Mehta P.L, Managerial Economics, Sultan Chand & Sons., New Delhi

Mithani, D.M, Managerial Economics – Theory and Application, Himalaya Publishing House Pvt. Ltd., Mumbai.

3. Varian H.R, Intermediate Microeconomics: A Modern Approach‖, East West Press Pvt., Ltd, New Delhi, Eighth Edition, 2015.
4. Ahluwalia, I.J. and I.M.D. Little (Eds.) (1999), India's Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New Delhi.

E-Resources:
1. www.icsi.edu
2. www.icai.org
3. www.ncertbooks.guru
4. www.iare.ac.in
5. www.innovative.org.in

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the discipline of business economics, micro and macro economic aspects.	K2
CO2	Explain law of diminishing marginal utility and law of equi–marginal utility.	K1,K2
CO3	Comprehend demand, supply, types and factors that influence of demand and supply.	K2,K3
CO4	Evaluate the production and cost analysis, law of variable of proportions and break-even analysis.	K2,K3
CO5	Develop the skills to use theories of profit and provide an idea regarding national income and its welfare.	K2,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	PSO9	PSO10
CO1			✓	✓	✓	✓		✓	✓	✓
CO2	✓		✓		✓		✓			
CO3	✓	✓			✓			✓	✓	✓
CO4	✓		✓	✓		✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓		✓		✓		
Number of matches =31, Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFASE31	**Skill Enhancement Course**	**FINANCIAL MANAGEMENT**	**3**	**3**

Course Objectives

1. To gain a knowledge about the basic functions' financial management
2. To make Students to know the importance of investment decision.
3. To know the importance of financing decision in business.
4. To familiarise the students to know the role of shareholders in business
5. To calculate the working capital requirements and its importance in business.

Unit-I	**Introduction**	**9 Hours**

. Nature and Scope of financial management- Objectives of financial management Functions of financial management- Role of finance manager- Functions of financial manager- Time value of money- Risk and return. (Simple Problems)

Unit-II	**Investment Decision**	**9 Hours**

Long term investment decisions- Capital budgeting – Needs – Method of Capital budgeting Techniques - Payback period method- Accounting Rate of Return method- Net Present Value (NPV) - Internal rate of return- Profitability index- Decision Tree Method. (Simple Problems only)

Unit-III	**Financing Decision**	**9 Hours**

Sources of Long term and short term finance- Estimation and component of Cost of Capital- Cost of Debt- Cost of Equity- Cost of retaining Earning- Weighted Average Cost of Capital- Capital Structure- Theories of Capital Structure- Determinants of Capital Structure. (Simple Problems only)

Unit-IV	**Dividend Decision**	**9 Hours**

Dividend policy decisions- Types of Dividends- Factors determining Dividend Policy – Dividend Theories- Dividend policy in practices. (Simple Problems only)

Unit-V	**Working Capital Decision**	**9 Hours**

Working capital Decision- Concept of Working Capital- Types of Working Capital- Sources of Working Capital- Determinant of Working Capital requirements- Forecasting of Working Capital requirements. (Simple Problems only)

Books for Study-

1. A. Murhty- "Financial Management"- Margham publication-2016
2. S.N. Maheshwary- Fundamentals of Financial Management- Sulthan Chand & Sons- New Delhi-2009.
3. Shashi K.Gupta- Neeti Gupta-"Financial Management"- Kalyani Publishers- New Delhi-2013.
4. V.Gurumurthy G. Selvaraj R.Swarnalakshmi- "Financial Management" Charulatha Publications- Chennai-2016
5. N.Premavathy & M.Inbalakshmi- "Financial Management" Sri Vishnu Publication-2010

Books for Reference-
1. Fundamentals of Financial Management- Von Horne- Prentice Hall- New Delhi - 2013
2. Prasana Chandra- "Financial Management-Text & Practices-" Tata McGraw hill- New Delhi-2006.
3. I.M Pandey- "Financial Management- Text & Practices-" Vikas Publishing House- New Delhi-2009.
4. M.Y. Khan & P.K.Jain- Financial Management- Tata McGraw Hill-New Delhi-2005
5. V.K. Bhalla- "Financial Management" Sulthan Chand & Sons-New Delhi-2014
.

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Gain knowledge and skills in financial management and value of risk.	**K1, K2**
CO2	Students gain the knowledge on the investment decision undertaking the business.	**K2, K3**
CO3	Students should be able to understand cost of capital.	**K3,K4**
CO4	Knowing how company pays its dividends to shareholders.	**K4,K5,K6**
CO5	Familiarize the calculation of working capital and its types.	**K3,K4, K5**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	✓			✓			✓			
CO2	✓			✓	✓	✓	✓	✓		
CO3	✓	✓	✓	✓	✓	✓	✓	✓		
CO4	✓	✓	✓		✓	✓	✓	✓		
CO5	✓	✓	✓		✓	✓	✓	✓		
Number of Matches = 31 , Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFA4001	**Discipline Specific Core Course**	**CORPORATE ACCOUNTING-II**	**5**	**4**

Course Objectives

4. To make the students understand the concepts of Accounting for Corporate Restructuring.
5. To familiarize the students about Alteration of Share Capital and Internal Reconstruction.
6. To equip the students with knowledge of Liquidation Accounting, Accounts of Banking Companies and Accounting for Price Level Changes.

Unit-I	**Accounting for Corporate Restructuring**	**15 Hours**

Corporate Restructuring – Meaning of Amalgamation, Absorption, External Reconstruction and Merger (AS14) – Purchase Consideration – Computation of Purchase Consideration – Entries in the books of Transferor and Transferee – Preparation Amalgamated Balance Sheet (Excluding Inter-Company Holdings)

Unit-II	**Alteration of Share Capital and Internal Reconstruction**	**15 Hours**

Alteration of Share Capital of Company – Internal Reconstruction – Internal Reconstruction Vs External Reconstruction – Procedure for Reducing Share Capital – Accounting Entries – Capital Reduction Account – Preparation of Post Reconstruction Balance Sheet

Unit-III	**Liquidation Accounting**	**15 Hours**

Liquidation - Meaning – Modes of Winding up or Liquidation – Circumstances in which Company may be wound up by the Tribunal – Order of Payment – Secured Creditors – Preferential Creditors – Statement of Affairs – Deficiency or Surplus Accounts – Liquidator's Final Statement of Account.

Unit-IV	**Accounts of Banking Companies**	**15 Hours**

Accounts of Banking Companies – Meaning – Preparation of Profit and Loss Account and Balance Sheet with Relevant Schedules (New Method) – Non-Performing Assets (NPA).

Unit-V	**Accounting for Price Level Changes**	**15 Hours**

Meaning– Limitation of Historical Cost Accounting – Methods or Techniques of Price Level Accounting – Current Purchasing Power Technique (CPP) – Computation of Gain or Loss on Monetary Items – Valuation of Cost of Sale and Closing Inventory - Current Cost Accounting Technique (CCA) - Cost of Sales Adjustment (COSA) – Monetary Working Capital Adjustment (MWCA).

Note: Weightage of marks: Theory 30% and Problems 70%

Books for Study:

11. **Shukla M.C, Grewal T.S, Gupta S.C,** Advanced Accounts, S. Chand & Co. Ltd., New Delhi.
12. **Reddy T.S & Murthy A,** Corporate Accounting, Margham Publications, Chennai.
13. **Jain S.P & Narang K.L,** Advanced Accounting, Kalyani Publishers, New Delhi.

14. **Maheshwari S.N. & Maheshwari S.K,** Corporate Accounting, Vikas Publication, New Delhi.
15. **Gupta R.L &Radhaswamy M,** Advanced Accountancy, Sultan Chand & Sons, New Delhi.

Books for Reference:

11. **Radhika P & Anita Raman**, Advanced Corporate Accounting, Mc Graw Hill Education (India) Private Ltd., Chennai
12. **Naseem Ahmed, Ashok Sharma &Rajender Kumar**, Corporate Accounting, Ane Book Pvt. Ltd., New Delhi.
13. **Palaniappan R & Dr. Hariharan N**, Corporate Accounting, Vijay Nicole Imprints Private Ltd., Chennai.
14. **Hanif M & Mukherjee A**., Corporate Accounting, Mc Graw Hill Education (India) Private Ltd. Chennai.
15. **Tulsian P.C. & Bharat Tulsian C.A**., Corporate Accounting, S. Chand & Co. Ltd. New Delhi.

E-Resources:

1.www. collegetutor.net
2.www. gkpad.com
3.www.icai.org

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand accounting for corporate restructuring.	**K2, K3**
CO2	Imbibe the techniques of recording transactions in the books of Transferor Company and Transferee Company.	**K2,K3**
CO3	Prepare accounts related to Alteration of Share Capital and Reduction of Share Capital.	**K2, K3**
CO4	Explain the concept of liquidation of companies.	**K2,K3**
CO5	Prepare statement of affairs and liquidator's final statement of accounts.	**K2,K3**
CO6	Draft final accounts of banking companies.	**K2, K3**
CO7	Describe the concept and techniques of inflation accounting.	**K2,K3**
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	PSO9	PSO10
CO1	✓	✓		✓	✓	✓		✓		✓
CO2	✓	✓		✓	✓	✓		✓		✓
CO3	✓	✓		✓	✓	✓	✓	✓		✓
CO4	✓	✓		✓	✓	✓	✓	✓		✓
CO5	✓	✓		✓	✓	✓	✓	✓		✓
CO6	✓	✓		✓	✓			✓		✓
CO7	✓	✓		✓	✓			✓		✓
Number of matches =50 , Correlation: Very High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-21	22-42	43-49	50-70
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFA4002	**Discipline Specific Core Course**	**COMPANY LAW**	**5**	**4**

Course Objectives

1. To make the students understand the concepts and contents of Indian Companies Act, 2013.
2. To disseminate knowledge on types of Companies, Memorandum of Association and Articles of Association.
3. To teach the students about the Qualification of Directors, Powers and their Duties.

Unit-I	**Introduction to the Companies Act, 2013**	**15 Hours**

Company – Meaning - Definition - Characteristics – Advantages – Limitations – Types – Private Company Vs Public Company – One Person Company (OPC) - Limited Liability Partnership (LLP).

Unit-II	**Memorandum, Articles of Association and Prospectus**	**15 Hours**

Formation of a Company – Promotion – Functions of a Promoter – Memorandum of Association – Meaning – Contents – Purpose – Articles of Association – Contents – Distinction between Memorandum and Articles of Association - Prospectus – Contents - Statement in Lieu of Prospectus.

Unit-III	**Shares and Debentures**	**15 Hours**

Share Capital - Kinds of Shares - Sweat Equity Shares and ESOPs - Rights Issue and Bonus Shares- Buyback of Securities – Debentures – Types - Differences between Shares and Debentures.

Unit-IV	**Directors and Shareholders**	**15 Hours**

Members of a Company – Members Vs Shareholders – Shareholders' Democracy - Powers - Directors of a Company – Definition – Qualification – Disqualification - Number of Directorships – Appointment of Directors – Removal of Directors – Independent Directors – Rights - Duties and Responsibilities.

Unit-V	**Meetings, Resolutions& Winding up of Company**	**15 Hours**

Meetings – Meaning – Kinds – Resolutions – Types - Resolution requiring Special Notice – Winding-up – Meaning - Modes of Winding-up - Powers and Consequences

Books for study:

1. N.D. Kapoor, Company Law and Secretarial Practice, Sultan Chand
2.Vijay Gupta, K.G. Garg, Company Law, Kalyani Publishers, New Delhi.
3. M.C. Shukla and S.S. Gulshan - Principles of Company Law-S. Chand & Co.,
4. A.K. Mujumdar,Dr. G.K. Kapoor, Taxmann's Company Law & Practice, Taxmann Publications Pvt. Ltd., New Delhi.
5. L. Santhi, Company Law (As per Companies Act, 2013), Margham Publications.

Books for Reference:

1. Ganesan, Company Law and Secretarial Practice, Rainbow Publications.
2. Kathiresan & Radha, Company Law and Secretarial Practice, Prasana Chand & Co
3. Sherlekar, Secretarial Practice, Himalaya Publishers
4. Pattan Shetti, Company Law and Secretarial Practice, S. Chand and Co.
5. V. Balachandran & M. Govindarajan, A Student Handbook on Company Law and Practice, Vijay Nicole Imprints Pvt. Ltd.

E-Resources:

1. http://www.clb.nic.in/

2. http://www.companiesact.in/ 3. http://www.mca.gov

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts, characteristics and different kinds Companies.	**K1,K2**
CO2	Create the Knowledge on the memorandum of Association, Articles of Association and Prospectus of a Company	**K2, K3**
CO3	Knowledge on the types of Shares and Debentures	**K3,K4**
CO4	Evaluate the qualifications, appointment of Directors and their rights, duties.	**K2,K5**
CO5	Analyze the types of Meetings and Resolutions of a Company	**K2, K3, 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	PSO9	PSO10
CO1	✓	✓	✓	✓			✓	✓		
CO2	✓	✓	✓	✓		✓	✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓	✓	✓			✓	✓	✓		
CO5	✓	✓	✓				✓	✓		
Number of matches 31=, Correlation: High										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFA4003	**Discipline Specific Core Course**	**MODERN BANKING**	**4**	**4**

Course Objectives:
1. To impart knowledge to students on different types of Banks in India.
2. To enlighten students about the functions of different Banks.
3. To create awareness among students about recent developments in Banking.

Unit-I	*Introduction to Banking*	**12 Hours**

Banking – Definition – Importance – Role of Banks in Economic Development - Types of Banks – Functions of Commercial Banks.

Unit-II	*Development Banks and Central Banks*	**12 Hours**

Development Banks – Functions of Development Banks – NABARD – Functions of NABARD – Cooperative Banks – Land Development Banks - Central Bank – Meaning – Functions – Reserve Bank of India – Functions – Credit Control Techniques – Quantitative Credit Control Techniques – Qualitative Credit Control Techniques.

Unit-III	**Banker and Customer**	**12 Hours**

Relationship between Banker and Customer – Rights of Banker and Customer – Obligations of Bankers and Customers – Dishonour of Cheque – Causes - Garnishee Order – Know Your Customer (KYC).

Unit-IV	**E – Banking**	**12 Hours**

E-Banking – Benefits and Limitations – Mobile Banking – Fund Transfers – NEFT – RTGS – IMPS – UPI – e-Cheque – EFTPOS.

Unit-V	**Payment Banks & Issues in Banking**	**12 Hours**

Payment Banks – Features – Functions - Advantages – Limitations – Different Payment Banks in India – Differences between Traditional Banks and Payment Banks - Contemporary Issues in Banking – Customer Grievances and Redressal – Banking Ombudsman.

Books for study:
1. Santhanam, Banking and Financial Services, Margham Publications, Chennai
2. Natarajan S, Dr. R. Parameswaran, Indian Banking, S. Chand, New Delhi.
3. D. Muraleedharan, Modern Banking – Theory and Practice, Prentice Hall of India, New Delhi.
4. Gordon & Natarajan, Banking Theory, Law and Practice, Himalaya Publishing House, New Delhi.
5. S. Gurusamy, Banking Theory, Law & Practice, Vijay Nicole Imprints Private Limited, Chennai.

Books for Reference:
1. Sundharam & Varshney, Banking Theory, Law & Practice, Sultan Chand & Sons, New Delhi.
2. R. Machiraju, Modern Commercial Banking, New Age International Publishers, Mumbai.
3. K.P.M. Sundaram, E.M. Sundaram, Modern Banking, Sultan Chand & Sons Ltd., New Delhi.
4. Dr. V. Balu, Banking and Financial System, Sri Venkateswara Publications, Chennai
5. Prof. D. Surya Chandra Rao, Banking Reforms in India, Regional Publications, New Delhi.

E-Resources:
www.rbi.org.in

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand different types of Banks and Analyse the role of banks	K1, K2, K4
CO2	Understand functions of Banks	K1, K2
CO3	Analyse the relationship between Banker and Customer	K2, K4
CO4	Assess the benefits of e-Banking	K2, K5
CO5	Evaluate the benefits of Payment Banks	K2, 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	PSO9	PSO10
CO1		✓	✓				✓	✓		
CO2		✓	✓	✓			✓	✓		✓
CO3		✓	✓	✓	✓		✓	✓	✓	
CO4		✓	✓	✓	✓		✓	✓		✓
CO5		✓	✓	✓	✓		✓	✓	✓	
Number of matches = 31, Correlation: High										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFANM41	**Other Elective Course 1**	**OPERATIONS RESEARCH**	**4**	**2**

Course Objectives

1. To familiarize the Operation research and its applications.
2. To know the calculation of effective cost of Transportations.
3. To assign the right person to a right job in a different ways.
4. To get a knowledge on Program Evaluation Review Techniques.
5. To evaluate the CPM (Critical Path Method).

Unit-I	**Operations Research and Linear Programming Problem**	**14 Hours**

Meaning- uses and limitations of Operations Research Meaning of linear programming- uses- assumptions and limitations of LPP- explanation of basic terminology of LP- Mathematical form of LP- solution of LP problem by graphical method only. Simple mathematical & applied problems of two variables only.

Unit-II	**Transportation Problem (TP)**	**12 Hours**

Meaning of balanced and unbalanced Transportation Problem (TP)- General Transportation table and its mathematical form for balanced TP- Initial basic feasible solution (IBFS) and its cost by North-West Corner Method (NWCM)- Least Cost (Matrix Minima) Method (LCM)- Vogel's Approximation Method (VAM)- examples based on these methods for balanced and unbalanced TP

Unit-III	**Assignment Problem (AP)**	**10 Hours**

Meaning of balanced Assignment problem (AP)- Hungerian method for solving A.P. in the cases of minimization and maximization problem.

Unit-IV	**PERT**	**12 Hours**

Meaning- uses- limitation- characteristics of PERT- explanation of basic terms like activity- event- dummy activity- optimistic time- pessimistic time- most likely time- expected time. Fulkerson's rules for numbering the events (Simple Problems Only)

Unit-V	**CPM Techniques**	**12 Hours**

Meaning- uses - limitations of Critical Path Method (CPM)- differences between PERT and CPM- earliest start time- earliest finish time- latest start time- latest finish time- total float time of activity. (Simple Problems Only)

Books for study:

1. H.A.Taha- Operations. Research- Macmillan Publishing Co. Inc.
2. Vohra N.D- Quantitative Techniques in Management Tata Mc Graw Hill- New Delhi.
3. J.K.Sharma : O.R. Theory and Applications- Macmillan India Ltd.
4. Gupta & Hira -Operations Research- S. Chand Publication- New Delhi.
5. V.K.Kapoor -Operations Research: Concept- Problems & Solutions- Sulthan Chand Publication- New Delhi.

Books for Reference:

1. Rama Murthy- Operations Research- New Age International Publisher- New Delhi
2. Anderson- Sweeney- Williams- An Introduction to Management Science Quantitative Approach to Decision Making- Cengage Learning India Pvt. Ltd. New Delhi.
3. Barry Render- Ralph M. Stair - Michael E. Hanna- Quantitative Analysis for

Management- Pearson Education(Singapore) Pvt. Ltd.
4. Ravinderan- Phillips and Solber- Operations Research Principles & Practice- Wiley Publication.
5. Govindasami Naadimuthu and Richard Bronson- Therory & Problems of Operations Research (Schaum's outline series

E-Resources:1. http://libguides.riphah.edu.pk
2. www. .ifors.org.
3. www.iisc.ac.in

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the Concept of Operation Research and LPP.	K1, K2,K3
CO2	Learn the Concepts and Procedure of Transportation Problems.	K3, K4, K5
CO3	Develop insights into the Assignment Problems	K2, K3, K6
CO4	Examine the Program Evaluation Review Techniques.	K1, K3, K6
CO5	Familiarize with the Critical Path Method.	K1, K4, K6
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	PSO 09	PSO 10
CO1	✓	✓		✓	✓		✓			
CO2	✓	✓		✓	✓		✓	✓		
CO3	✓	✓		✓	✓		✓	✓		
CO4	✓	✓		✓	✓		✓	✓		✓
CO5	✓	✓		✓	✓		✓	✓		✓
Number of matches = 31, Correlation: High										

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFANM42	**Other Elective Course 2**	**PERSONAL FINANCE & PLANNING**	**4**	**2**

Course Objectives

1. To know the role of personal finance.
2. To recognize the concept of investment planning.
3. To understand the personal tax planning.
4. To analyze Insurance tax planning.
5. To familiarize the retirement planning procedure.

Unit-I	***Introduction***	**12 Hours**

Financial goals- time value of money- steps of financial planning- personal finance/loans- education loan- car loan & home loan schemes. Introduction of savings- benefits of savings- management of spending & financial discipline- net banking and UPI- digital wallets- security and precautions against ponzi schemes and online frauds such as phishing- credit card cloning- skimming etc.

Unit-II	***Investment Planing***	**12 Hours**

Process and objectives of investment- concept of return & risk for various assets class- portfolio risk and return- diversification & portfolio formation- real estate- financial derivatives & commodity market in India- mutual fund schemes including SIP.

Unit-III	**Personal Tax Planning**	**12 Hours**

Tax structure in India for personal taxation- steps of personal tax planning- exemptions and deductions for individuals- tax avoidance versus tax evasion.

Unit-IV	**Insurance Planning**	**12 Hours**

Need for protection planning - risk of mortality- health- disability and property. Importance of insurance: life and non-life insurance schemes.

Unit-V	**Retirement Planning**	**12 Hours**

Retirement planning goals- process of retirement planning- pension plans available in India- reverse mortgage- new pension 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. Sinha Madhu- Financial Planning: A Ready Reckoner July 2017 Mc Graw Hill- New Delhi- 2017

3. Tripathi- Vanita- Fundamentals of Investment- 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- Amar The Only Financial Planning Book that You Will Ever Need- Network 18 Publications Ltd (CNBC TV 18)

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- New Delhi-2018

E-Resources:
1. www.smartasset.com
2. www.cfp.net
3. www.cleartax.in

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the meaning and relevance of Financial Planning.	K1,K2
CO2	Familiarize with regard to the concept of Investment Planning and its methods.	K2,K3
CO3	Examine concept of Personal Tax Planning.	K3, K4,K5
CO4	Analyze Insurance Planning and its relevance	K3, K4,K6
CO5	Develop insights in to Retirement planning and its relevance	K2, 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	PSO9	PSO10
CO1	✓	✓	✓				✓		✓	
CO2	✓	✓	✓		✓		✓		✓	
CO3	✓	✓	✓	✓	✓		✓	✓	✓	
CO4	✓		✓	✓			✓	✓	✓	
CO5	✓		✓	✓			✓	✓	✓	
Number of Matches = 31 , Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFANM43	**Other Elective Course**	**PUBLIC FINANCE**	**4**	**2**

Course Objectives

1. To enable them to know more about public finance, revenue, and its importance towards the development of nations.
2. To create awareness of public expenditure, public debt, and deficit finance
3. To give an understanding of the role of local finance towards the development of local infrastructure. .

Unit-I	***Introduction of Public Finance & Public Revenue & Canons of Taxation***	**12 Hours**

Introduction – Definition and Meaning – Scope of Public Finance – Meaning, Definition, and Scope of Public Revenue – Sources and Classification of Public Revenue –Meaning and Definition of Tax and Characteristics and Classification of Taxes – Canons of Taxation

Unit-II	***Public Expenditure***	**12 Hours**

Meaning and Definition of Public Expenditure – Classifications and Canons of Public Expenditure – Public Vs Private Expenditure – Causes for growth of Public Expenditure in India – Developmental and Non – Developmental Funds.

Unit-III	**Public Debt & Deficit Financing**	**12 Hours**

Meaning and Definition of Public Debt – Classification – Redeemable and Irredeemable Debts – Funded and Unfunded Debts – Voluntary and Compulsory Debts – Productive and Unproductive Debts – Causes for growth of Public Debts – Deficit Budget – objectives-Role & Effects of Deficit Financing in India.

Unit-IV	**Federal Finance & Finance Commission**	**12 Hours**

Federal finance – Principles – Centre & State Financial Relationship – Finance Commission – Latest Finance Commission Recommendations.

Unit-V	**Local Finance**	**12 Hours**

Meaning of Local Finance – GRAM Panchayats (Village Panchayats) – Panchayat Union – Zila Parishad (District Board) – Municipal Corporation – Finances of Local Bodies.

Books for Study:

1. B.P. Tyagi, Public Finance, Jai Prakash Nath & Co., Meerut – 2015
2. S.Sankaran, Fiscal Economics, Margham Publications – Chennai – 2019
3. SK. Singh, Public Finance, S.Chand, New Delhi – 2017
4. RK Lekhi,Jogindar Singh, Public Finance, Kalyani Publisher - 2020

Books for Reference:

1. Arjun.Y, Pangannavar, Public Finance Practices and Principles, Atlantic Publisher and Distributor, Karnataka – 2014.
2. Maria John, M. Kennedy, Public Finance, Prentice-Hall of India Pvt. Ltd – 2013.
3. Harvey S Rosen and Ted Gayer, Public Finance, McGraw Hill – 2012.
4. Kisan Sukhdeorao, Dr. Ambethkar's Approach Public Finance Policy, BR Publishing Corporation – 2010.
5. Ambar Ghosh, Chandana Ghosh, Public Finance & GST, PHI Learning Publishers – 2018.

E-Resources:

1. www.doe.gov.in
2. www.oecd.org
3. www.corporatefinanceinstitute.com
4. www.pfms.nic.in
5. www.isec.ac.in

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Familiarize the basics of public finance and revenue	K2, K3
CO2	Learn about the spending on public expenditure	K2, K3
CO3	Examine the various classifications of public debt, its causes, and deficit financing.	K2, K3
CO4	Give ideas over federal finance and finance commission's recommendations	K2, K3
CO5	Understand the contributions of state finance and local finance.	K2, K3
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	PSO9	PSO10
CO1	✓	✓	✓	✓	✓			✓		
CO2		✓	✓	✓				✓		
CO3	✓	✓	✓	✓	✓			✓		
CO4	✓	✓	✓	✓	✓			✓		
CO5	✓	✓	✓	✓	✓			✓		
Number of matches = 28, Correlation: Moderate										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBCSE41	**Skill Enhancement Course**	**COMPUTER APPLICATIONS IN BUSINESS**	**3**	**3**

Course Objectives:

1. To provide computer knowledge to commerce students and equip them with computational skillsusing ICT tools.
2. To handle the document creation for communications- preparation of spreadsheet and skills to create and make good presentations.
3. To formulate various computations in finance and accounts and represent the business data.

Unit-I	***Basic of Computer***	**7 Hours**

Meaning of computer- areas of applications- components of computer- input process- output cycle- memory & control unit- RAM- types of RAM- ROM- types of ROM- RAM vs. ROM- input & output device- software- types of software- hardware- programming language- computer virus- types of virus.

Unit-II	***Word Processing***	**10 Hours**

Introduction to word Processing: Word processing concepts- use of templates- working with word document- editing text: find and replace text- formatting: spell check- autocorrect- auto text- bullets and numbering- tabs- paragraph formatting: indent- page formatting- header and footer- tables: inserting- filling and formatting a table- inserting pictures and video- mail merge: including linking with databases and spreadsheet files- printing documents- citations and footnotes. Creating Business Documents using the above facilities.

Unit-III	**Excel**	**10 Hours**

Spreadsheet concepts: Managing worksheets- formatting- conditional formatting- entering data- editing- printing- protecting worksheets- handling operators in formula- project involving multiple spreadsheets- organizing charts and graphs- working with multiple worksheets- controlling worksheet views- naming cells and cell ranges.

Unit-IV	**Spreadsheet and its Business Application**	**8 Hours**

Working with Data: sort and filter- consolidate: tables- pivot tables- goal seek- data tables and scenario manager- data analysis Toolpak: descriptive statistics- moving averages- histogram- covariance- correlation- regression analysis (only for projection)

Creating business spreadsheet: loan and lease statement- ratio analysis- payroll statements- graphical representation of data- frequency distribution and its statistical parameters- correlation and- regression analysis.

Unit-V	**Preparing Presentation**	**10 Hours**

Basics of presentations: slide - fonts- drawing - editing - inserting- tables - images - texts- symbols - hyper linking- media- design- transition- animation- slideshow.

Creating Business Presentations using above facilities.

Books for Study:

1. P. Rizwan- Computer Application in Business- Margham Publication- Chennai.
2. Joyce Cox and Joan Lambert- Microsoft Word 2010 -Step by Step- Microsoft Press.
3. Mathur Shruti and Jain Pooja- Computer Applications in Business- Golgotha Publishing- Delhi
4. Sharma S.K. and Bansal Mansi- Computer Applications in Business- Taxmann- New Delhi.

Books for Reference:

1. Elmasari Ranez & Shamkant B.Navathe- Fundamentals of Database Systems- Pearson Education.

2. Jain Hem Chand and Tiwari H. N. (2019)- Computer Applications in Business- Taxmann- Delhi.
3. Madan Sushila- Computer Applications in Business- Scholar Tech Press.
4. Wayne Winston- Data Analysis & Business Modeling- PHI.
5. Simon Benninga- Financial Moddeling- The MIT Press.

E-Resources:

1. **www.slideshare.net**
2. **www.goskills.com**
3. **www.invensislearning.com**
4. **www.microsoft.com**

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend the basics of computer and its devices	K1,K2,K3,K5
CO2	Handle the document creation for communications	K1,K2,K3,K5
CO3	Familiar to preparation of spreadsheet	K1,K2,K3,K5,K6
CO4	Make various computations in finance and accounts and represent the business data	K1,K2,K3,K5,K6
CO5	Gain skills to create and make good presentations.	K1,K2,K3,K5,K6
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	PSO 09	PSO 10
CO1	✓		✓	✓	✓		✓			✓
CO2	✓		✓	✓	✓		✓			✓
CO3	✓		✓	✓	✓	✓	✓			✓
CO4	✓		✓	✓	✓	✓	✓			✓
CO5	✓		✓	✓	✓	✓	✓			✓
Number of matches = 33 , Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFAAL41	**Other Elective Course**	**BUSINESS STATISTICS - II**	**5**	**4**

Course Objectives:

1. To estimate the relationship between two or more variables through correlation.
2. To estimate or predict the value of one variable from the given value of other variable through regression.
3. Index numbers are series of number by which changes in the magnitude of phenomenon are measured over time to time.
4. To study arrangement statistical data in accordance with time of occurrence.
5. To gain knowledge on statistical quality control & business forecasting.

Unit-I	Correlation	**15 Hours**

Correlation- definition- significance- types- properties- assumptions- merits- demerits- methods- Simple correlation – Karl Pearson's co-efficient of correlation – Spearman's rank correlation- concurrent deviation method. (only simple problems)

Unit-II	Regression	**15 Hours**

Definition- uses- significance- distinction between correlation and regression- methods- regression equation (actual mean & assumed mean) - regression lines- standard error of estimate. (only simple problems).

Unit-III	**Index Number**	**15 Hours**

Index number – introduction – uses of index numbers – types- interpretations- un weighted index number – simple aggregate method and simple average of price relative method – weighted index number – Laspyres- Paasches- Dorbish- Bowley's- Marshall- Edgeworth and Fisher's index number.

Unit-IV	**Time Series**	**15 Hours**

Time Series – definition- uses- components of time series – methods- measurement of trends – semi average method - moving average method – method of least square – seasonal indices.

Unit-V	**Statistical Quality Control & Business Forecasting**	**15 Hours**

Statistical quality control- need- advantages- limitations- methods- control chart- meaning- uses- types- business forecasting- role- steps- methods- limitations.(Theory only)

Books for Study:

1. Dr. S. P. Gupta- Statistical Methods- Sultan Chand & Sons- New Delhi- 2009.
2. P.R. Vittal- Business Statistics- Margham Publication-Chennai-2018.
3. S.Sankaran: Statistics- Margham Publication-Chennai-2018.
4. S.P. Gupta- Practical Statistics- S Chand & Co- New Delhi 2010.
5. Dr. H.Premraj- Business Statistics- Margham Publication-Chennai-2018.

Books for Reference:

R.S.N. Pillai and Bhagavathi: Statistics - Theory & Practice- Sultan Chand & Company- New Delhi- 2012
2. P.R. Vittal- Business Statistics- Margham Publication-Chennai-2018.

3. B.N.Asthana- Elements of statistics – Chaitanya Publishing house Allahabad.
4. Richard Levin & David Rubin- Statistics for Management – Prentice Hall.
5. Venkatachalapathy & Dr. Premraj- Statistical Methods- Margham Publication-Chennai-2018

E-Resources:
1. www.sas.com
2. www.scribbr.com
3. www.statisticshowto.com

Methodology of Teaching:

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	To estimate the relationship between two or more variables through correlation.	K3,K4
CO2	To estimate or predict the value of one variable from the given value of other variable through regression.	K3,K4, K6
CO3	Index numbers are series of number by which changes in the magnitude of phenomenon are measured over time to time.	K2, K3, K6
CO4	To study arrangement statistical data in accordance with time of occurrence.	K1, K5, K6
CO5	To gain knowledge on statistical quality control & business forecasting	K1, K2,K5
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

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

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	✓		✓	✓	✓	✓	✓			
CO2	✓		✓	✓	✓	✓	✓			
CO3	✓		✓	✓	✓	✓	✓	✓		
CO4	✓		✓	✓	✓	✓	✓	✓		
CO5	✓		✓	✓	✓	✓	✓			
Number of matches = 32 , Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBFAAL42	**Other Elective Course**	**BUSINESS RESEARCH METHODOLOGY**	**3**	**3**

Course Objectives:

1. The course provides a basic understanding of business research and analytics.
2. Primary objective of this course is to orient and develop research acumen among students and also to acquaint them with fundamentals of research.
3. It also aims to equip the students with analytical skills to enhancebusing decision-making in real life situations.

Unit-I	**Nature and Methods of Social Science Research**	**10 Hours**

Meaning and definitions of Research - pure and applied research - meaning of social science research: subject matter- importance and problems in social science research- case study method- historical method-scientific methods - objectivity in social science research**.**

Unit-II	**Research Problems and Hypothesis**	**10 Hours**

Choice of the research problem - factors involved in the choice- research design-role of review of literature - hypothesis: definition - importance of hypothesis in social science research - source of hypothesis - characteristics of a good hypothesis.

Unit-III	**Sampling Techniques**	**8 Hours**

Census method - sampling method. Methods of sampling: random sampling - simple and stratified - judgment method – quota sampling, multistage sampling method- sampling and non sampling errors - methods of reducing both - sampling size - sampling design.

Unit-IV	**Techniques of Data Collection**	**10 Hours**

Primary and Secondary Data, merits and demerits of primary data - methods of collecting primary data: schedule method-observation method - interview method - questionnaire method - measurement and scaling techniques qualities of a good questionnaire. Secondary data: - merits and demerits- sources of secondary data: published, unpublished and e-sources-field survey logistics –challenges and solution.

Unit-V	**Report Writing**	**7 Hours**

Meaning of analysis and interpretation - editing - coding – classification of data – data entry - statistical and mathematical tools of analysis - research report writing: steps and layout.

Books for Study:

1. C.R.Kothari- Research Methodology, Vishwa Prakasan, New Delhi.(2018)
2. B.N.Gosh- Research Methods in Social Science- Sterling, New Delhi.
3. T. Raju- R. Phabu- Business Research Methods- TMH- New Delhi 2004
4. Donald R Cooper- Pamela S Schindler- Business Research Methods- Tata McGraw Hill
5. Dhondyal and Wells - A Guide to Research Methodology, New Delhi.

Books for Reference:

Willam G.Zikmund- Business Research Methods- Cengage New Delhi 2008
2. M.H.Gopal- An Introduction to Research Procedures in Social Sciences: Asia Publishing House- New Delhi.
3. P.V.Young -Scientific Social Surveys and Research: Asia Publishing House, New Delhi.
4. Dr. Vinayaka Murthy- Business Research Methods-Vaishali Publications, Jollarpettai.
5. Goode and Hatt - Methods in Social Research, McGraw-Hill, New Delhi.

E-Resources:

1. **www.sdeouc.ac.in**

2. www.academic.edu
3. www.gfgc.kar.nis.in
4. www.leverageedu.com
5. www.studocu.com

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	To create awareness on business research	K2, K3
CO2	to have clear understanding of business research problem and solution	K2, K3
CO3	to know more about various types of research	K2, K3
CO4	To understand importance of data collection and its suitability for business research	K2, K3
CO5	To awaken the students on various basic statistical test.	K2, K3
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	PSO9	PSO10
CO1	✓			✓	✓	✓	✓		✓	✓
CO2	✓		✓	✓	✓	✓	✓		✓	✓
CO3	✓			✓	✓	✓	✓		✓	✓
CO4				✓	✓	✓	✓		✓	✓
CO5				✓	✓	✓	✓		✓	✓
Number of matches = 34 , Correlation: High										

Mapping Correlation Benchmark

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-15	16-30	31-35	36-50
Correlation	Poor	Moderate	High	Very High

DEPARTMENT OF MATHEMATICS
Program Specific Outcomes (PSOs)

By the end of the program, the students will be able to

PSO1	Develop mathematical ability to think abstractly.
PSO2	Problem solving skills.
PSO3	Creative talents for various types of employment.
PSO4	Student are equipped to appear competitive examinations.
PSO5	Learn independently and improve self performance.
PSO6	Develop in depth knowledge in mathematics appreciating the connection between theory and its applications.
PSO7	Identify the application of mathematics in other discipline and society.
PSO8	Demonstrate the mathematical modelling ability.

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBMS3001	**DSC4**	**VECTOR ANALYSIS & ORDINARY DIFFERENTIAL EQUATIONS**	**5**	**4**

Course Objectives
This course aims to provide logical skills in the formation of ordinary differential equations, to find the solution of differential equations, to apply the Ordinary differential equations in real life problems, to study the basic concepts of vector analysis.

UNIT– I	**VECTOR CALCULUS, GRADIENT, DIVERGENT AND CURL & VECTOR INTEGRATION**	**15 Hours**
Vector differentiation – The vector differential operator – Gradient – Direction and magnitude of gradient – Divergence and Curl – Formula involving ∇ operator – Operators involving ∇ twice. Line integral – Surface integral – Volume integral – Problems. Text Book 1 : Chapter 4 : Sections 6 to 12. Chapter 6 : Sections 2 to 5.		
UNIT– II	**APPLICATIONS**	**15 Hours**
Gauss Divergence Theorem – Stoke's Theorem – Green's Theorem (Without Proof) – Simple verification of Theorems and problems. Text Book 1 : Chapter 6 : Sections 6 to 10.		
UNIT– III	**ORDINARY DIFFERENTIAL EQUATIONS – I**	**15 Hours**
Definitions – Solutions of Differential Equations – Formation of Differential Equations – Variable Separable – Homogeneous Equations – Non-homogeneous Equations of the First Degree in *x* and *y*– Linear Equation – Bernoulli's Equation – Exact Differential Equations – Equations solvable for dy/dx - Equations solvable for *y* - Equations solvable for *x* – Clairaut's form Text Book 2: Chapter I : Sections 1, 2, 3 Chapter II : Sections 1, 2, 3, 4, 5, 6 Chapter IV : Sections 1, 2.1, 2.2, 3.		
UNIT– IV	**ORDINARY DIFFERENTIAL EQUATIONS – II**	**15 Hours**
Definitions – The Operator D – Complementary Function of a Linear Equation with constant coefficients – Particular Integral		

Text Book 2: Chapter V : Sections 1, 2, 3, 4		
UNIT– V	**ORDINARY DIFFERENTIAL EQUATIONS – III**	**15 Hours**
Linear equations with variable coefficients – Equations reducible to the linear homogeneous equations – Simultaneous Linear Differential Equations Text Book 2: Chapter V : Sections 5, 6 Chapter VI : Sections 1		
Books for Study: 1. *S. Narayanan and T.K. Manicavachagom Pillai* (1995), VECTOR ALGEBRA AND ANALYSIS, S. Viswanathan Publishers Pvt. Ltd. 2. *S. Narayanan and T.K. Manicavachagom Pillay*, (1994), DIFFERENTIAL EQUATIONS, S. Viswanathan (Printers & Publishers), Pvt., Ltd.		
Books for Reference: 1. *G.B. Thomas and R.L. Finney* (1998), CALCULUS AND ANALYTICAL GEOMETRY, Addison Wesley, 9th Edition, Mass, Indian Print. 2. *M.L. Khanna* (1986), VECTOR CALCULUS, Eighth Edition, Jai Prakash Nath and Co. 3. *George F. Simmons*, (1974), DIFFERENTIAL EQUATIONS WITH APPLICATIONS AND HISTORICAL NOTES, Second Edition, Tata Mcgraw Hill Publications. 4. *M.D. Raisinghania*, (2009), ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS, S. Chand. 5. *M.K. Venkataraman* (1992), ENGINEERING MATHEMATICS, Part B, National Publishing Company, Chennai.		

UBMS3001 – Vector Analysis and Ordinary Differential Equations

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Enrich the basic concepts of ordinary differential equations	**K1**
CO2	Understand the Legendre's linear equation and other types	**K2**
CO3	Evaluate various types of solution of differential equations	**K5**
CO4	Understand the concept of differentiation of vectors.	**K2**
CO5	Acquire skills about the line integral, surface integral and volume integral.	**K3**
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
CO1	✓	✓		✓		✓		✓
CO2	✓	✓		✓			✓	✓
CO3	✓	✓	✓	✓	✓	✓		✓
CO4	✓	✓		✓		✓		✓
CO5	✓	✓		✓		✓		
Number of matches = 26, Correlation : High								

Prepared by		Verified by	
	Dr. S.N. MOHAMED ASSARUDEEN		

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBMS3002	**DSC5**	**FOURIER SERIES & PARTIAL DIFFERENTIAL EQUATIONS**	**4**	**3**

Course Objectives
This course covers the topics in Fourier series which are essential tools of modern applied mathematics and to provide logical skills in the formation of paratial differential equations, to expose to different techniques of finding solutions to these equations. To develop deep understanding of key concepts followed by problems of applied nature.

UNIT–I	**FOURIER SERIES**	12 Hours
Euler's Formulae – Conditions for a Fourier expansion – Functions having points of discontinuity Text Book 1 : Chapter 10 : Sections 10.2, 10.3, 10.4.		
UNIT–II	**FOURIER SERIES** (Contd..)	12 Hours
Change of interval – Even and odd functions- Half Range Series Text Book 1 : Chapter 10 : Sections 10.5, 10.6, 10.7		
UNIT–III	**PARSEVAL'S FORMULA AND HARMONIC ANALYSIS**	12 Hours
Parseval's Formula – Root mean square value – Practical Harmonic analysis. Text Book 1 : Chapter 10 : Sections 10.9, 10.11		
UNIT–IV	**PARTIAL DIFFERENTIAL EQUATIONS – I**	12 Hours
Introduction – Classification of Integrals – Derivation of Partial Differential Equations – Lagrange's Method of solving the Linear Equations Text Book 2:Chapter XII : Sections 1, 2, 3, 4		
UNIT–V	**PARTIAL DIFFERENTIAL EQUATIONS – II**	12 Hours
Special Methods : Standard Forms – Charpit's Method Text Book 2: Chapter XII : Sections 5, 6		

Books for Study:

1. *Dr. B.S. Grewal* (2008), HIGHER ENGINEERING MATHEMATICS, Khanna Publishers, New Delhi.
2. *S. Narayanan and T.K. Manicavachagom Pillay*, (1994), DIFFERENTIAL EQUATIONS, S. Viswanathan (Printers & Publishers), Pvt., Ltd.

Books for Reference:

1. *M.K. Venkataraman* (1992), ENGINEERING MATHEMATICS, Part B, National Publishing Company, Chennai.
2. *M.D. RaiSinghania* (2001), ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS, S. Chand & Co., New Delhi.
3. *M.R. Spiegel* (2005), ADVANCED MATHEMATICS FOR ENGINEERS AND SCIENTISTS, Tata Mc Graw Hill Edition, New Delhi.
4. *Sheply L. Ross* (1984), DIFFERENTIAL EQUATIONS, III Edition, John Wiley & Son, New York.
5. *M.L. Khanna* (2004), DIFFERENTIAL EQUATIONS, Jaiprakash nath and Co.
6. *Dr. M. K. Venkataraman* (1998), ENGINEERING MATHEMATICS, Volume III B, 13th Edition, National Publishing Company.

UBMS3002 - FOURIER SERIES & PARTIAL DIFFERENTIAL EQUATIONS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts of Fourier Series	**K2**
CO2	Identify the even and odd functions and derive the Fourier series	**K1,K5**
CO3	Derive the Parseval's Formula & Evaluate the RMS value	**K2**
CO4	Classify the type of integral & derive the integral surface and Legendre equations	**K2,K3, K5**
CO5	Analyse the standard type of PDE and Charpit's methods	**K4**
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
CO1	✓	✓		✓		✓	✓	✓
CO2	✓	✓		✓	✓	✓		
CO3		✓		✓		✓	✓	✓
CO4	✓	✓	✓	✓		✓		✓
CO5	✓	✓	✓	✓	✓	✓		
Number of matches = 28, Correlations : High								

Prepared by		Verified by	
	Dr. S. Balakrishnan		

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBMSAL31	**OEC5**	**ALLIED- STATISTICS**	**5**	**4**

Course Objectives
1. To understand the concepts of probability. 2. To study the mathematical expectation. 3. To understand the probability distributions.

UNIT–I	**PROBABILITY**	15 Hours
Introduction - Basic terminology - Mathematical probability – Statistical probability - Axiomatic approach to probability - Some theorems on probability - Conditional probability - multiplication on probability - Independent events. Chapter 3: 3.1, 3.3, 3.4, 3.5, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13.		
UNIT–II	**RANDOM VARIABLE AND DISTRIBUTION FUNCTIONS**	15 Hours
Baye's theorem - Distribution function - Discrete random variable – Continuous random variable -Two dimensional random variable. Chapter 4: 4.2, Chapter 5: 5.2, 5.3, 5.4, 5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.5.5		
UNIT–III	**MATHEMATICAL EXPECTATION.**	15 Hours
Introduction - Mathematical expectation or Expected value of a random variable - Expected value of a function of a random variable – Properties of expectations - Properties of variance –Covariance Chapter 6: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6		
UNIT–IV	**CORRELATION, LINEAR AND CURVILINEAR REGRESSION**	15 Hours
Karl Pearson's coefficient of correlation-Rank correlation –Linear Regression. Chapter 10: 10.4, 10.7 & Chapter 11: 11.2		
UNIT–V	**GENERATING FUNCTIONS:**	15 Hours
Moment generating function - Cumulants – Characteristic function - Properties of characteristic function - Chebychev's inequality. Chapter 7: 7.1, 7.2, 7.3,7.3.1, (Omit-7.3.2, 7.3.3, 7.3.4), 7.5.		

Books for Study: *S.C. Gupta and V.K. Kapoor*(2017), FUNDAMENTALS OF MATHEMATICAL STATISTICS, Eleventh thoroughly revised edition, Sultan Chand & sons, New Delhi.
Books for Reference: 1. *R. V. Hogg and A. T. Craig,* (1998), INTRODUCTION TO MATHEMATICAL STATISTICS, Macmillan. 2. *A. M. Mood, G. A. Graybil and D. G. Boes,* (1974), INTRODUCTION TO THEORY OF STATISTICS, McGraw Hill. 3. *S. S. Wilks,* ELEMENTARY STATISTICAL ANALYSIS, Oxford and IBH. 4. *S.C. Gupta and V.K.Kapoor,* FUNDAMENTAL OF APPLIED STATISTICS, Sultan Chand & sons.

UBMSAL31 –ALLIED STATISTICS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Determine various statistical constants.	**K3**
CO2	Acquire knowledge in random variables and distribution functions.	**K3**
CO3	Determine the correlation and rank correlation.	**K3**
CO4	Able to predict the future data using regression.	**K3**
CO5	Understand the characteristic functions and their properties.	**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
CO1		✓	✓	✓	✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓	
CO3			✓	✓	✓	✓	✓	
CO4			✓	✓	✓	✓	✓	
CO5				✓	✓	✓	✓	
Number of matches = 26, Correlations : High								

Prepared by		Verified by	
	Dr.P.Govindaraju		

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBMSAP31	**OEC6**	**ALLIED PRACTICAL – STATISTICS – I**	**3**	**3**

Course Objectives
1) To study the concept central tendency measures 2) To find the relationship between the two variables 3) To study the method of least square

1. Measure of Central Tendency
2. Measure of Dispersion.
3. Correlation Coefficient, Bivariate Correlation Coefficient, Rank Correlation Coefficient and Coefficient of Concurrent deviation
4. Regression Equations
5. Curve Fitting by the Method of Least Squares
   a) $y = a x + b.$
   b) $y = a x^2 + b x + c.$
   c) $y = ae^{bx}.$
   d) $y = a x^b.$

NOTE:

Use of Scientific Calculator shall be permitted for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

Books for Study:

S. P. Gupta, STATISTICAL METHODS, Sultan Chand & Sons, New Delhi.

Books for Reference:

1. *R.V. Hogg and A.T. Craig,* (1998), INTRODUCTION TO MATHEMATICAL STATISTICS, Macmillan.
2. *A. M. Mood, G. A. Graybil and, D.G. Boes,* (1974), INTRODUCTION TO THEORY OF STATISTICS, McGraw Hill.
3. *S. S. Wilks,* ELEMENTARY STATISTICAL ANALYSIS, Oxford and IBH.
4. *S.C. Gupta and V.K. Kapoor,* FUNDAMENTAL OF APPLIED STATISTICS, Sultan & sons.

UBMSAP31 –ALLIED PRACTICAL STATISTICS - I

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Determine the measures & Dispersion	**K5**
CO2	Compute Correlation Coefficient	**K5**
CO3	Evaluate the Regression equations	**K5**
CO4	Fit the curve by the method of least square	**K4**
CO5		
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**
CO1	✓	✓	✓	✓	✓		✓	
CO2	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓
CO4	✓	✓	✓	✓	✓		✓	
CO5								
Number of matches = 26, Correlations : High								

Prepared by	Dr. B. Towfeeq Ahmed & Dr. Zahiruddeen	**Verified by**	

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBMS4001	**DSC6**	**INTEGRAL TRANSFORMS**	**5**	**4**

Course Objectives
To introduce the concepts of Fourier transforms and Z – transforms.

UNIT–I	**FOURIER TRANSFORMS**	**15 Hours**
Definitions – Fourier Integral Theorem – Fourier Transform – Properties of Fourier Transforms. Chapter 22: Sections 22.2, 22.3, 22.4(1)		
UNIT–II	**FOURIER TRANSFORMS (CONTD…)**	**15 Hours**
Fourier Cosine transforms – Fourier Sine transforms – Properties. Chapter 22 : Sections 22.4 (2), 22.5		
UNIT–III	**FOURIER TRANSFORMS (CONTD…)**	**15 Hours**
Convolution theorem – Parseval's Identity for Fourier transform. Chapter 22 : Sections 22.6, 22.7		
UNIT–IV	**Z- TRANSFORMS**	**15 Hours**
Definition – Some standard Z – transforms – Linearity property – Damping rule – Some standard results – Shifting U_n to right and to left – Multiplication by n – Two basic theorems. Chapter 23 : Sections 23.2, 23.3, 23.4, 23.5, 23.6, 23.7, 23.8, 23.9		
UNIT–V	**INVERSE Z – TRANSFORMS AND ITS APPLICATIONS**	**15 Hours**
Some Useful Inverse Z – transform – Convolution Theorem – Evaluation of Inverse Z – Transforms – Application to Difference Equations. Chapter 23 : Sections 23.11, 23.12, 23.15, 23.16		

Books for Study:

Dr. B.S. Grewal, (2008), HIGHER ENGINEERING MATHEMATICS, Khanna Publishers, New Delhi.

Books for Reference:

1. *Goyal Gupta*, LAPLACE AND FOURIER TRANSFORMS, Pragati Edition.
2. *G. Balaji*, TRANSFORM AND PARTIAL DIFFERENTIAL EQUATIONS, Balaji Publishers, Chennai.
3. *P.Kandasamy, Thilagavathy, K. Gunavathy,* ENGINEERING MATHEMATICS, Volume III, S Chand Publishing, New Delhi
4. *A. Singaravelu,* TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS, Meenakshi Agency, Chennai.

UBMS4001 – INTEGRAL TRANSFORM

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the properties of Fourier transforms.	**K2**
CO2	Acquire the knowledge in properties of Fourier Cosine and Sine transforms.	**K1**
CO3	Derive convolution theorem and Parseval's identity.	**K5**
CO4	Explore the transformation techniques to the discrete systems.	**K1**
CO5	Apply Z-tranforms to solve difference equations.	**K3**
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**
CO1				✓	✓	✓	✓	
CO2				✓	✓	✓	✓	✓
CO3		✓	✓	✓		✓	✓	✓
CO4		✓		✓	✓	✓	✓	✓
CO5	✓				✓	✓	✓	✓
Number of matches = 26, Correlations : High								

Prepared by		Verified by	
	Dr. V.J. Sudhakar		

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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
UBMS4002	DSC7	SPECIAL TRANSFORMS	4	3

Course Objectives
To introduce the concepts of Laplace transforms and use them to solve differential equations.

UNIT–I	LAPLACE TRANSFORMS	12 Hours
Definition – Conditions for existence – Transforms of elementary functions – Properties of Laplace transforms – Simple Problems. Chapter 21 : Sections 21.2, 21.3, 21.4		
UNIT–II	LAPLACE TRANSFORMS (CONTD…)	12 Hours
Transforms of Periodic functions – Transforms of Derivatives – Transforms of Integrals – Multiplication by t^n – Division by t – Evaluation of integrals by Laplace Transforms – Simple problems. Chapter 21 : Sections 21.5, 21.7, 21.8, 21.9, 21.10, 21.11		
UNIT–III	INVERSE LAPLACE TRANSFORMS	12 Hours
Inverse Laplace Transforms – Method of Partial Fractions. Chapter 21 : Section 21.12		
UNIT–IV	INVERSE LAPLACE TRANSFORMS (CONTD…)	12 Hours

Other Methods of finding Inverse Transforms – Convolution Theorem. Chapter 21 : Sections 21.13, 21.14		
UNIT–V	**APPLICATIONS**	12 Hours
Application to Differential Equations – Simultaneous Linear equations with constant coefficients. Chapter 21 : Sections 21.15, 21.16		

Books for Study:

Dr. B.S. Grewal (2008), HIGHER ENGINEERING MATHEMATICS, Khanna Publishers, New Delhi.

Books for Reference:

1. *Goyal Gupta*, (1994), LAPLACE AND FOURIER TRANSFORMS, Meerut, Pragati Prakashan Publication.
2. *G. Balaji*, ENGINEERING MATHEMATICS – II, Balaji Publishers, Chennai.
3. *A. Singaravelu,* ENGINEERING MATHEMATICS II, Meenakshi Agency, Chennai

UBMS4002 – SPECIAL TRANSFORMS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Remembering the conditions for existence	**K1**
CO2	Understand the properties of Laplace transforms.	**K2**
CO3	Evaluate the integrals by Laplace transforms.	**K5**
CO4	Find inverse Laplace transform using partial fraction method and convolution theorem.	**K4**
CO5	Acquire the knowledge of solving initial value problems.	**K1**
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
CO1				✓	✓	✓		
CO2	✓		✓	✓	✓	✓		✓
CO3		✓	✓	✓		✓	✓	✓
CO4	✓	✓	✓	✓		✓		✓
CO5			✓	✓	✓		✓	✓
Number of matches = 26, Correlations : High								

Prepared by		Verified by	
	Dr. V.J. Sudhakar		

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBMSAL41		**ALLIED: SAMPLING TECHNIQUES**	**5**	**4**

Course Objectives

1. To understand the concepts of different types of sampling.
2. To study the applications of chi-square distribution.
3. To introduce the concepts of sampling distributions.
4. To study the various estimators and level of significance

UNIT–I	**LARGE SAMPLE THEORY**	15 Hours
Types of sampling - Parameter and Statistic - Test of significance-Procedure for testing of hypothesis - Test of significance for large samples - sampling of attributes - sampling of variables. Chapter 14: 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8		
UNIT–II	**EXACT SAMPLING DISTRIBUTIONS-I (CHI SQUARE DISTRIBUTION)**	15 Hours
Application of chi square distribution – Inferences about a population variance – Goodness of fit test - Test of independent of Attributes – contingency tables –Yates correlation. Chapter 15 : 15.6, 15.6.1, 15.6.2, 15.6.3, 15.6.4,		
UNIT–III	**EXACT SAMPLING DISTRIBUTIONS-II (T, F AND Z - DISTRIBUTION)**	15 Hours
Applications of t distribution- t - test for single mean - t - test for difference of means - Paired t -test for difference of means - t-test for Testing the significance of an observed sample correlation Chapter 16: 16.3, 16.3.1, 16.3.2, 16.3.3, 16.3.4,		
UNIT–IV	**STATISTICAL INFERENCE –I (THEORY OF ESTIMATION)**	15 Hours
Characteristics of estimators - Unbiasedness - Consistency - Efficient Estimators – Cramer Rao Inequality Chapter 17: 17.2, 17.2.1, 17.2.2, 17.2.3, 17.3 (omit 17.3.1)		
UNIT–V	**STATISTICAL INFERENCE –II (TESTING OF HYPOTHESIS AND NON-PARAMETRIC METHODS)**	15 Hours
Introduction - Statistical hypothesis – Simple and composite - Test of a Statistical hypothesis - Null hypothesis – Alternative hypothesis – Critical region - Two types of Errors – Level of significance – Power of the test – Steps in solving testing of hypothesis problem – Optimum test under different situations - Most powerful test - Uniformly most powerful test – Neyman J and Pearson, E.S.Lemma. Chapter 18: 18.1, 18.2, 18.3, 18.4, 18.5 (Omit 18.5.1,18.5.2).		

Books for Study: *S.C.Gupta and V.K.Kapoor*, FUNDAMENTALS OF MATHEMATICAL STATISTICS, Eleventh thoroughly revised edition(2017), Sultan Chand & sons, New Delhi.
Books for Reference: 1. *R. V. Hogg and A. T. Craig,* (1998), INTRODUCTION TO MATHEMATICAL STATISTICS, Macmillan. 2. *A. M. Mood, G. A. Graybil and D. G. Boes,* (1974), INTRODUCTION TO THEORY OF STATISTICS, McGraw Hill. 3. *S. S. Wilks,* ELEMENTARY STATISTICAL ANALYSIS, Oxford and IBH. 4. *S.C. Gupta and V.K.Kapoor,* FUNDAMENTAL OF APPLIED STATISTICS, Sultan & sons.

UBMSAL41 – ALLIED SAMPLING TECHNIQUES

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the procedure for testing of hypothesis.	**K2**
CO2	Describe the test of independent of attributes and Goodness of Fit.	**K4**
CO3	Derive Cramer – Rao inequality.	**K5**
CO4	Acquire knowledge in Likelihood Ratio test.	**K1**
CO5	Illustrate the most powerful test	**K4**
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**
CO1	✓			✓	✓	✓	✓	✓
CO2				✓	✓	✓	✓	✓
CO3		✓		✓	✓	✓	✓	
CO4				✓	✓	✓	✓	
CO5		✓		✓	✓	✓	✓	✓
Number of matches = 26, Correlations : High								

Prepared by		Verified by	
	Dr. P. Govindaraju		

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 III				
COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
UBMSAP41	OEC9	ALLIED PRACTICAL STATISTICS – II	3	3

Course Objectives
1) To study the basic concept of large sample test. 2) To Provide significance test of mean, variance and coefficient of correlation. 3) To apply the significance test for independence of attributes. 4) To construct ANNOVA table for one way and two way classifications.

1. Large sample tests with regard to population mean, proportion, standard deviation
2. Exact test with respect to Mean, Variance and Coefficient of correlation
3. Test for independence of Attributes Based on χ^2 - Distribution
4. Confidence interval based on Normal, t, χ^2 - and F distributions
5. ANOVA : One way and Two way classifications.

NOTE:

Use of Scientific Calculator shall be permitted for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

Books for Study: *S. P. Gupta*, STATISTICAL METHODS, Sultan Chand & Sons, New Delhi.
Books for Reference: 1. *R.V. Hogg and A.T. Craig,* (1998), INTRODUCTION TO MATHEMATICAL STATISTICS, Macmillan. 2. *A. M. Mood, G. A. Graybil and, D.G. Boes,* (1974), INTRODUCTION TO THEORY OF STATISTICS, McGraw Hill. 3. *S. S. Wilks,* ELEMENTARY STATISTICAL ANALYSIS, Oxford and IBH. 4. *S.C. Gupta and V.K. Kapoor,* FUNDAMENTAL OF APPLIED STATISTICS, Sultan & sons.

UBMSAP41 – Allied Practical – Statistics II

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Apply the appropriate significant test to the situation	**K3**
CO2	Acquire knowledge in confidence interval based on normal , t, χ^2 &F distribution	**K2**
CO3	Classify one way & two way ANNOVA	**K5**
CO4		
CO5		
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**
CO1	✓	✓	✓	✓			✓	✓
CO2	✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓	✓			✓	✓
CO4								
CO5								
Number of matches = 18, Correlations : Moderate								

Prepared by		Verified by	
	Dr. B. Towfeeq Ahmed & Dr. Zahiruddeen		

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 III				
COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
UBPYAL31/ UBCHAL31	OEC5	ALLIED MATHEMATICS – I	5	4

Course Objectives
To Explore the Fundamental Concept of Mathematics

UNIT–I	ALGEBRA	15 Hours
Partial Fractions – Binomial, Exponential and logarithmic Series (without Proof) –Summation and approximation. Chapter 1: 1.2 Chapter 2: 2.1, 2.2, 2.3		
UNIT–II	THEORY OF EQUATIONS	15 Hours
Polynomial Equations with real Coefficients –imaginary and Irrational roots – Solving equations with related roots –Formation of Equations– Equation whose roots are Symmetric functions of roots of a given equation by diminishing (or increasing) its roots by a constant – Reciprocal equations– Simple problems. Chapter 3: 3.1,3.2,3.3		
UNIT–III	MATRICES	15 Hours
Symmetric – Skew-symmetric – Orthogonal and Unitary matrices –Hermitian – Skew Hermitian – Rank of a matrix (upto order 4) – Consistency of equations – Eigen roots and		

eigen vectors – Cayley-Hamilton theorem (without proof) – verification – Computation of inverse matrix. Chapter 4: 4.1,4.2		
UNIT–IV	**TRIGONOMETRY**	15 Hours
Expansions of $\sin^n\theta$, $\cos^n\theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$–Expansions of $\sin\theta$, $\cos\theta$, $\tan\theta$ in terms of θ– Hyperbolic and inverse hyperbolic functions. Chapter 6: 601,6.2,6.3		
UNIT–V	**DIFFERENTIAL CALCULUS**	15 Hours
The nth derivatives – Leibnitz theorem (without proof) and applications – Jacobians – Polar coordinates – Curvature and radius of curvature in Cartesian and Polar co-ordinates. Vol II: Chapter 1: 1.1,1.2,1.4.3		

Books for Study:

P. Duraipandian and S. Udayabaskaran, (1997), ALLIED MATHEMATICS, Vol. I & II, Muhil Publishers, Chennai.

Books for Reference:

1. *P.Balasubramanian and K.G. Subramanian*, (1997), ANCILLARY MATHEMATICS, Vol. I & II, Tata McGraw Hill, New Delhi.
2. *S.P. Rajagopalan and R. Sattanathan*, (2005),ALLIED MATHEMATICS, Vol. I & II, Vikas Publications, New Delhi.
3. *P. Kandasam and, K. Thilagavathy*, (2003), ALLIED MATHEMATICS, Vol. I & II, S.Chand& Company, New Delhi.

UBPYAL31/UBCHAL31 – Allied Mathematics I

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concept of summation and approximation	**K2**
CO2	Solve the reciprocal equations	**K5**
CO3	Determine the eigen values and eigen vectors	**K5**
CO4	Find the Logarithmics and complex number	**K5**
CO5	Evaluate Definite integral	**K5**
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**
CO1					✓	✓	✓	
CO2	✓	✓		✓	✓			✓
CO3		✓	✓	✓		✓	✓	✓
CO4	✓	✓	✓	✓		✓		✓
CO5		✓	✓	✓		✓	✓	✓
Number of matches = 26, Correlations : High								

Prepared by	Dr. V.J. Sudhakar	**Verified by**	

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBPYAP31/ UBCHAP31	**OEC6**	**ALLIED PRACTICAL MATHEMATICS I**	**3**	**3**

Course Objectives
This course provides the concepts of data analysis with the quantitative measures like measure of dispersion and its ratios.

1. Central Tendency – Mean, Median and mode
2. Standard Deviation, Quartile Deviation and Coefficient of Variation.
3. Skewness and Kurtosis.
4. Correlation
5. Regression

NOTE:

Use of Scientific Calculator shall be permitted for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

Books for Study:

S. P. Gupta, STATISTICAL METHODS, Sultan Chand & Sons, New Delhi.

Books for Reference:

1. *R.V. Hogg and A.T. Craig,* (1998), INTRODUCTION TO MATHEMATICAL STATISTICS, Macmillan.
2. *A. M. Mood, G. A. Graybiland, D.G. Boes,* (1974), INTRODUCTION TO THEORY OF STATISTICS, McGraw Hill.
3. *S. S. Wilks,* ELEMENTARY STATISTICAL ANALYSIS, Oxford and IBH.
4. *S.C. Gupta and V.K.Kapoor,* FUNDAMENTAL OF APPLIED STATISTICS, Sultan & sons.

UBPYAP31/UBCHAP31 – Allied Practical – Mathematics I

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Find measures of central tendency	**K5**
CO2	Comprehend & Identify dispersion rations	**K3**
CO3	Acquire Knowledge in Skewness & kurtosis	**K1**
CO4		
CO5		
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**
CO1	✓	✓	✓	✓		✓	✓	✓
CO2	✓	✓	✓	✓		✓	✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓
CO4								
CO5								
Number of matches = 21, Correlations : High								

Prepared by		**Verified by**	
	Dr. B. Towfeeq Ahmed		

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBPYAL41 /UBCHAL41	**OEC8**	**ALLIED MATHEMATICS – II**	**5**	**4**

Course Objectives
To Explore the Fundamental Concept of Mathematics

UNIT–I	**INTEGRAL CALCULUS**	15 Hours
Properties of definite integrals – Integration by parts – Reduction formulae $\left(\int \sin^n x\, dx, \int \cos^n x\, dx \text{ only}\right)$ –Simple Problems. Chapter 2: Sections 2.6,2.8,2.9		
UNIT–II	**PARTIAL DIFFERENTIAL EQUATIONS**	15 Hours
Formation – Complete integrals and general integrals – Four standard types, Lagrange's equation. Chapter 6: Sections 6.1,6.2,6.3,6.4		
UNIT–III	**LAPLACE TRANSFORMS**	15 Hours
Laplace Transformations of standard functions and simple properties – Inverse Laplace transforms – Simple problems. Chapter 7: 7.1,7.2		
UNIT–IV	**VECTOR ANALYSIS**	15 Hours
Scalar point functions – Vector point functions – Gradient, divergence and curl – Directional derivatives –Line, Surface and Volume integrals – Guass, Stoke's and Green's theorems (Statement only). Chapter 8, 8.1,8.2,8.3,8.4,8.5,8.6		
UNIT–V	**FINITE DIFFERENCES**	15 Hours
Operators – Differences of a Polynomial – Factorial Polynomial Text Book 2: Chapter 3, Pages 70-98		

Books for Study:

1. *P. Duraipandian and S. Udayabaskaran,* (1997), ALLIED MATHEMATICS, Vol. I & II, Muhil Publishers, Chennai.
2. *P. Kandasamy and K. Thilagavathy,* CALCULUS OF FINITE DIFFERENCES AND NUMERICAL ANALYSIS, S.Chand& Company, New Delhi

Books for Reference:

1. *P. Balasubramanian and K.G. Subramanian*, (1997), ANCILLARY MATHEMATICS, Vol. I & II, Tata McGraw Hill, New Delhi.
2. *S.P. Rajagopalan and R. Sattanathan*, (2005), ALLIED MATHEMATICS, Vol. I & II, Vikas Publications, New Delhi.
3. *P. Kandasamy and K. Thilagavathy*, (2003), ALLIED MATHEMATICS, Vol. I & II, S.Chand& Company, New Delhi.

UBPYAL41/UBCHAL41 – Allied Mathematics - II

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Classify and solve the PDE	**K4**
CO2	Evaluate the problems using Laplace Transforms	**K5**
CO3	Verify the applications of Gauss, Stoke's and Green's Theorem	**K4**
CO4	Understand the properties of Operators and E-Relation	**K2**
CO5	Evaluate the approximate values of integration using various numerical techniques	**K5**
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**
CO1	✓	✓		✓	✓	✓		✓
CO2		✓	✓	✓				✓
CO3			✓	✓		✓	✓	
CO4	✓	✓	✓	✓		✓		
CO5		✓	✓	✓	✓	✓	✓	✓
Number of matches = 29, Correlations : High								

Prepared by	Dr. V.J. Sudhakar	**Verified by**	

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
UBPYAP41/ UBCHAP41	**OEC9**	**ALLIED PRACTICAL MATHEMATICS II**	**3**	**3**

Course Objectives
This course covers the basic method for forming difference table, solving algebraic equations and system of linear equations and numerical solution of ODE.

1. Newton's Divided differences formula
2. Langrange's formula (unequal interval)
3. Guass Elimination method- Guass Jordan Method – Guass Seidal method
4. Taylor Series method –Picard's method.
5. Euler's Method – Modified Euler's Method

NOTE:

Use of Scientific Calculator shall be permitted for practical examination.

Books for Study:

1. P. Kandasamy and K. Thilagavathy, CALCULUS OF FINITE DIFFERENCES AND NUMERICAL ANALYSIS (2003), S. Chand & Co Ltd., New Delhi.

Books for Reference:

1. H.C. Saxena, FINITE DIFFERENCES AND NUMERICAL ANALYSIS (1991), S. Chand & Co Ltd., New Delhi.
2. S. Arumugham, NUMERICAL METHODS (2003), New Gamma Publishing, Palamkottai.
3. M.K. Vengataraman, NUMERICAL METHODS FOR SCIENCE AND ENGINEERING (1992), National Publishing Company, Chennai.

UBPYAP41/UBCHAP41 – Allied Practical – Mathematics II

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Compute the Divided differences tables	**K4**
CO2	Compute the Lagrange's formula	**K4**
CO3	Solving algebraic equations	**K5**
CO4	Evaluate the numerical solutions to ODE	**K5**
CO5		
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**
CO1	✓	✓	✓	✓			✓	✓
CO2	✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓	✓			✓	✓
CO4	✓	✓	✓	✓			✓	✓
CO5								
Number of matches = 24, Correlations : High								

Prepared by	Dr. B. Towfeeq Ahmed	**Verified by**	

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

PO1 Demonstrate knowledge and scientific understanding to identity research problems, design experiments, use appropriate methodologies, analyze and interpret data and provide solutions, and Exhibit organizational skills, and the ability to manage time and resources.

PO2 Demonstrate knowledge of the concepts, principles, theories, and techniques of the domain andallied subject areas.

PO3 Synergise knowledge with Analytical & Experimental skills to systematically, create & runprograms/carry out experiments/ formulate &prove theories to enrich the body of knowledge.

PO4 Identify and critically analyze pertinent problems in the relevant discipline using appropriate tools and techniques.

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

PO6 Utilize specialized instruments and Equipment, Computers, Software,Internet, and other ICT tools to carry out experiments.

PO7 Create Compounds/Products/Software or Design experiments 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 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 oflife, caring for the underprivileged, leading to a better sustainable future.

PROGRAM SPECIFIC OUTCOMES (PSOs)

By the end of the program, the students will be able to

PSO1	Understand in depth knowledge in pure and applied mathematics.
PSO2	Attain the ability to solve challenging problems in Mathematics and prove abstract theorem.
PSO3	Know the specialized area of mathematics and its applications.
PSO4	Analyse practical problems and propose solution.
PSO5	Obtain the exact solutions for the society oriented problems by mathematical models.
PSO6	Discuss in groups or individually in multidisciplinary tasks.
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

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMS3001	**DSC9**	**COMPLEX ANALYSIS – I**	**6**	**4**

Course Objectives
To study Cauchy integral formula, local properties of analytic functions, general form of Cauchy's theorem and evaluation of definite integral and harmonic functions.

UNIT–I	**CAUCHY'S INTEGRAL FORMULA**	18 hours
The Index of a point with respect to a closed curve – The Integral formula – Higher derivatives. **LOCAL PROPERTIES OF ANALYTIC FUNCTIONS:** The Maximum Principle. **Chapter 4:** Section 2: 2.1 to 2.3; Section 3: 3.4		
UNIT–II	**THE GENERAL FORM OF CAUCHY'S THEOREM**	18 hours
Chains and Cycles – Simple Connectivity – Homology – The General Statement of Cauchy's Theorem – Proof of Cauchy's Theorem – Locally Exact Differentials – Multiply Connected Regions. **THE CALCULUS OF RESIDUES:**The Residue Theorem – The Argument Principle. **Chapter 4:** Section 4: 4.1 to 4.7; Section 5 : 5.1 and 5.2		
UNIT–III	**THE CALCULUS OF RESIDUES (Contd..)**	18 hours
Evaluation of Definite Integrals. **HARMONIC FUNCTIONS** Definition and Basic Properties – Mean Value Property – Poisson's Formula. **Chapter 4 :** Section 5 : 5.3 ; Section 6 : 6.1 to 6.3		
UNIT–IV	**HARMONIC FUNCTIONS (Contd..)**	18 hours
Schwarz's Theorem – The Reflection Principle **POWER SERIES EXPANSIONS** Weierstrass's Theorem – The Taylor Series – The Laurent Series. **Chapter 4:** Sections 6: 6.4 and 6.5; **Chapter 5 :** Sections 1: 1.1 to 1.3		

PBMS3001 – COMPLEX ANALYSIS – I

UNIT–V	PARTIAL FRACTIONS AND FACTORIZATION	18 hours
Partial fractions – Infinite products – Canonical products – The Gamma function. **ENTIRE FUNCTIONS** Jensen's formula – Hadamard's theorem. **Chapter 5:** Sections 2: 2.1 to 2.4; Sections 3: 3.1 and 3.2		
Books for Study: *Lars V. Ahlfors,* (2012), COMPLEX ANALYSIS, (Third Edition), McGraw-Hill Book Co, New York.		
Books for Reference: 1. *H.A. Priestley,* (1990), INTRODUCTION TO COMPLEX ANALYSIS, Clarendon Press, Oxford. 2. *J.B.Conway,* (1978), FUNCTIONS OF ONE COMPLEX VARIABLES, Springer – Verlag, International Student Edition, Narosa Publishing Co. 3. *E. Hille,* (1959), ANALYTIC FUNCTION THEORY, (vol II), Gonm& Co. 4. *S. Ponnusamy, (2000), FOUNDATIONS OF COMPLEX ANALYSIS,* Narosa Publishing House. 5. *S. Arumugam, A. Thangapandi Isaac and A. Somasundaram* (2015), Complex Analysis, Scitech Publications (India) Pvt. Ltd.		

PBMS3001 – COMPLEX ANALYSIS – I

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the index of a point with respect to a closed curve and higher order derivatives, the concept of maximum principle	**K2**
CO2	Examine the various complex structure and evaluate definite integrals	**K1, K5**
CO3	Analyze the properties of Harmonic functions	**K4**
CO4	Compute the series representation of complex functions	**K3**
CO5	Determine the infinite product of various functionsand prove Jensen's formula and Hadamard's theorem	**K3, K5**
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
CO1	✓	✓	✓				✓	
CO2	✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓			✓	✓	
CO4	✓	✓	✓	✓		✓	✓	✓
CO5	✓	✓	✓		✓		✓	
Number of matches = 27, Correlation : High								

Prepared by		Verified by	
	Dr. SYED TAHIR HUSSAINY		

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMS3002	**DSC10**	**TOPOLOGY**	**6**	**4**

Course Objectives
To study topological spaces, continuous functions, connectedness, compactness, countability and separation axioms.

UNIT–I	**TOPOLOGICAL SPACES**	18 hours
Topological spaces – Basis of a topology – The order topology – The product topology on X Y – The Subspace topology –Closed sets and limit points. **Chapter 2:** section 12 to 17.		
UNIT–II	**CONTINUOUS FUNCTIONS**	18 hours
Continuous functions –The product topology –The metric topology. **Chapter 2:** sections 18 to 21		
UNIT–III	**CONNECTEDNESS**	18 hours
Connected spaces –Connected subspaces of the real line **Chapter 3:** section 23 to 24.		
UNIT–IV	**COMPACTNESS**	18 hours
Compact spaces – Compact subspaces of the real line. **Chapter 3:** sections 26, 27		
UNIT–V	**COUNTABILITY AND SEPARATION AXIOMS**	18 hours
The countability Axioms – The separation axioms – Normal spaces – The Urysohn lemma – The Urysohn metrization theorem – The Tietz extension theorem. **Chapter 4:** sections 30 to 35		
Books for Study: *James R. Munkres,* (2002), TOPOLOGY, (Second Edition), Pearson Education, New Delhi.		

PBMS3002 - TOPOLOGY

Books for Reference:

1. *J. Dugundji*, (1975), TOPOLOGY, Prentice Hall of India , New Delhi.
2. *George F. Simmons,* (1963), INTRODUCTIONS TO TOPOLOGY AND MODERN ANALYSIS, McGraw Hill.
3. *J.L. Kelly,* GENERAL TOPOLOGY, Van Nostrand, Reinhold Co, New York.
4. *L.Sten and J. Subash,Holt, Rinehart and Winston*, COUNTER EXAMPLES IN TOPOLOGY.
5. *S. Willard,* (1970), GENERAL TOPOLOGY, Addison Wesley Mass.

PBMS3002 - TOPOLOGY

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquire the knowledge and significance of topological structures	**K1**
CO2	Comprehend and identify the continuous functions on topological spaces	**K2**
CO3	Analyse and understand the concepts of connected spaces	**K4**
CO4	Procure the knowledge of compactness of topological spaces	**K1**
CO5	Discuss the countability and separation axioms and ability to prove various theorems	**K5**
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**
CO1	✓	✓	✓			✓	✓	
CO2	✓	✓	✓			✓	✓	✓
CO3	✓	✓	✓			✓	✓	
CO4	✓	✓	✓			✓	✓	✓
CO5	✓	✓	✓			✓	✓	
Number of matches = 27, Correlation : High								

Prepared by		Verified by	
	Dr. S. SOUNDARARAJAN		

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 III				
COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
PBMS3003	DSC11	PROBABILITY THEORY	5	4

Course Objectives
To introduce axiomatic approach to probability theory, to study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability.

UNIT–I	RANDOM EVENTS AND RANDOM VARIABLES	15 hours
Random events – Probability axioms – Combinatorial formulae – Conditional probability – Bayes Theorem – Independent events – Random Variables – Distribution Function – Joint Distribution – Marginal Distribution – Conditional Distribution – Independent random variables – Functions of random variables. Chapter 1: Sections 1.1 to 1.7 Chapter 2: Sections 2.1 to 2.9		
UNIT–II	PARAMETERS OF THE DISTRIBUTION	15 hours
Expectation – Moments – The Chebyshev's Inequality – Absolute moments – Order parameters – Moments of random vectors – Regression of the first and second types. Chapter 3: Sections 3.1 to 3.8		
UNIT–III	CHARACTERISTIC FUNCTIONS	15 hours

Properties of characteristic functions – Characteristic functions and moments – Semi invariants –Characteristic function of the sum of the independent random variables – Determination of distribution function by the Characteristic function – Characteristic function of multidimensional random vectors – Probability generating functions. Chapter 4: Sections 4.1 to 4.7		
UNIT–IV	**SOME PROBABILITY DISTRIBUTIONS**	15 hours
One point, two point, Discrete Distributions: Binomial – Polya – Hypergeometric – Poisson distributions – Continuous Distributions: Uniform – Normal – Gamma – Beta – Cauchy and Laplace distributions. Chapter 5: Section 5.1 to 5.10		
UNIT–V	**LIMIT THEOREMS**	15 hours
Stochastic convergence – Bernoulli law of large numbers – Convergence of sequence of distribution functions – Levy-Cramer Theorems – deMoivre Laplace theorem – Poisson, Chebyshev, Khintchine Weak law of large numbers – Lindberg Theorem – Lyapunov theorem. Chapter 6: Sections 6.1 to 6.4, 6.6 to 6.9		

Books for Study:

M. Fisz, (1963), PROBABILITY THEORY AND MATHEMATICAL STATISTICS,John Wiley and sons, New York.

Books for Reference:

1. *R.B. Ash,* (1972), REAL ANALYSIS AND PROBABILITY, Academic Press, New York.
2. *K.L. Chung,* (1974), A COURSE IN PROBABILITY, Academic press, New York.
3. *R. Durrett,* (1996), PROBABILITY THEORY AND EXAMPLES, (Second edition), Duxbury press, New York.
4. *V.K. Rohatgi,* (1988), AN INTRODUCTION TO PROBABILITY THEORY AND MATHEMATICAL STATISTICS, Wiley Eastern, NewDelhi.
5. *S.I. Resnick,* (1999), A PROBABILITY PATH, Birhauser, Berlin.
6. *B.R.Bhat,* (1999),MODERN PROBABILITY THEORY, (Third edition), New Age International, New Delhi.

PBMS3003 - PROBABILITY THEORY

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand random events, Borel field, axioms and random variables	**K2**
CO2	Evaluate marginal, conditional and joint distributions	**K5**
CO3	Derive characteristic function, Normal, Gamma, Beta and Laplace distributions	**K5**
CO4	Proving various statistical concepts	**K5**
CO5	Compile weak law of large numbers	**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**
CO1	✓	✓	✓				✓	
CO2		✓	✓	✓	✓	✓	✓	
CO3		✓	✓	✓	✓	✓	✓	
CO4		✓		✓	✓	✓	✓	✓
CO5		✓	✓		✓	✓	✓	
Number of matches = 27, Correlation : High								

Prepared by	Dr. A. MOHAMED ALI	**Verified by**	

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMS3004	**DSC12**	**DIFFERENTIAL GEOMETRY**	**5**	**4**

Course Objectives
This course introduces space curves and their intrinsic properties of a surface and geodesics. The non–intrinsic properties of a surface and the differential geometry of surfaces are explored.

UNIT–I	**SPACE CURVES**	15 hours
Definition of a space curve – Arc length – Tangent – Normal and binormal – Curvature and torsion – Contact between curves and surfaces – Tangent surface – Involutes and evolutes – intrinsic equations – Fundamental existence theorem for space curve – Helices. Chapter 1: Sections 1 to 9		
UNIT–II	**INTRINSIC PROPERTIES OF A SURFACE**	15 hours
Definition of a surface – Curves on a surface – Surface of revolution – Helicoids – Metric – Direction coefficients – Families of curves – Isometric correspondence – Intrinsic properties. Chapter 2: Sections 1 to 9		
UNIT–III	**GEODESICS**	15 hours
Geodesics – Canonical geodesic equations – Normal properties of geodesics – Existence theorem – Geodesic parallels – Geodesic curvatures – Gauss Bonnet theorem – Gaussian curvature – Surface of constant curvature. Chapter 2: Sections 10 to 18		
UNIT–IV	**NON–INTRINSIC PROPERTIES OF A SURFACE**	15 hours
The second fundamental form – Principal curvature – Lines of curvature – Developable – Developable associated with space curves and with curves on surface – Minimal surfaces –Ruled surfaces. Chapter 3: Sections 1 to 8		

UNIT–V	DIFFERENTIAL GEOMETRY OF SURFACES	15 hours
Fundamental equations of surface theory – Fundamental existence theorem for surfaces – Compact surfaces whose points are umbilics– Hilbert's lemma – Compact surfaces of constant curvature – Complete surfaces. Chapter 3: Sections 9 to 10 Chapter 4: Sections 1 to 5		
Books for Study: *T. J. Willmore,* (2002), An INTRODUCTION TO DIFFERENTIAL GEOMETRY, Oxford University Press, New Delhi.		
Books for Reference: 1. *D. T. Struik,* (1950), LECTURES ON CLASSICAL DIFFERENTIAL GEOMETRY, Addison Wesley, Mass. 2. *Kobayashi and K. Nomizu,* (1963), FOUNDATIONS OF DIFFERENTIAL GEOMETRY, Interscience. 3. *D. Somasundaram, (2008),* DIFFERENTIAL GEOMETRY A FIRST COURSE, Alpha Science Publications. 4. *Andrew* Pressley *(2010),* ELEMENTARY DIFFERENTIAL GEOMETRY, Second Edition, Springer, New York. 5. *Stephen Lovett, (2019),* DIFFERENTIAL GEOMETRY OF MANIFOLDS*, Second Edition,* Chapman and Hall/CRC, New York.		

PBMS3004 - DIFFERENTIAL GEOMETRY

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the space curve and their intrinstic properties	**K1**
CO2	Discuss the normal properties of geodesics	**K3**
CO3	Prove the Gauss-Bonnet theorem	**K2**
CO4	Acquire the knowledge of developable, minimal surfaces and ruled surfaces	**K4**
CO5	Derive the fundamental existence theorem for surfaces	**K3**
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
CO1	✓			✓	✓	✓	✓	✓
CO2	✓		✓		✓	✓	✓	✓
CO3		✓		✓	✓	✓	✓	✓
CO4	✓		✓		✓	✓	✓	✓
CO5	✓	✓		✓	✓	✓	✓	✓
Number of matches = 31, Correlation : Very High								

Prepared by		Verified by	
	Dr. R. SRINIVASAN		

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMSVB31	**VBC1**	**RESEARCH METHODOLOGY & ETHICS**	**3**	**3**

Course Objectives
This course provides the basic procedure for research and gives the guidelines for publication of research articles and also provides the metrics of the research publication.

UNIT–I	**RESEARCH METHODOLOGY**	9 hours
Meaning of Research – Objectives of Research – Motivation in Research – Types of Research – Research Approaches – Significance of Research – Criteria of Good Research. Text Book 1		
UNIT–II	**PROCESSING OF DATA**	9 hours
Processing Operations – Some Problems in Processing – Elements/Types of Analysis – Statistics in Research – Measures of Central Tendency – Measures of Dispersion – Measures of Asymmetry (Skewness) – Measures of Relationship – Simple problems Text Book 1		
UNIT–III	**ANALYSIS OF DATA**	9 hours
Simple Regression Analysis – Multiple Correlation and Regression – Partial Correlation - Simple problems Text Book 1		
UNIT–IV	**RESEARCH ETHICS**	9 hours
Definition - Moral Philosophy – nature of moral judgements and reactions – Ethics with respect to science and research Text Book 2		
UNIT–V	**PUBLICATION ETHICS**	9 hours
Definition – introduction and importance – Conflicts of interest – Violation of publication ethics, authorship and contributor ship – Identification of publication misconduct, complaints and appeals. Text Book 2		

PBMSVB31 - RESEARCH METHODOLOGY & ETHICS

Books for Study:

1. C.R. Kothari, (2004), Research Methodology : Methods and Techniques, Second Revised Edition, NEW AGE INTERNATIONAL PUBLISHERS, New Delhi
2. Paul Oliver, The Student's Guide to Research Ethics, Open University Press, 2003

Books for Reference:

1. Nicholas H. Steneck. Introduction to the Responsible Conduct of Research. Office of Research Integrity. 2007 https://ori.hhs.gov/sites/default/files/rcrintro.pdf
2. Responsible Conduct of Research By Adil E. Shamoo; David B. Resnik Oxford University Press, 2003
3. Ethics in Science Education, Research and Governance Edited by Kambadur Muralidhar, Amit Ghosh Ashok Kumar Singhvi. Indian National Science Academy, 2019. ISBN : 978-81-939482-1-7.
4. Anderson B.H., Dursaton, and Poole M.: Thesis and assignment writing, Wiley Eastern 1997.
5. Bijorn Gustavii: How to write and illustrate scientific papers? Cambridge University Press.
6. Bordens K.S. and Abbott, B.b.: Research Design and Methods, Mc Graw Hill, 2008.
7. Graziano, A., M., and Raulin, M.,L.: Research Methods – A Process of Inquiry, Sixth Edition, Pearson, 2007.

PBMSVB31 - RESEARCH METHODOLOGY & ETHICS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquire the knowledge of Fundamentals of Research Methodology.	**K2**
CO2	Collect and analyse data.	**K3, K4**
CO3	Understand the various methods to Quantitative measures	**K2**
CO4	Critically reflecting on the different methods used in the study of disciplinary and interdisciplinary communication in work life and education	**K4**
CO5	Understanding of ethical issues related to Research and Publication	**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
CO1				✓		✓		✓
CO2	✓		✓		✓	✓		✓
CO3	✓	✓	✓		✓	✓		✓
CO4		✓		✓	✓	✓		✓
CO5		✓		✓	✓	✓		✓
Number of matches = 24, Correlation : Moderate								

Prepared by		Verified by	
	Dr. S. BALAKRISHNAN		

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMSDE31	**DSE3**	**CALCULUS OF VARIATIONS**	**5**	**3**

Course Objectives
This course provides the variation problems in various conditions and gives the solving skills.

UNIT–I	**THE METHOD OF VARIATIONS IN PROBLEMS WITH FIXED BOUNDARIES**	15 hours
Variation and its Properties – Euler'sEquation – Functionals of the Form $\int_{x_0}^{x_1} F(x, y_1, y_2, \ldots, y_n, y_1', y_2', \ldots, y_n')\, dx$ – Functionals Dependent on Higher-Order Derivatives – Functionals Dependent on the Functions of Several Independent Variables – Variational Problems in Parametric Form – Some Applications. **Chapter 6 :** Sections 1 to 7		
UNIT–II	**VARIATIONAL PROBLEMS WITH MOVING BOUNDARIES AND CERTAIN OTHER PROBLEMS**	15 hours
An Elementary Problem with Moving Boundaries – The Moving-Boundary Problem for a Functional of the Form $\int_{x_0}^{x_1} F(x, y, z, y', z')\, dx$ – Extremals with Corners – One-Sided Variations. **Chapter 7 :** Sections 1 to 4		
UNIT–III	**SUFFICIENT CONDITIONS FOR AN EXTREMUM**	15 hours
Field of Extremals – The Function $E(x, y, p, y')$ – Transforming the Euler Equations to the Canonical Form. **Chapter 8 :** Sections 1 to 3		
UNIT–IV	**VARIATIONAL PROBLEMS INVOLVING A CONDITIONAL EXTREMUM**	15 hours

Constraints of the Form $\varphi(x, y_1, y_2, \ldots, y_n) = 0$ – Constraints of the Form $\varphi(x, y_1, y_2, \ldots, y_n, y_1', y_2', \ldots, y_n') = 0$ – Isoperimetric Problems. **Chapter 9 :** Sections 1 to 3		
UNIT–V	**DIRECT METHODS IN VARIATIONAL PROBLEMS**	15 hours
Direct Methods – Euler's Finite-Difference Method – The Ritz Method – Kantorovich's Method. **Chapter 10 :** Sections 1 to 4		
Books for Study: *L. Elsgolts*, (1973), DIFFERENTIAL EQUATIONS AND THE CALCULUS OF VARIATIONS, (2nd Edition), Mir Publishers, Moscow.		
Books for Reference: 1. *I.M. Gelfand and S.V. Fomin*, (1963), CALCULUS OF VARIATIONS, Prentice-Hall Inc., New Jersey. 2. *A.S. Gupta*, (1997), CALCULUS OF VARIATIONS, Prentice-Hall of India, New Delhi. 3. *L.A. Pars*, (1965), AN INTRODUCTION TO THE CALCULUS OF VARIATIONS, Heinemann, London. 4. *R. Weinstock*, (1952), CALCULUS OF VARIATIONS WITH APPLICATIONS TO PHYSICS AND ENGINEERING, Mc Graw-Hill Book Company Inc., New York. 5. *Filip Rindler*, (2018), CALCULUS OF VARIATIONS, Springer, New York.		

PBMSDE31 - CALCULUS OF VARIATIONS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts of variation problems and identify the situation of variation problems in real life	**K2, K4**
CO2	Acquire the knowledge of variation problems with boundary conditions	**K1**
CO3	Derive the sufficient condition for variation problems	**K5**
CO4	Evaluate the variation problems with constraints	**K5**

CO5	Discuss the various method to solve variation problems	**K3**
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**
CO1	✓	✓	✓	✓	✓		✓	✓
CO2	✓	✓		✓	✓		✓	✓
CO3	✓	✓			✓	✓	✓	
CO4	✓	✓					✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 29, Correlation : High								

Prepared by	Dr. S. BALAKRISHNAN	**Verified by**	

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 III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMSDE32	**DSE3**	**ACTUARIAL MATHEMATICS**	**5**	**3**

Course Objectives
To develop working knowledge of real world problems like investments, premium calculation in insurance, profit testing unit-linked polices, pension plan and future projections.

UNIT–I	**BASIC FINANCIAL MATHEMATICS**	15 hours
Simple and compound interest – Actuarial notion for financial mathematics.		
UNIT–II	**INTRODUCTION TO LIFE CONTINGENCIES**	15 hours
Survival probability – Death probabilities – deterministic modeling.		
UNIT–III	**INTRODUCTION TO ACTUARIAL MATHEMATICS**	15 hours
Life-contingent annuity factors – Premium payable for an annuity – Assurance factors – Guaranteed endowments – Premium calculations for assurance benefits.		
UNIT–IV	**UNIT LIKED PRODUCTS**	15 hours
Charging structure – Benefit flexibility – Investment flexibility – Unit price – Market practice.		
UNIT–V	**BASIC PENSION MATHEMATICS**	15 hours
Theory and practice of pension plan funding – Concepts of normal cost – Supplemental liability – Unfunded liability – Projected benefit cost methods.		
Books for Study: *David C. M. Dickson, Mary R. Hardy and Howard R. Waters,* (2013), ACTUARIAL MATHEMATICS FOR LIFE CONTINGENT RISKS, International Series on Actuarial Science, Cambridge.		

PBMSDE32 - ACTURIAL MATHEMATICS

Books for Reference:

1. *S. David Promislow,* (2011), FUNDAMENTALS OF ACTUARIAL MATHEMATICS, 2nd Edition, Willey Publications.
2. *Arjun K. Gupta and Tamas Varga, (2002), AN INTRODUCTION TO ACTUARIAL MATHEMATICS,* Kluwer Academic Publishers.
3. Glen Ninian, (2009), ACTUARIAL SCIENCE: AN ELEMENTARY MANUAL, BiblioLife Publishers.
4. *Annamaria Olivieri and Ermanno Pitacco, (2011),* INTRODUCTION TO INSURANCE MATHEMATICS, Springer, New York.
5. *Stephen Garrett, (2013),* AN INTRODUCTION TO THE MATHEMATICS OF FINANCE: A DETERMINISTIC APPROACH, 2nd Edition, Butterworth-Heinemann Publishers.

PBMSDE32 - ACTURIAL MATHEMATICS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand basic financial calculations	**K1, K2**
CO2	Acquire the knowledge of deterministic models	**K2**
CO3	Compute the premium and benefits of insurance	**K3**
CO4	Calculate the stock markets	**K3**
CO5	Analyse and determine the pension calculation for future	**K3, K4**
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**
CO1	✓		✓	✓	✓		✓	✓
CO2	✓		✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓	✓		✓	✓
CO4	✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 34, Correlation : Very High								

Prepared by		Verified by	
	Dr. S. BALAKRISHNAN		

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 III				
COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
PBMSDE33	DSE3	DISCRETE MATHEMATICS	5	3

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	15 hours
Properties and examples of Lattices – Distributive lattices – Boolean algebras – Boolean polynomials – Minimal Forms of Boolean Polynomials. Chapters: 1 to 4 and 6.		
UNIT–II	APPLICATIONS OF LATTICES	15 hours
Switching Circuits - Applications of Switching Circuits *Chapters: 7 and 8.*		
UNIT–III	FINITE FIELDS AND POLYNOMIALS	15 hours
Finite fields *Chapter: 13.*		
UNIT–IV	FINITE FIELDS AND POLYNOMIALS	15 hours
Irreducible Polynomials over Finite fields - Factorization of Polynomials over Finite fields.		

Chapters: 14 and 15.		
UNIT–V	**CODING THEORY**	15 hours
Introduction to Coding - Linear Codes. *Chapters: 16 and 17.*		
Books for Study: *Rudolf Lidl & Gunter Pilz,* (2006), APPLIED ABSTRACT ALGEBRA, Second IndianReprintSpringer Verlag, NewYork.		

PBMSDE33 – DISCRETEMATHEMATICS

Books for Reference:

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.

PBMSDE33 – DISCRETEMATHEMATICS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquire the knowledge of Lattices and Boolean algebras	**K2**
CO2	Apply the lattices in circuits	**K3**
CO3	Understand the finite field structure	**K2**
CO4	Compute the factorization of polynomials over finite fields	**K3**
CO5	Understand the coding theory and analyze the coding theory	**K1, K4**
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
CO1	✓	✓					✓	✓
CO2	✓		✓	✓	✓		✓	✓
CO3	✓	✓		✓			✓	
CO4	✓	✓			✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 27, Correlation : High								

Prepared by		Verified by	
	Dr. S.N. MOHAMED ASSARUDEEN		

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMS4001	**DSC13**	**COMPLEX ANALYSIS - II**	**6**	**5**

Course Objectives
To study Riemann Zeta function and normal families, Riemann mapping theorem, Conformal mapping of polygons, Harmonic functions, Elliptic functions and Weierstrass theory of analytic continuation.

UNIT–I	**THE RIEMANN ZETA FUNCTION**	18 hours
The Product development – Extension of $\zeta(s)$ to the whole plane – The functional equation –The zeros of Zeta function **NORMAL FAMILIES** Equicontinuity – Normality and compactness – Arzela's theorem – Families of analytic functions. Chapter 5: Section 4: 4.1 to 4.4 Chapter 5: Section 5: 5.1 to 5.4.		
UNIT–II	**THE RIEMANN MAPPING THEOREM**	18 hours
Statement and proof – Boundary Behaviour – Use of the Reflection Principle. **CONFORMAL MAPPING OF POLYGONS** The Behaviour at an angle – The Schwarz-Christoffel formula – Mapping on a rectangle. **A CLOSER LOOK AT HARMONIC FUNCTIONS** Functions with the Mean-value property – Harnack's principle. Chapter 6: Section 1: 1.1 to 1.3 ; Chapter 6 : Section 2: 2.1 to 2.3; Chapter 6: Section 3: 3.1 and 3.2.		
UNIT–III	**SIMPLY PERIODIC FUNCTIONS**	18 hours
Representation by exponentials – The Fourier development – Functions of finite order **DOUBLY PERIODIC FUNCTIONS** The period module – Unimodular transformations – The canonical basis – General properties of elliptic functions Chapter 7: Section 1: 1.1 to 1.3; Chapter 7: Section 2: 2.1 to 2.4		

PBMS4001 - COMPLEX ANALYSIS - II

UNIT–IV	**THE WEIERSTRASS THEORY**	18 hours
The Weierstrass $\wp$-function – The functions $\zeta(z)$ and $\sigma(z)$ – The differential equation – The Modular function $\lambda(\tau)$ – The conformal mapping by $\lambda(\tau)$. Chapter 7: Section 3: 3.1 to 3.5		
UNIT–V	**ANALYTIC CONTINUATION**	18 hours
The Weierstrass theory – Germs and sheaves – Sections and Riemann surfaces – Analytic continuations along Arcs – Homotopic curves –The Monodromy theorem – Branch points. Chapter 8: Section 1: 1.1 to 1.7.		
Books for Study: *Lars V. Ahlfors,* (2012), COMPLEX ANALYSIS, (Third Edition), McGraw Hill Book Co, New York.		
Books for Reference: 1. *H.A. Priestley,* (1990), INTRODUCTION TO COMPLEX ANALYSIS, Clarendon Press, Oxford. 2. *J.B.Conway,* (1978), FUNCTIONS OF ONE COMPLEX VARIABLES, Springer – Verlag, International Student Edition, Narosa Publishing Co. 3. *E. Hille,* (1959), ANALYTIC FUNCTION THEORY, (vol II), Gonm& Co. 4. *S. Ponnusamy, (2000), FOUNDATIONS OF COMPLEX ANALYSIS,* Narosa Publishing House. 5. *S. Arumugam, A. Thangapandi Isaac and A. Somasundaram* (2015), Complex Analysis, Scitech Publications (India) Pvt. Ltd.		

PBMS4001 - COMPLEX ANALYSIS - II

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the product development, Zeta function, equicontinuity, normality and compactness and prove Arzela's theorem	**K2, K5**
CO2	Prove Riemann mapping theorem and Harnack's principle and derive the Schwarz-Christoffel formula	**K4, K5**
CO3	Employ mean value property to solve the problems and examine the periodicity of elliptic functions	**K1, K3**
CO4	Acquire knowledge about the special functions $\wp(z)$, $\zeta(z)$ and $\sigma(z)$ and Modular function $\lambda(\tau)$	**K1**
CO5	Analyse the sections and Riemann surfaces, Homotopic curves and prove the Monodromy theorem	**K4, K5**
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
CO1	✓	✓	✓			✓	✓	
CO2	✓	✓				✓	✓	
CO3	✓	✓	✓	✓	✓		✓	✓
CO4	✓	✓		✓	✓		✓	✓
CO5	✓	✓				✓	✓	✓
Number of matches = 27, Correlation : High								

Prepared by		Verified by	
	Dr. SYED TAHIR HUSSAINY		

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMS4002	**DSC14**	**FUNCTIONAL ANALYSIS**	**6**	**4**

Course Objectives
To study the details of Banach and Hilbert spaces and to introduce Banach algebras.

UNIT–I	**BANACH SPACES**	18 hours
Definition and Some examples – Continuous Linear Transformations – The Hahn Banach Theorem – The Natural embedding of N in N^{**}. Chapter 9: sections 46 to 49.		
UNIT–II	**BANACH SPACES AND HILBERT SPACES**	18 hours
Open Mapping Theorem – Conjugate of an operator – Definition and some simple properties of Hilbert spaces – Orthogonal complements. Chapter 9: Sections 50 and 51. Chapter 10 : Sections 52,53.		
UNIT–III	**HILBERT SPACES**	18 hours
Conjugate space H^*–Adjoint of an operator – Self-adjoint operator – Normal and Unitary operators. Chapter 10: Sections 55,56,57,58.		
UNIT–IV	**GENERAL PRELIMINARIES ON BANACH ALGEBRAS**	18 hours
Definition and some examples – Regular and singular elements – Topological divisors of zeros – The formula for the spectral radius. Chapter 12: Sections 64 to 66 and 68.		
UNIT–V	**THE STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS**	18 hours
Gelfand Mapping – Applications of the formula $r(x) = \|\|x^n\|\|^{1/n}$– Involutions in Banach Algebras – Gelfand – Neumark Theorem. Chapter 13 : Section 70 to 73.		

Books for Study:

G.F. Simmons, (1963), INTRODUCTION TO TOPOLOGY AND MODERN ANALYSIS, McGraw Hill, New York.

Books for Reference:

1. *W. Rudin,* (1973), FUNCTIONAL ANALYSIS, Tata McGraw Hill, New Delhi.
2. S. *G. Bachman and L. Narici,* (1966), FUNCTIONAL ANALYSIS, Academic Press, New York.
3. *H.C. Goffman and G. Fedrick,*(1987), FIRST COURSE IN FUNCTIONAL ANALYSIS, Prentice Hall of India, New Delhi.
4. *E. Kreyszig,* (1978), INTRODUCTORY FUNCTIONAL ANALYSIS WITH APPLICATIONS, John Wiley & sons, New York.
5. Balmohan V. Limaye, (2016), LINEAR FUNCTIONAL ANALYSIS FOR SCIENTISTS AND ENGINEERS, Springer New York.

PBMS4002 - FUNCTIONAL ANALYSIS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand Banach spaces with examples and transformations on Banachspaces	**K2**
CO2	Analyse the conjugate operators and prove Open mapping theorem	**K4**
CO3	Comprehend Hilbert spaces with examples and various operators	**K1**
CO4	Discuss about Banach algebras with examples and derive the formula for spectral radius	**K4**
CO5	Prove Gelfand representation theorem and Gelfand-Neumann theorem	**K5**
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**
CO1	✓	✓	✓			✓	✓	
CO2	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓			✓	✓	
CO4	✓	✓	✓			✓	✓	
CO5	✓	✓	✓			✓	✓	
Number of matches = 26, Correlation : High								

Prepared by		Verified by	
	Dr. S. SOUNDARARAJAN		

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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS./ WEEK	CREDIT
PBMS4003	DSC15	MATHEMATICAL STATISTICS	5	4

Course Objectives
This course introduces sampling theory, significance tests, estimation,testing of hypothesis, ANOVA and sequential analysis with rigorous mathematicaltreatment.

UNIT–I	SAMPLE MOMENTS AND THEIR FUNCTIONS	15 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**	15 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**	15 hours
Preliminary notion – Consistent estimates – Unbiased estimates – Suffiency – Effciency – Asymptotically most efficient estimates – Methods of finding estimates – Confidence interval Chapter 13: Sections 13.1 to 13.8		
UNIT–IV	**ANALYSIS OF VARIANCE**	15 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**	15 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		

Books for Study:

M. Fisz, (1963), PROBABILITY THEOREM AND MATHEMATICAL STATISTICS, John Wiley and sons, New York.

Books for Reference:

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.

PBMS4003 – MATHEMATICAL STATISTICS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand various types of distributions	**K2**
CO2	Apply the appropriate significance test to the situation	**K3**
CO3	Find sufficiency, efficiency and asymptotically most efficient estimation	**K5**
CO4	Classify one-way and two-way ANOVA	**K4**
CO5	Analyse the hypothesis types of Normal population	**K4**
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**
CO1	✓	✓	✓		✓		✓	
CO2		✓	✓		✓	✓	✓	✓
CO3		✓			✓	✓	✓	
CO4		✓		✓		✓	✓	✓
CO5		✓	✓	✓		✓	✓	✓
Number of matches = 26, Correlation : High								

Prepared by	Dr. A. MOHAMED ALI	**Verified by**	

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMS4004	**DSC16**	**MODERN FLUID DYNAMICS**	**5**	**4**

Course Objectives
This course aims to discuss kinematics of fluids in motion, equation of motion of a fluid, three dimensional flows and viscous flows.

UNIT–I	**KINEMATICS OF FLUIDS IN MOTION**	15 hours
Real fluids and ideal fluids – Velocity of a fluid at a point, Stream lines, path lines, steady and unsteady flows – Velocity potential – The vorticity vector – Local and particle rates of changes – Equations of continuity – Worked examples – Acceleration of a fluid – Conditions at a rigid boundary. Chapter 2: Sections 2.1 to 2.10		
UNIT–II	**EQUATIONS OF MOTION OF FLUID**	15 hours
Pressure at a point in a fluid at rest – Pressure at a point in a moving fluid – Conditions at a boundary of two inviscid immiscible fluids – Euler's equation of motion – Discussion of the case of steady motion under conservative body forces. Chapter 3: Sections 3.1 to 3.7.		
UNIT–III	**SOME THREE DIMENSIONAL FLOWS**	15 hours
Introduction – Sources sinks and doublets – Images in a rigid infinite plane – Axis symmetric flows – Stokes stream function. Chapter 4 : Sections 4.1, 4.2, 4.3, 4.5.		
UNIT–IV	**SOME TWO DIMENSIONAL FLOWS**	15 hours
Meaning of two dimensional flow – Use of Cylindrical polar coordinate – The stream function – The complex potential for two dimensional, irrational imcompressible flow – Complex velocity potentials for standard two dimensional flows – Some worked examples – Two dimensional image systems – The Milne Thompson circle Theorem. Chapter 5 : Sections 5.1 to 5.8		

PBMS4004 - MODERN FLUID DYNAMICS

UNIT–V	**VISCOUS FLOWS**	15 hours
Stress components in a real fluid – Relations between Cartesian components of stress Translational motion of fluid elements – The rate of strain quadric and principal stresses – Some further properties of the rate of strain quadric – Stress analysis in fluid motion – Relation between stress and rate of strain – The co-efficient of viscosity and Laminar flow – The Navier – Stokes equations of motion of a Viscous fluid. Chapter 8: Sections 8.1 to 8.9.		
Books for Study: *F. Chorlton,* (1985), TEXT BOOK OF FLUID DYNAMICS, CBS Publications, NewDelhi.		
Books for Reference: 1. *R. W. Fox and A. T. McDonald,* (1985),INTRODUCTION TO FLUID MECHANICS, Wiley. 2. *E. Krause,* (2005), FLUID MECHANICS WITH PROBLEMS AND SOLUTIONS, Springer. 3. *M.D. Raisinghania,* (2008), FLUID DYNAMICS, S. Chand & Sons, New Delhi. 4. *G.K. Batchelor,* AN INTRODUCTION TO FLUID DYNAMICS. 5. *William S. Janna,* INTRODUCTION TO FLUID DYNAMICS.		

PBMS4004 - MODERN FLUID DYNAMICS

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the kinematics of fluids in motion	**K1**
CO2	Acquire the knowledge of Euler's equation of motion	**K2**
CO3	Prove the Milne-Thomson circle theorem	**K2**
CO4	Discuss the two dimensional flows and complex velocity potentials	**K5**
CO5	Derive the Navier-Stoke's equation of a viscous fluid	**K3**
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
CO1	✓	✓		✓	✓	✓	✓	✓
CO2	✓		✓		✓	✓	✓	✓
CO3	✓		✓		✓	✓	✓	✓
CO4	✓		✓	✓		✓	✓	✓
CO5	✓		✓		✓	✓	✓	✓
Number of matches = 32, Correlation : Very High								

Prepared by		Verified by	
	Dr. R. SRINIVASAN		

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMSNMP4	**SEC1**	**MATHEMATICS LAB**	**3**	**2**

Course Objectives

1. To practice the students in Mathematics document preparation
2. To compute tedious computations using mathematical softwares.

CREATING A DOCUMENT USING LATEX

- Title creation
- Page Layout
- Fonts
- List Structures
- Tables
- Include Images
- Header and Footer
- Mathematical Equations
- Bibliography Management.

BASIC COMPUTATIONAL TECHNIQUES

- Algebra and Arithmetic
- Calculus, Graphics and Linear Algebra
- Programming

Books for Reference:

1. LATEX MANUAL.
2. https://en.wikibooks.org/wiki/LaTeX
3. *Brain R. Hunt, Ronald R. Lipsman and Jonathan M. Rosenberg*, (2003), A GUIDE TO MATLAB FOR BEGINNERS AND EXPERIENCED USERS,Cambridge University Press.
4. *Rose L. Spencer*, INTRODUCTION TO MATLAB
5. https://www.scilab.org/sites/default/files/progscilab-v.0.10_en.pdf
6. SCILAB Reference Manual : http://www.ee.iitm.ac.in/~hsr/scilab/manual.pdf

PBMSNMP4 - MATHEMATICS LAB

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Prepare documents with list, tables and images.	**K3**
CO2	Manage Bibliography and References along with citation.	**K6**
CO3	Print mathematical equations clearly.	**K6**
CO4	Apply computational techniques in algebra, calculus	**K3**
CO5	Write Programme for some mathematical concepts	**K3**
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**
CO1				✓	✓	✓		✓
CO2				✓		✓		
CO3			✓	✓	✓	✓		✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 27, Correlation : High								

Prepared by	Dr. S.N. MOHAMED ASSARUDEEN	**Verified by**	

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMSDE41	**DSE4**	**NUMBER THEORY AND CRYPTOGRAPHY**	**5**	**4**

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**	15 hours
Time Estimates for doing arithmetic – Divisibility and Euclidean Algorithm – Congruence's – Some applications to Factoring. Chapter I		
UNIT–II	**CRYPTOGRAPHY**	15 hours
Some simple cryptosystems – Enciphering matrices. CHAPTER III		
UNIT–III	**QUADRATIC RESIDUES**	15 hours
Quadratics – Residues and reciprocity. CHAPTER II		
UNIT–IV	**PUBLIC KEY**	15 hours
The idea of Public key Cryptography – RSA – Discrete Law – Knapsack – Zero– Knowledge. CHAPTER IV : Sections 1 to 4.		
UNIT–V	**PRIMALITY AND FACTORING**	15 hours
Pseudo–primes – The rho method – Fermat factorization and factor bases – The continued fraction method – The quadratic sieve method.		

CHAPTER V
Books for Study: *Neal Koblitz,* (1987), A COURSE IN NUMBER THEORY AND CRYPTOGRAPHY, Springer–Verlag, New York.

PBMSDE41 - NUMBER THEORY AND CRYPTOGRAPHY

Books for Reference:

1. *Niven and Zuckerman,* (1976), AN INTRODUCTION TO THEORY OF NUMBERS, Third Edition,Wiley Eastern Ltd,New Delhi.
2. *David M. Burton,* (1989), ELEMENTARY NUMBER THEORY, Wm. C. Brown Publishers, Dubuque, Iowa.
3. *K. Ireland and M. Rosen,* (1972), A CLASSICAL INTRODUCTION TO MODERN NUMBER THEORY, Springer–Verlag.
4. *James S. Kraft and Lawrence C. Washington*, (2013), AN INTRODUCTION TO NUMBER THEORY WITH CRYPTOGRAPHY, Chapman and Hall/CRC Publisher.
5. *M. Welleda Baldoni, Ciro Ciliberto and G.M. Piacentini Cattaneo*, (2008), ELEMENTARY NUMBER THEORY, CRYPTOGRAPHY AND CODES, Springer, New York.

PBMSDE41 - NUMBER THEORY AND CRYPTOGRAPHY

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand fundamental algorithms such as the Euclidean algorithm and Chinese remainder theorem	**K2**
CO2	Evaluate the basic problems involved with cryptography and Enciphering matrices	**K5**
CO3	Derive quadratic residues and reciprocity	**K1**
CO4	Demonstrate understanding of the RSA cryptosystem and apply public key cryptography	**K3**
CO5	Solve problems on continued fraction	**K5**
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
CO1	✓	✓	✓	✓	✓		✓	
CO2	✓		✓	✓	✓			✓
CO3	✓	✓	✓				✓	
CO4	✓	✓	✓	✓	✓			✓
CO5	✓	✓	✓	✓			✓	
Number of matches = 26, Correlation : High								

Prepared by		Verified by	
	Dr. ZAHIRUDDEEN		

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMSDE42	**DSE4**	**ADVANCED NUMERICAL ANALYSIS**	**5**	**4**

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**	15 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**	15 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**	15 hours
Hermite Interpolation – Piecewise andSpline Interpolation – Bivariate Interpolation – Approximation – Least SquareApproximation. **Chapter 4:**Sections4.5, 4.6, 4.7, 4.8, 4.9		
UNIT–IV	**DIFFERENTIATION AND INTEGRATION**	15 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		

PBMSDE42 - ADVANCED NUMERICAL ANALYSIS

UNIT–V	**ORDINARY DIFFERENTIAL EQUATIONS**	15 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.		
Books for Study: 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.		
Books for Reference: 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.		

PBMSDE42 - ADVANCED NUMERICAL ANALYSIS

CO	**COURSE OUTCOME**	**KNOWLEDGE LEVEL**

CO1	Understand the various methods and compute the solution of the transcendental and polynomial equation	**K2, K3**
CO2	Apply the different methods to solve the system of linear algebraic equations	**K3**
CO3	Acquire the knowledge of interpolation and approximation and predict the value of the given from the data	**K2**
CO4	Understand the numerical differentiation and integration	**K2**
CO5	Compute the solution of the ordinary differential equations	**K3**
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**
CO1	✓	✓	✓				✓	✓
CO2			✓	✓	✓	✓	✓	
CO3	✓		✓		✓	✓	✓	✓
CO4	✓	✓		✓		✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓
Number of matches = 28, Correlation : High								

Prepared by	Dr. S. BALAKRISHNAN	**Verified by**	

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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS./ WEEK**	**CREDIT**
PBMSDE43	**DSE4**	**OPTIMIZATION TECHNIQUES**	**5**	**4**

Course Objectives
Operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function). The problem formulation by using linear, dynamic programming, game theory and queuing models. The stochastic models for discrete and continuous variables to control inventory and simulation of manufacturing models for the production decision making. Formulation of mathematical models for quantitative analysis of managerial problems in industry.

UNIT–I	**DEVELOPMENT OF O.R AND ALLOCATION**	18 hours
Development, definition, characteristics and phases, types of operation research models, applications; Allocation: linear programming, problem formulation, graphical solution, simplex method, artificial variables techniques, two–phase method, big-M method. Chapter 1: Sections 1.1 to 1.10 Chapter 4: Sections 4.1 to 4.6		
UNIT–II	**TRANSPORTATION AND ASSIGNMENT PROBLEM**	18 hours
Transportation problem: Formulation, optimal solution, unbalanced transportation problem, Degeneracy; Assignment problem, formulation, optimal solution, variants of assignment problem, traveling salesman problem. Chapter 9: Sections 9.1 to 9.7 Chapter 10: Sections 10.1 to 10.4		
UNIT–III	**SEQUENCING AND REPLACEMENT**	18 hours
Sequencing: Introduction, flow, shop sequencing, n jobs through two machines, n jobs through three machines, job shop sequencing, and two jobs through “m” machines. Replacement: Introduction: Replacement of items that deteriorate with time, when money value is not counted and counted, replacement of items that fail completely, group replacement. Chapter 17: Sections 17.1 to 17.4		

Chapter 20: Sections 20.1 to 20.6		
UNIT–IV	**THEORY OF GAMES AND INVENTORY**	18 hours
Theory Of Games: Introduction – Terminology, Solution of games with saddle points and without saddle points, 2×2 games, dominance principle, m X 2 & 2 X n games, Graphical method. Inventory: Introduction, Single item, Deterministic models, Purchase inventory models with one price break and multiple price breaks, Stochastic models, demand may be discrete variable or continuous variable, Single period model and no setup cost. Chapter 12: Sections 12.1 to 12.6 Chapter 14: Sections 14.1 to 14.6		
UNIT–V	**WAITING LINES, DYNAMIC PROGRAMMIMG AND SIMULATION**	18 hours
Waiting Lines: Introduction, Terminology, Single Channel, Poisson arrivals and exponential service times with infinite population and finite population models, Multichannel, Poisson arrivals and exponential service times with infinite population. Dynamic Programming: Introduction, Terminology, Bellman‟s Principle of optimality, Applications of dynamic programming, shortest path problem, linear programming problem. Simulation: Introduction, Definition, types of simulation models, steps involved in the simulation process - Advantages and Disadvantages, Application of Simulation to queuing and inventory. Chapter 16: Sections 16.1 to 16.6 Chapter 19: Sections 19.1 to 19.11 Chapter 22: Sections 22.1 to 22.5		

PBMSDE43 - OPTIMIZATIONTECHNIQUES

Books for Study:

J. K. Sharma, (2012), OPERATIONS RESEARCH, 5th Edition, Macmillan.

Books for Reference:

1. *A. M. Natarajan, P. Balasubramani, A. Tamilarasi*, (2013), OPERATIONS RESEARCH, Pearson Education.
2. *Maurice Saseini, Arhur Yaspan, Lawrence Friedman*, (1959), OPERATIONS RESEARCH: METHODS & PROBLEMS, 1st Edition.
3. *R. Pannerselvan*, (2006), OPERATIONS RESEARCH, 2nd Edition, PHI Publications.
4. *P.K. Gupta and D. S. Hira, (2014),* OPERATIONS RESEARCH, 7th Edition, S. Chand & Co., New Delhi.
5. *Hamdy A. Taha, (2017),* OPERATIONS RESEARCH AN INTRODUCTION, Tenth Edition, Pearson.

PBMSDE43 - OPTIMIZATIONTECHNIQUES

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Explain the theoretical workings of the graphical, simplex and analytical methods for making effective decision on variables so as to optimize the objective function.	**K2**
CO2	Demonstrate the optimized material distribution schedule using transportation model to minimize total distribution cost.	**K2**
CO3	Explain the theoretical workings of sequencing techniques for effective scheduling of jobs on machines.	**K2**
CO4	Apply the knowledge of game theory concepts to articulate real-world competitive situations to identify strategic decisions to counter the consequences.	**K4**
CO5	Develop a suitable queuing system to control important performance measures dynamically.	**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
CO1	✓	✓		✓	✓		✓	✓
CO2	✓		✓	✓	✓		✓	✓
CO3	✓	✓			✓	✓	✓	
CO4		✓	✓	✓	✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	
Number of matches = 30, Correlation : High								

Prepared by	Dr. V. J. SUDHAKAR	Verified by	

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 III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBPY3001	**DSC4**	**CLASSICAL MECHANICS & RELATIVITY**	**6**	**4**

Course Objectives

This paper

1. aims to impart the fundamental understanding of mechanics.
2. makes the students understand the lagrangian formulation.
3. provides the understanding of Hamiltonian Mechanics.
4. imparts the knowledge of Gravitational Fields and Potentials.
5. gives basic knowledge of relativity is introduced.

Unit-I	**MECHANICS**	**15 Hours**

Mechanics of single and system of particles-conversion law of linear momentum, mechanical energy for a particle and a system of particles-centre of Mass and equation of motion-constrained Motion-degrees of freedom -Centre of gravity of solid and hollow tetrahedron–Centre of pressure – vertical rectangular lamina – vertical triangular lamina – Meta-centric height and its determination-Equation of continuity of flow –Venturi meter – Euler's equation of unidirectional flow – Bernoulli's theorem -Torricelli's theorem and its applications.

Unit-II	***THE LAGRANGIAN FORMULATION***	**15 Hours**

Constraints – Holonomic and non-holonomic constraints – Generalized co-ordinates – Transformation equations – Configuration space – Principle of virtual work –D' Alembert's principle – Lagrange's equation - Applications of Lagrange's equation - Simple pendulum – Linear Harmonic Oscillator- Bead sliding on a uniformly rotating wire - Atwood's machine-Motion of a particle moving in a plane-Projectile.

Unit-III	**THE HAMILTONIAN FORMULATION**	**15 Hours**

Introduction to Hamiltonian Mechanics– Hamiltonian function – Hamilton's canonical equations of motion-Hamilton's Principle- Physical significance of Hamiltonian-Applications of Hamilton's equations of motion - Simple pendulum - Compound pendulum –Hamilton's equations for spring mass system-Motion of a particle in central force field in space.

Unit-IV	**GRAVITATIONAL FIELDS AND POTENTIALS**	**15 Hours**

Newton's law of gravitation-Gravitational Field-GravitationalIntensity of the field- Gravitational potential and Gravitational potential energy- Gravitational potential and field due to spherical shell- Gravitational potential and field due to solid sphere- GravitationalIntensity and potential of the Gravitational field at a point due to circular disc-Inertial and gravitational mass- Potential energy of a multicharged systems-Binding energy.

Unit-V	**RELATIVITY**	**15 Hours**

Frames of references – Michelson-Morley Experiment and its Negative results– Postulates of special theory of relativity – Galilean and Lorentz transformation equations – Length contraction(problems) – Time dilation(problems) –Relativistic variation of mass(problems) – Addition of velocities – Einstein's mass energy equivalence- Minkowski'sfour dimensional space-Time continuum.

Books for study:

1. Mechanics and mathematical methods by R Murugeshan, S Chand & Co. Pvt. Ltd.,NewDelhi,2014.
2. Elements of Classical Mechanics by Nisha Gupta, Anmol Publications,2011.
3. Classical Mechanics by Gupta Kumar and Sharma, Pragati Prakashan, Meerut,2012
4. Classical Mechanics by B D Gupta and Sathya Prakash, Kedar Nath Ram Nath& Co.,Meerut,2020.

Books for Reference:

1. Mechanics by S.G. Venkatachalapathy, MarghamPublicataions,Chennai,2012.
2. Classical Mechanics by Herbert Goldstein, Charles P. Poole, John Safko, Pearson India Education Services Pvt Ltd,2018.
3. Mechanics by D S Mathur S Chand & Co. Pvt. Ltd., New Delhi,2000.
4. General theory of Relativity by Puri, Pearson Education India,2013.
5. Classical Mechanics by Srinivasa Rao K N , University press Pvt. Ltd., Hyderabad,2003.

E-Resources:

1.https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-07-dynamics-fall-2009/lecture-notes/MIT16_07F09_Lec21.pdf
2. https://sites.astro.caltech.edu/~golwala/ph106ab/ph106ab_notes.pdf
3. https://www.feynmanlectures.caltech.edu/I_15.html
4. https://www.feynmanlectures.caltech.edu/I_16.html

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

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	The student learns to derive expression for centre of gravity, centre of pressure and various theorems on continuous flow.	**K1, K2**
CO2	To know the basic ideas of constraints and applications of Lagrange's equations to explain the dynamics of systems.	**K1, K3**
CO3	To Explore the Hamiltonian formulation and their applications to describe the behaviour of pendulums and spring mass system.	**K1, K2**
CO4	To Apply the knowledge of Gravitational Fields andPotentials.	**K1, K3**
CO5	To impart basic knowledge of relativity.	**K1, K2**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Creative		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	-	-	✓	✓	✓
CO3	✓	✓	✓	-	-	✓	✓	✓
CO4	✓	-	-	✓	✓	✓	✓	✓
CO5	✓	-	-	-	-	✓	✓	✓
Number of matches =30Correlation =Very 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**
UBPYPR31	**DSC5**	**Physics Practical II**	**3**	**3**

Course 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

Any Ten Experiments

1. Young's modulus-Uniform Bending-Pin & Microscope.
2. Young's modulus-Cantilever-Depression- Static method-Scale and Telescope.
3. Rigidity modulus – Static Torsion.
4. Melde's string –Determination of frequency of a fork .
5. Spectrometer - i-d curve –Determination of R.I of the material of the prism .
6. Potentiometer - Calibration of low range ammeter.
7. Air wedge- Determination of thickness of a thin wire.
8. Determination of M and B_H-Tan A position –Deflection and Vibration magnetometer.
9. Figure of Merit of a Table galvanometer.
10. Joule's Calorimeter -Specific heat capacity of Liquid.
11. Post office box-Temperature coefficient of resistance.
12. Determination of acceptance angle and numerical aperture using Fiber optic kit.

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.

E-Resources:

https://nptel.ac.in/courses/115/105/115105110/

Methodology of Teaching:

Demonstration of experimental techniques and measurements of physical parameters.

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Determine Young's modulus and Rigidity modulus of the given material	**K1,K2,K3**
CO2	Measure the frequency of tuning fork and the refractive index of a material.	**K1, K2,K3**
CO3	Find the specific heat capacity of the given liquid and specific resistance of the given material.	**K1,K2,K3**
CO4	Determine of M and B_H and Figure of Merit of Table galvanometer.	**K1,K2,K3**
CO5	Determine the thickness of the wire and parameters of optical fiber.	**K1,K2,K3**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Creative		

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	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBPY4001	**DSC6**	**OPTICS AND SPECTROSCOPY**	**5**	**5**

Course Objectives

1.To make the students understand the dual nature of light through the concepts of Geometrical and Physical Optics.
2. To introduce importance of interference, diffraction and polarization of light.
3. To impart the basics of spectroscopy and laser and their current applications.

Unit-I	**GEOMETRICAL OPTICS**	**12 Hours**

Convex and Concave lens – spherical aberration – methods of minimizing spherical aberration – condition for minimum spherical aberration in the case of two lenses separated by a distance – chromatic aberration in lenses – condition for achromatism of two thin lenses in contact and out of contact –Coma-Astigmatism and distortion (Qualitative Analysis only)- Dispersion- angular dispersion – Dispersive power- Combination of prisms to produce:Dispersion without deviation – Deviation without dispersion-Constant deviation spectrometer – Determination of refractive index of the material of the small angled prism.

Unit-II	**INTERFERENCE**	**12 Hours**

Introduction-Theory of thin films- condition for bright and dark fringes –interference due to reflected light and transmitted light - colors of thin films – Reflected system – Air wedge – theory – Experimental determination of diameter of a thin wire -determination of wedge angle– Test for optical flatness of glass plate – Michelson's Interferometer – theory – Determination of wavelength and resolution of spectral lines- Newton's rings by reflected system of light (Theory) – Determination of wavelength of sodium light and refractive index using Newton's rings-Newton's rings formed by two curved surfaces.

Unit-III	**DIFFRACTION**	**12 Hours**

Introduction-Fresnel's diffraction-Fresnel's assumptions and half period zones-Zone plate- action of zone plate for an incident spherical wave front-comparison of zone plate with convex lens – diffraction at a straight edge- circular aperture- positions of maximum and minimum intensity–Analytical treatment-Fraunhofer diffraction at single slit ,double slit and N-slit diffraction–Dispersive power of a grating–Resolving Power-Limit of resolution- Rayleigh's criterion – Resolving power of telescope, prism and grating.

Unit-IV	**POLARIZATION**	**12 Hours**

Polarization : Brewster's law- Malu's law – Double refraction – Nicol Prism – construction and working- Nicol prism as a polarizer and analyzer – Huygen's explanation of double refraction in uniaxial crystals – Production , detection and theory of plane, circularly and elliptically polarized light – optical activity – Fresnel's explanation – specific rotatory power – Determination of specific rotatory power by Laurent's half shade Polarimeter – Kerr and Faraday effect.		
Unit-V	**SPECTROSCOPY**	**12 Hours**
Spectroscopy : Introduction to spectroscopy - Electromagnetic spectrum - characterization of electromagnetic radiation - quantization of energy - regions of the spectrum – classification of molecules – microwave spectroscopy – rigid rotator - vibrational spectroscopy – harmonic oscillator - Laser - Ruby laser - He-Ne, Semiconductor laser construction and working- Raman effect and its theory- Experimental set up - Characteristics of Raman lines.		

Books for study:

1. A text book of Optics by Subramaniam N &Brij Lal ,S Chand & Co. Pvt. Ltd., New Delhi, 2010.
2. Optics and Spectroscopy by Murugesan R - S Chand & Co. Pvt. Ltd., New Delhi,2010.
3. An Introduction to Lasers Theory and Applications by Dr. M.P. Avadhanulu and Dr. P.S.Hemne, S Chand & Co. Pvt. Ltd., New Delhi, 2013.
4. Molecular structure and spectroscopy by Aruldhas, Prentice Hall, New Delhi, 2007.

Books for Reference:

1. Fundamentals of Optics by Ashok Kumar, D R Gulati, H R Gulati, R Chand & Co. Pvt. Ltd., New Delhi, 2018.
2. Optics by Ajay Ghatak, McGraw Hill , 2020.
3. Fundamentals of Molecular Spectroscopy by P S Sindhu, New age International (p)Ltd,2019
4. Optics by Eugene Hecht , Pearson Education Limited, India,2008.

E-Resources:

1. https://nptel.ac.in/courses/115/102/115102124/
2. https://www.nptel.ac.in/courses/115/105/115105104
3. https://nptel.ac.in/courses/122/107/122107035
4. https://www.digimat.in/nptel/courses/video/104104085/L01.html
5. https://ocw.mit.edu
6. https://www.youtube.com/watch?v=FNp81kkxj5c

Methodology of Teaching:

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

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Learn the fundamentals of spherical and chromatic aberration and their minimisation.	**K1,K2,K3**
CO2	Gain the knowledge on interference and experiments based on interference.	**K1,K2,K3**
CO3	Evaluate concepts on diffraction and experiments based on diffraction.	**K1,K2,K3**
CO4	Apply the principles of polarization and its theory to know the production and detection of polarized light.	**K1,K2,K3**
CO5	Analyze different types of lasers and its applications in spectroscopy.	**K1,K2,K3**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Creative		

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	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBPYPR41	**DSC7**	**Physics Practical III**	**3**	**3**

Course 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
Any Ten Experiments

1. Young's modulus-Uniform Bending –Scale and Telescope.
2. Young's modulus-Cantilever - Depression-Dynamic method- Pin and Microscope.
3. Compound pendulum –Determination of 'g' and 'K'.
4. Sonometer –Determination of AC Frequency –Brass wire.
5. Spectrometer –Grating - Minimum deviation position-determination of N and λ.
6. Potentiometer –Determination of resistance and specific resistance of a coil.
7. Air wedge –Determination of thickness of enamel coating.
8. Determination of M and B_H –Tan B Position –Deflection and Vibration magnetometer.
9. Construction and study of regulated power supply using IC (7805).
10. Construction and study of regulated power supply using Zener diode.
11. Wavelength of laser light from Diode Laser.
12. Specific rotation of sugar solution-Polarimeter.

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.

E-Resources:

https://nptel.ac.in/courses/115/105/115105110/

Methodology of Teaching:

Demonstration of experimental techniques and measurements of physical parameters.

On the completion of this course the students will be able to

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Determine the young's modulus and acceleration due to gravity at a place.	K1, K2, K3
CO2	Analyze spectra of the given source and determination of wavelength of laser light.	K1, K2, K3
CO3	Compute the resistance and specific resistance of a material.	K1, K2, K3
CO4	Determine M and B_H and specific rotatory power.	K1, K2, K3
CO5	To Construct regulated power supply using Zener diode and IC.	K1, K2, K3
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Creative		

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	1-30%	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**
PBPY3001	**DSC9**	**SOLID STATE PHYSICS I**	**6**	**4**

Course Objectives

1. ***To relate crystal structure to symmetry, recognize the correspondence between real and reciprocal space.***
2. ***Acquire knowledge of the behaviour of electrons in solids based on classical and quantum theories.***
3. ***To get familiarized with the different parameters associated with superconductivity and the theory of superconductivity***

Unit-I	**Diffraction and Reciprocal lattice**	**15 Hours**

Types of lattices- symmetry elements- Space Groups- Bravais Lattices-Miller indices andits determination - Simple crystal structure- Atomic packing Factor (SC, BCC, FCC,HCP) – Crystal diffraction – Bragg's law – Scattered Wave Amplitude – Reciprocal Lattice (SC, BCC, FCC) – ***diffractionof electrons-Space groups.***

Unit-II	***Lattice vibration and Phonons***	**15 Hours**

Mono atomic and diatomic one dimensional lattice, phonon momentum – Inelastic scattering by phonons- Debye's theory of specific heats, thermal expansion and lattice thermal conductivity of solids–An harmonic Crystal interactions.

Unit-III	**Free electron theory of metals**	**15 Hours**

Free electron in solids-Drude Lorentz free electron theory – Wiedemann-Franz law- Free electron gas in three dimension-fermi Dirac distribution function - Density of states –Fermi surface-Failure of the free electron model-Specific heat capacity of electrons in metals.

Unit-IV	**Band theory of solids**	**15 Hours**

Band theory of solids- Electron in periodic potentials-Bloch's theorem –Kroning-Penny model- Brillouin zones- Semiconductors- Intrinsic and extrinsic carrierconcentration- Temperature dependence- Mobility-Impurity conductivity- Hall effect– Experimental method in Fermi surface studies-de Hass-van alphen effect

Unit-V	**Super conductivity**	**15 Hours**

Superconductivity: Effect of magnetic fields-Meissner effect – Entropy and heat capacity- Energy gap – Type I and II superconductors.

Thermodynamics of super conducting transition – London equation I and II – Coherence length – Cooper pairs – BCS Theory – Single particle tunneling- Josephson tunneling – DC and AC Josephson effect

Books for study:

1. Solid State Physics-S.O.Pillai, New Age International, 2006.

2. Solid State Physics-K.Ilangovan, MJP Publisher,2009.
3. Introduction to Solid State Physics- Charles Kittel, Wiley India Edition,2012.
4. Solid State Physics-Gupta kumar, K.Nath& Co, 2010.

Books for Reference:

1. G.K. Narula, K.S.Narula and V.K.Gupta, 1988, Materials Science, Tata McGraw-Hill.
2. Lawrence H. Van Vlack, 1998, Elements of Materials Science and Engineering, 6th Edition, second ISE reprint, Addison-Wesley
3. H. Iabch and H.Luth, 2001, Solid state Physics – An introduction to principles of Material Science, 2nd Edition, Springer
4. S.L Kakani and Amit Kakani, 2006, Material Science, New Age International Publishers

E-Resources:

1) https://web.iit.edu/sites/web/files/departments/academic-affairs/academic-resourcecenter/pdfs/Miller_Indices.pdf
2) https://www.youtube.com/watch?v=LcoUFX3_A1s
3) https://www.youtube.com/watch?v=-MTYPNfVw5Y
4) https://en.wikipedia.org/wiki/Brillouin_zone 5. 5.
5) http://yclept.ucdavis.edu/course/215b.W17/Kronig-Penney_Rapp-3.pdf.
6) https://www.youtube.com/watch?v=6EdotZPaCIA
7) https://www.youtube.com/watch?v=IMbGqcb8aN4
8) https://en.wikipedia.org/wiki/Hund%27s_rules
9) https://en.wikipedia.org/wiki/Meissner_effect
10) https://www.youtube.com/watch?v=NVeAmKUbXvA

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	To correlate the X-ray diffraction pattern for a given crystal structure based on the corresponding reciprocal lattice.	**K2,K3,K4,K5**
CO2	Identify the vibration of mono and diatomic one dimensional lattice	**K3,K4,K5**
CO3	Able to explain how the predicted electronic properties of solids differ in the classical free electron theory, quantum free electron theory and the nearly free electron model	**K2,K3,K4,K5**
CO4	Understand Kronig-Penney model to describes the motion of electrons in metals and provides the basis for categorisation of solids and to know the significance of Hall effect	**K2,K3,K4**
CO5	Formulate ideas on super conductivity and to differentiate between type-I and type-II superconductors and their theories.	**K3,K4,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 = 26 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**
PBPY3002	**DSC10**	**NUCLEAR AND PARTICLE PHYSICS**	**6**	**4**

Course Objectives

1.**To study of the fundamentals ofnucleus with deuteron system and explain the origin of nuclear forces,**
2. To illustrate differentnuclear models that exposes the structure of nucleus,
3. To explain the theories of variousradioactive decays and nuclear reactions and to determine conservation of physicalquantities and study the elementary particle and cosmic radiation of high energy physics.

Unit-I	**Nuclear Forces**	**15 Hours**

Central and non central forces-Its property-Meson theory of nuclear force-Yukawa potential-Spin dependence of nuclear forces-Charge independence of nuclear forces-Isospin formalism-Ground state of deuteron.

Unit-II	**Nuclear Models**	**15 Hours**

Liquid drop model-Bohr Wheeler theory of nuclear fission-Shell Model-Evidence for existence of magic number - Spin orbit potential-Prediction of shell model-Magnetic moment – Electric quadrupole moment – Nuclear isomerism - parity-Collective model - Vibrational states & Rotational states.

Unit-III	**Nuclear Reactions**	**15 Hours**

Types of nuclear reactions-Conservation laws-Q value equation-scattering and partial wave analysis of cross section-Compound nucleus-Energy level of nuclei-level width and de-excitation-Reciprocity theorem-Breit-Wigner dispersion formula-Continnum theory of nuclear reaction-Stripping reaction.

Unit-IV	**Radioactive Decays (Beta, Gamma radiations)**	**15 Hours**

Beta decay:Fermi theory of beta decay-life time of beta decay-Mass of neutrino- selection rules.
Gamma decay: Multipole transition in nuclei- internal conversion-Pair Production-Nuclear isomerism.

Unit-V	**Elementary Particle Physics**	**15 Hours**

Classification of elementary particles- **Particle interactions**–Unitary Symmetry SU(2)-SU(3) Symmetry - Quark theory- Classification-Quark model of nucleus-.**Cosmic rays - Origin - Geomagnetic effects – Showers – Theory of electron showers.**

Books for study:

1. Nuclear Physics-R.R.Roy and B.P.Nigam, Wily Eastern Ltd, New York
2. Nuclear Physics-D.C.Tayal, Himalya Publications, Bombay
3.Nuclear Physics vol II- S.N.Ghosal ,S.chand& co New Delhi
4. Nuclear Physics – Pandiya and Yadav, 2nd Edition, kedarnath and Ram nath

publication

Books for Reference:

1. **H. A. Enge**, 1983, *Introduction to Nuclear Physics*, Addison-Wesley, Tokyo
2. **Y. R. Waghmare**, 1981, *Introductory Nuclear, Physics*, Oxford-IBH, New Delhi.
3. **Ghoshal**, *Atomic and Nuclear Physics*, Vol. 2
4. **J. M. Longo**, 1971, *Elementary particles*, McGraw-Hill, New York.
5. **R. D. Evans**, 1955, *Atomic Nucleus*, McGraw-Hill, New York.
6. **I. Kaplan**, 1989, *Nuclear Physics*, Narosa, New Delhi
7. **B. L. Cohen**, 1971, *Concepts of Nuclear Physics*, TMH, New Delhi

E-Resources:

1. https://www.youtube.com/watch?v=Jf6MSWoZRmc
2. http://www.scholarpedia.org/article/Nuclear_Forces
3. https://en.wikipedia.org/wiki/Alpha_decay
4. https://www.youtube.com/watch?v=CwExbnOzc4o
5. https://www.youtube.com/watch?v=nqSs7vrF9DY
6. http://hyperphysics.phy-astr.gsu.edu/hbase/Nuclear/liqdrop.html
7. https://en.wikipedia.org/wiki/Geiger_counter
8. https://www.youtube.com/watch?v=jxY6RC52Cf0
9. https://www.youtube.com/watch?v=fivOAjr_suA
10. https://en.wikipedia.org/wiki/Gell-Mann%E2%80%93Nishijima_formula

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand about nuclear forces and their dependence on various parameters.	**K2,K3,K4,K5**
CO2	Analytical understanding is developed by studying the shell model andliquid drop model provides skill of preparing empirical models .	**K1,K2,K3,K4**
CO3	Study of nuclear forces and characteristics assists to develop inclusive knowledge in the nuclear structure.	**K2,K3,K4.**
CO4	Compute the total decay rate, selection rules for beta and gamma decay	**K3,K4,K5**
CO5	A comprehensive knowledge is gathered about the Elementary Particles and their properties , symmetries are well understood by this topic.	**K1, K2,K4,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 =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**
PBPY3003	**DSC11**	**PHYSICS OF CRYSTALS**	**5**	**4**

Course Objectives

1. To study the basic knowledge of crystal systems and spatial symmetries
2. Understand the Nucleation and Kinetics of Crystal Growth and techniques.
3. To demonstrate knowledge of single crystal X-ray diffraction methods
4. To Learn the different diffraction techniques and determination of crystal structure
5. To expose the basic information of refinement on crystal structure

Unit-I	**Growth and nucleation**	**12 Hours**

Crystal System and Symmetry - Nucleation- Different kinds of nucleation - Concept of formation of critical nucleus – Classical theory of nucleation - Spherical and cylindrical nucleus – Crystal growth by Solution, Melt, Solid and Vapour-Growth Kinetics of Thin Films - Thin Film Structure.

Unit-II	**X-ray Diffraction**	**12 Hours**

X-ray – generation – Ewald`s sphere **– X- ray diffractometer – four circle diffractometer – data collection** – X- ray diffraction of crystal lattice – Coherent scattering - scattering of X-ray by electron – Scattering by one atom - diffraction from a one dimension crystal – Laue formulae of X- ray diffraction.

Unit-III	**Diffraction Techniques**	**12 Hours**

Laue diffraction – orientation – calculation of Laue angles –Rotating crystal method – X- ray powder diffraction- principle- method of powder diffraction pattern – SAED pattern- interpretation of powder diffraction photographs -**Cubic Systems** - applications and limitation of X- ray powder diffraction

Unit-IV	**Determination of Crystal Structure**	**12 Hours**

Scattering factor –structure factor- **determination of structure factor –amplitude from intensities- data reduction – crystal mounting – collection of Bragg's intensities** – Identification of phases – Patterson method –heavy atom technique – anomalous dispersion – direct method procedure.

Unit-V	**Refinement of Crystal Structure**	**12 Hours**

Weighting scheme – residual indices – least square refinement – thermal parameters – Wilsons plot – space group determination – structure refinement - structural analysis – bond length - bond angle - torsion angle - confirmation of rings.

Books for Study:

1. Crystal Growth for Beginners: Fundamentals of Nucleation, Crystal Growth and Epitaxy, I.V. Markov, (2004)
2. Crystal Growth Process and Methods, P.Santhanaragavan and P. Ramasamy, KRU

Publications, Kumbakonam, (2001).
3. D. Velmurugan, Elementary Crystallography, MJP publisher, Chennai

3. Crystal Physics D.velmurugan

Books for Reference:

1. J.C. Brice, Crystal Growth Processes, John Wiley and Sons, New York (1986).
2. X-ray Structure Determination, Second Edition, Stout and Jensen, John WileyPublications.
3. Fundamentals of Crystallography, Second Edition, C. Giacovazzo, Oxford Press.
4. Structure Determination by X-ray Crystallography, Second Edition, Ladd andPalmer.

E-Resources:

1) https://lms.su.edu.pk/lesson/511/crystal-structure
2) https://www.govinfo.gov/content/pkg/GOVPUB-C13-ffe43afbcfc5ce61d4b7952bd2f2bcd8/pdf/GOVPUB-C13-ffe43afbcfc5ce61d4b7952bd2f2bcd8.pdf
3) https://www.britannica.com/science/crystal
4) https://unlcms.unl.edu/cas/physics/tsymbal/teaching/SSP-927/Section%2003_Crystal_Binding.pdf
5) https://application.wiley-vch.de/books/sample/3527412824_c01.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basics of crystal systems and spatial symmetries	K1, K2, K3
CO2	Knowledge of single crystal X-ray diffraction methods	K1, K3, K5
CO3	Apply the different diffraction techniques and its application	K3, K4, K5
CO4	Evaluate the structural determination of crystal structure	K2, K4, K5
CO5	Analyse the fundamentals of refinements of crystal	K1, K3, K4
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 =30					Correlation = Very 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
PBPYPR31	DSC12	PRACTICAL III- GENERAL PHYSICS EXPERIMENTS II	5	4

Course Objectives

Aim of General Physics Lab is to train the students for techniques in Physics so that they can investigate various relevant aspects and be confident to handle sophisticated instruments. To make the students to understand experimental physics is a natural extension of the theoretical concepts of Physics. Students will cherish that the laboratory experiments are set in consonance with the topics covered in theory like Lasers, Meyer's disc. F. P. Etalon using spectrometer, Arc spectrum, B-H curve etc. The purpose of doing laboratory experiments by the students is to afford an opportunity to familiarize themselves with various instruments, which they read in theory and to culture the habit of taking readings carefully, so as to get the results nearer to the already determined standard values with least error. The student is made to understand the physical principles underlying the experiment undertaken.

LIST OF EXPERIMENTS

(Any 10 out of the given 15)

1. GM counter – Characteristics, inverse square law.
2. G.M. Counter - absorption coefficient.
3. Michelson Interferometer – Wavelength, separation of wavelengths
4. Michelson Interferometer - thickness of mica sheet.
5. F.P.Etalon – using Michelson set up.
6. Hall effect.
7. Molecular spectra – ALO band.
8. Molecular spectra – CN Band.
9. Susceptibility by Quincke's method.
10. Susceptibility by Guoy's method.

11. Ultrasonic Interferometer – Velocity and Compressibility of a liquid.
12. Ultrasonic Diffraction - Velocity and Compressibility of a liquid.
13. Dielectric measurements in Microwave test bench.
14. B-H curve using CRO.
15. Spectral analysis of a salt.

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Comprehend the concept of the experiment. Evaluate theoretical calculations using experimental observations.	**K2, K3, K5**
CO2	Analyze the data and arrive at a valid conclusion. Apply computational thinking.	**K4, K5**
CO3	Ability to analyze various spectra and identify the molecules by their spectra. Experimental skill development by performing basic spectroscopic measurements	**K4, K5**
CO4	Measuring the magnetic susceptibility of different materials.	**K4, K5**
CO5	Learn various experimental for developing analytical abilities to address real world problems.	**K5, K6**
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 =30					**Correlation = Very 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**
PBPYVB31	**VALUE BASED COURSE**	**Research Methodology & Ethics**	**3**	**3**

Course Objectives

At the end of this course the learner is expected:

1. To understand the philosophy of science and ethics, research integrity and publication ethics.
2. To identify research misconduct and predatory publications
3. To understand indexing and citation databases, open access publications, research metrics (citations, h-index, impact Factor,etc.). To understand the usage of plagiarism tools.

Unit-I	**Introduction to Research**	**9 Hours**

Meaning of Research and Scope of Research Methodology - Significance of research in Social and business Science Identification of the problem area - Selection of the problem - Formulation of research question(s) - Pilot study - Meaning and Components of research design.

Unit- II	***Research Ethics***	**9 Hours**

Ethics with respect to science and research - Intellectual honesty and research integrity - Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) - Redundant Publications: duplicate and overlapping publications, salami slicing - Selective reporting and misrepresentation of data.

Unit-III	**Data Collection & Types**	**9 Hours**

Data Collection - Sources : Primary and Secondary - Data matrix - Unit of data collection and unit of data analysis - Methods and tools of data collection : Interview and questionnaires and their types - observation and its types - Audio visual aids in data collection - Scaling and Testing Techniques - Reliability and validity of instruments - Uses of information technology in data collection.

Unit-IV	**Publication ethics**	**9 Hours**

Types of publications. Publication ethics: definition, introduction and importance - Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. - Conflicts of interest - Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types - Violation of publication ethics, authorship and contributor ship - Identification of publication misconduct, complaints and appeals - Predatory publisher and journals.

Unit-V	**Research Writing**	**9 Hours**

Report writing - Meaning, Techniques and precautions of interpretation - significance of report writing - Target audience - Different steps in writing report - Layout of research report - Types: Technical report, popular report - Mechanics of writing a research report. Tools for reference organization- zotero, mendeley, endnote. Online statistical tools.

Books for study:

1. The Student's Guide to Research Ethics By Paul Oliver Open University Press, 2003
2. Responsible Conduct of Research By Adil E. Shamoo; David B. Resnik Oxford University Press, 2003
3. Ethics in Science Education, Research and Governance Edited by Kambadur Muralidhar, Amit Ghosh Ashok Kumar Singhvi. Indian National Science Academy, 2019. ISBN : 978-81-939482-1-7.
4. Amarchand D, Research Methods in Commerce - Emerald Publishers, Chennai
5. C.R.Kothari, Research Methodology: Methods and Techniques, New Age Intenational Publishers,New Delhi. 4th edition, 2019
6. N. Gurumani, Research Methodology: For Biological Sciences, MJP Publishers, 2019.

Books for Reference:

1. Anderson B.H., Dursaton, and Poole M.: Thesis and assignment writing, Wiley Eastern 1997.
2. Bijorn Gustavii: How to write and illustrate scientific papers? Cambridge University Press.
3. Bordens K.S. and Abbott, B.b.: Research Design and Methods, Mc Graw Hill, 2008.
4. Graziano, A., M., and Raulin, M.,L.: Research Methods – A Process of Inquiry, Sixth Edition, Pearson, 2007.

E-Resources:

1. Nicholas H. Steneck. Introduction to the Responsible Conduct of Research. Office of Research Integrity. 2007. Available at: https://ori.hhs.gov/sites/default/files/rcrintro.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understrand the concept and significance of research	K2
CO2	Recognize the ethical issues in research and publications	K1
CO3	Collect, correlate and collaborate different types of data	K3, K4, K6
CO4	Classify, develop and apprise various modes of research writings	K2, K5, K6
CO5	Identify, solve and develop protocols for existing and future research problems.	K1, K3, K6
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 =					Correlation =			

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
PBPYDE31	DSE3	SENSOR SYSTEMS	5	3

Course Objectives

1. To provide basic understanding of Sensor and instrumentation systems.
2. To offer thorough knowledge about the variety of measuring systems and the methods of measurement and the use of different sensors.

Unit-I	INTRODUCTION	12 Hours

General concepts and terminology of measurement systems, Sensors and transducers, Classification ofsensors,Static and dynamic characteristics, Mathematical model of sensor - Zero, I and II order systems. Introduction to open and closed loop systems, Feedback mechanism in a process.

Unit-II	VARIABLE RESISTANCE TYPE SENSORS	12 Hours

Resistive sensors- Potentiometers, strain gages, resistive temperature detectors (RTD), thermistors, magnetoresistors, light dependent resistor (LDR), resistive hygrometers, resistive gas sensors, liquid conductivity sensors.

Unit-III	INDUCTANCE AND CAPACITANCE SENSORS	12 Hours

Capacitive sensors- variable capacitor, differential capacitor, Inductive sensors - variable reluctance sensors, Eddy current sensors, Linear variable differential transformers (LVDT), variable transformers, magnetoelastic and magnetostrictive sensors, Electromagnetic sensors -

Sensors based on Faraday's law, Hall effect sensors.		
Unit-IV	**SELF-GENERATING SENSORS**	**12 Hours**
Thermoelectric sensors, piezo electric sensors, pyroelectric sensors, photovoltaic sensors, electrochemical sensors		
Unit-V	**SPECIAL PURPOSE SENSORS AND ACTUATORS**	**12 Hours**
Ultrasonic sensor, Hall effect sensor, optical sensors, Microphones, Bio sensors, Metal-Oxide Chemical Sensors, Thermal Transport Sensors for flow measurement, Actuators-hydraulic, pneumatic, electrical, solenoid valves and electromagnetic relays. Sensors based on semiconductor junctions, sensors based on MOSFET transistors.		

Books for study:

1) Doebelin E.O., "Measurement System Application and Design", McGraw Hill, 5th Edition 2004.
2) Patranabis, 'Sensors and Transducers', Prentice Hall of India, NewDelhi, 2nd Edition, 2009.

Books for Reference:

1) Ernest O Doebelin and Dhanesh N. Manik, 'Measurement Systems Application and Design' 5th Edition, McGraw Hill. 2007.
2) Ramon Pallas-Areny, John G. Webster, 'Sensors and Signal Conditioning', John Wiley and Sons Inc, 2nd Edition, 2012.
3) Jacob Fraden,' Handbook of Modern Sensors: Physics, Designs, and Applications', Springer, 5th Edition,2015

E-Resources:

1) https://www.thomasnet.com/articles/instruments-controls/types-of-sensors/
2) https://www.oecd.org/sti/44379113.pdf
3) https://www.gla.ac.uk/media/Media_227573_smxx.pdf
4) https://research.iaun.ac.ir/pd/abbas.chatraei/pdfs/UploadFile_1903.pdf
5) http://www.nomads.usp.br/pesquisas/design/dos/Capacitacao/arquivos/Understanding%20Smart%20Sensors,%202nd%20Ed.pdf
6) https://www.govinfo.gov/content/pkg/GOVPUB-C13-a862be42c77bb72e75f15c51b9d4a245/pdf/GOVPUB-C13-a862be42c77bb72e75f15c51b9d4a245.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	To gain the basic idea of measurements and the errors associated with measurement.	**K2, K3**
CO2	To differentiate between the types of sensors available.	**K4, K5**

CO3	To select a suitable sensor for a given application.	**K4, K5**
CO4	To apply the knowledge about the measuring methods to use them more effectively.	**K3,K4,K5**
CO5	Gain the knowledge about self purpose sensors and actuators	**K2,K5,K6**
KI- Remembering/Knowledge, K2- Understand, K3-Apply,K4-Analyse, K5 Evaluate, K6 – Create		

Course Learning Outcomes (COs)	Programme Learning Outcomes (PLOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PLO8
CO1	✓	✓	✓	✓	✓			
CO2	✓	✓	✓	✓	✓	✓		
CO3	✓		✓			✓	✓	
CO4	✓	✓		✓		✓	✓	
CO5	✓	✓	✓		✓	✓		✓
Number of matches = 26, Correlations: 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
PBPYDE32	DSE3	Non-linear optics	5	3

Course Objectives

1. To study the basics of Lasers and its types
2. To acquire the knowledge on introduction to non-linear optics and its generation
3. To teach the multiphonon processes and hence to study the optical Kerr effect
4. To expose the basic information on non-linear optical materials
5. To know about the fundamentals of fiber optics and different types of fiber

Unit-I	Lasers	12 Hours

Gas lasers – He-Ne, Ar+ ion lasers – Solid state lasers – Ruby – Nd:YAG, Ti sapphire -Organic dye laser – Rhodamine – Semiconductor lasers – Diode laser, p-n-junctionlaser andGaAs laser.

Unit-II	Basics of Nonlinear Optics	12 Hours

Wave propagation in an anisotropic crystal – Polarization response of materials to light - Harmonic generation – Second harmonic generation – Sum and difference frequency generation– Phase matching – Third harmonic generation – Terahertz – Bistability - Self - focusing.

Unit-III	Multiphoton Processes	12 Hours

Two photon process – Theory and experiment – Three photon process – Parametric generation of light – Oscillator – Amplifier – Stimulated Raman scattering – Intensity dependent refractive index -- Optical Kerr effect -- Foucault effect – Photorefractive, electronic and optic effects.

Unit-IV	Nonlinear Optical Materials	12 Hours

Basic requirements – Inorganics – Borates – Organics – Urea, Nitroaniline – Semiorganics – Thoreau complex – Laser induced surface damage threshold

Unit-V	Fiber Optics	12 Hours

Step -Graded index fibers – Wave propagation – Fiber modes – Single and multimode fibers - Numerical aperture – Dispersion – Fiber bandwidth- Fiber losses -Scattering, absorption, Bending, leaky mode and mode coupling losses-Attenuation coefficient -Material absorption.

Books for study:

1. K.R. Nambiar, Lasers: Principles, Types and Applications (New Age Inter-national Publishers Ltd, New Delhi, 2014).
2. B.B. Laud, Lasers and Nonlinear Optics, 3rd Edn. (New Age, New Delhi, 2011).
3. R.W. Boyd, Nonlinear Optics, 2nd Edn. (Academic Press, New York, 2003).
4. G.P. Agarwal, Fiber-Optics Communication Systems, 3rd Edn. (John Wiley,

Books for Reference:

1. W.T. Silvast, Laser Fundamentals (Cambridge University Press, Cambridge, 2003).
2. D.L. Mills, Nonlinear Optics – Basic Concepts (Springer, Berlin, 1998).

E-Resources:

1.https://en.wikipedia.org/wiki/Laser
2. https://en.wikipedia.org/wiki/Helium%E2%80%93neon_laser

3.https://www.physics-and-radio-electronics.com/physics/laser/ndyaglaser.html
4. https://en.wikipedia.org/wiki/Nonlinear_optics
5.https://www.youtube.com/watch?v=3WevI1A2Bdk
6.https://shodhganga.inflibnet.ac.in/bitstream/10603/35888/1/chapter1.pdf
7. https://www.photonics.com/Articles/Fiber_Optics_Understanding_the_Basics/a25151
8.http://www.infocobuild.com/education/audio-video-courses/physics/IntroToNonlinearOptics-IIT-Kharagpur/lecture-12.html
9.https://www.slideshare.net/krishslide/nonlinear-optical-materials
10.https://en.wikipedia.org/wiki/Graded-index_fiber

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basics of Lasers and its types	K1, K2, K3
CO2	Knowledge on introduction to non-linear optics and its generation	K1, K2, K3, K4
CO3	Evaluate the optics of anisotropic mediaofmultiphonon processes and hence to analyse the optical Kerr effect	K3, K4, K5
CO4	Analyze non-linear effects in optical fibers	K3, K4, K5
CO5	Apply the fundamentals of fiber optics and different types of fiber	K1, K3, K4
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 =31					Correlation = Very 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	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
PBPYDE33	DSE3	SYNTHESIS AND CHARACTERIZATION OF NANOMATERIAL	5	3

Course Objectives

1. To study the fundamental concepts of nanomaterials and its properties.
2.To learn the synthesis of nanostructure materials by various methods.
3.To expose an idea about one dimensional material.
4.To impart the knowledge about structure and morphology of nanomaterial.
5.To study the transport properties of nanomaterial.

Unit-I	Fundamentals of Nanoscale Science	12 Hours

Introduction - nano and nature – classification of nanostructures - surfaces and dimensional space - bulk to nano transition – effects of nanoscale dimensions on various properties – structural, chemical, mechanical, magnetic, optical and electronic properties.

Unit-II	Synthesis of Nanomaterial	12 Hours

Top down and bottom up approaches – ball and ion milling, Lithography.
Physical methods: Thermal evaporation, Spray pyrolysis, Molecular beam epitaxy (MBE), Physical vapour deposition (PVD), Microwave heating, Electric arc deposition, Ion implantation.
Chemical methods: Chemical and co - precipitation, sol - gel synthesis of metal oxides, Solvothermal, Electrochemical synthesis, Photochemical synthesis, Langmuir-blodgett (LB) technique, Chemical vapour deposition (CVD)

Unit-III	Nanotubes and nanowires	12 Hours

Carbon nanotubes – structure of CNT's – Growth mechanism of CNT's - Electronic properties, Vibrational properties, Mechanical properties of CNTs – application of CNT's. Nanowires – growth of nanowires- Lithography -Vapor-Liquid-Solid (VLS) method, template assisted method – application.

Unit-IV	Structural and morphological studies	12 Hours

Powder X - Ray Diffraction, Scanning electron microscope(SEM), Transmission electron microscope (TEM), Scanning tunneling microscope (STM), Atomic force microscope(AFM),Scanning probe microscopy (SPM), NMR Basics and application to nano materials.

Unit-V	Analysis of Chemical and Transport properties	12 Hours

Energy dispersive X - ray (EDX), X – ray photoelectron spectroscopy (XPS) - FT-IR Analysis- UV - Visible absorption, Photoluminescence, Impedance measurement, I-V characteristics, Vibrating Sample Magnetometer (VSM)- Brunauer -Emmett - Teller (BET) Surface Area Analysis.

Books for Study:

1) B. Viswanathan, Structure and Properties of Solid State Materials, 2nd Edition, Alpha Science International,2006.
2) T. Pradeep, Nano - The Essentials, Tata McGraw –Hillpublishing company limited,2007.
3) Bharat Bhushan, "Springer Handbook of nanotechnology", Springer-Verlog, Berlin, 2004.

Books for Reference:

1) Robert W. Kelsall, Ian W. Hamley, Mark Geoghegan, "Nanoscale Science and Technology", John Wiley & Sons Ltd, 2005.
2) Pulickel M. Ajayan, Linda S. Schadler, Paul V. Braun, Nanocomposite Science and Technology, John Wiley &Sons, 2006.
3) Günter,Schmid, Nanoparticles: From Theory to Application, 2nd Edition, John Wiley & Sons, 2011.
4) SulabhaK.Kulkarni, Nanotechnology: Principles And Practices, Capital publishing company,2007.
5) B. Viswanathan, Nanomaterials, NarosaPublishingHouse Pvt. Ltd., New Delhi, 2009.
6) A. K. Bandyopadhyay, Nano Materials, 2nd Edition, NewAge International Publishers Ltd., New Delhi, 2007.
7) Charles P.Poole, Frank J. Owens,Introduction to nanotechnology, John Wiley & Sons publication,2003.

E – Resources:

1) https://www.docsity.com/en/nanomaterials-study-notes/4106119/
2) https://web.pdx.edu/~pmoeck/phy381/intro-nanotech.pdf
3) https://nanohub.org/
4) http://nanoscale-materials-and-nanotechnolog.blogspot.com/
5) https://www.nano.gov/html/edu/eduunder.html
6) https://www.nsf.gov/news/classroom/nano.jsp

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Explain the emergence and challenges of nanoscience and classification of nanostructures	**K2, K3**
CO2	Apply the Chemical and physical methods for the synthesis of nanomaterial	**K3, K6**
CO3	Understand the different forms of nanostructure and their synthesis methods for special applications	**K4, K5, K6**
CO4	Analyze different nano structures and surface morphology of materials using various characterization techniques.	**K4, K5**
CO5	Analyze chemical and transport property of nanomaterials using various characterization techniques.	**K3, K4, K5**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Learning Outcomes (COs)	Programme Learning Outcomes (PLOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PLO8
CO1	✓	✓	✓	✓	✓			
CO2	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓		✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 36,					Correlations: High			

SEMESTER IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBPY4001	DSC13	SOLID STATE PHYSICS II	6	5

Course Objectives

1. ***This paper aims to give an understanding of the basic theoretical models to study the properties of matter from a microscopic point of view***
2. ***To become familiar with the different types of magnetism and magnetism based phenomenon.***
3. ***To develop an understanding of the dielectric properties and ordering of dipoles in ferroelectrics***

Unit-I	Dielectrics	15 Hours

Dielectrics- Different types of polarization, frequency and temperature effects on polarization-Dielectric loss and Dielectric Breakdown - Local or internal field-Clausius Mosotti equation-determination of dielectric constant- Classification and applications of dielectric materials – piezoelectric and ferroelectric materials.

Unit-II	Para and Diamagnetism	15 Hours

Definitions of Magnetism-Classification – Langevin theory of Dia magnetism- Weisstheory of paramagnetism - Quantum theory of Dia Magnetism-Quantum theory of paramagnetism-Adiabatic demagnetization

Unit-III	Ferro and Anti-ferro magnetism:	15 Hours

Quantum theory of ferromagnetism – Curie point- Heisenberg's interpretation of Weiss field – Ferromagnetic spin waves- Quantization of spin wave-Thermal excitation of magnons-Ferromagnetic domain-Origin of domains– Bloch wall (Domain wall energy)-Theory of anti-feromagnetism – Neel temperature- Susceptibility below Neel temperature.

Unit-IV	Optical properties	15 Hours

Optical reflectance- Kramers-kronig relation-. Electronic interband transitions-Drude relation for optical conductivity – optical absorption in metals, insulator and semiconductor - Excitons -Frenkel and Mott-Wannier Excitons – luminescence- electroluminescence.		
Unit-V	**Solid state ionics**	**15 Hours**
Concept of solid state ionics- Importance of super-ionic materials and structures- Classification of Superionic solids- Experimental probes pertaining to solid state ionics- Theoretical models of fast ion transport- Applications of fast ionic solids-Hydrogen storage materials- preparation and fabrication- -characterization of Li-ion cells- Applications of Lithium batteries in electronic devices, electric vehicle, fuel cells, sensors -Solar energy conversion devices.		

Books for study:

1) Solid State Physics-S.O.Pillai, New Age International, 2006.
2) Solid State Physics-K.Ilangovan, MJP Publisher, 2009.
3) Introduction to Solid State Physics- Charles Kittel, Wiley India Edition, 2012.
4) Solid State Physics-Gupta kumar, K.Nath& Co, 2010.

Books for Reference:

1) G.K. Narula, K.S.Narula and V.K.Gupta, 1988, Materials Science, Tata McGraw-Hill.
2) Lawrence H. Van Vlack, 1998, Elements of Materials Science and Engineering, 6th Edition, second ISE reprint, Addison-Wesley
3) H. Iabch and H.Luth, 2001, Solid state Physics – An introduction to principles of Material Science, 2nd Edition, Springer
4) S.L Kakani and Amit Kakani, 2006, Material Science, New Age International Publishers.

E-Resources:

1) https://www.youtube.com/watch?v=XEWfw7CHST8
2) https://www.youtube.com/watch?v=DocyilQj8yE
3) https://www.youtube.com/watch?v=DDLljK1ODeg
4) https://www.youtube.com/watch?v=IMlc8Fz5k0Y
5) https://www.youtube.com/watch?v=r_gBQ_qhg8U
6) https://www.youtube.com/watch?v=d8q6DzQ7CpU
7) https://www.youtube.com/watch?v=ZZRrEXcU6Jg
8) https://www.youtube.com/watch?v=m17wFyZ03CQ
9) https://www.youtube.com/watch?v=YXysympNhfg
10) https://www.youtube.com/watch?v=6EOVaK2Pn9c

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquiring of knowledge concerning the behaviour of dielectric materialsand classifying based on it.	**K2,K4,K5**
CO2	Able to explain dia and para magnetic phenomena and describe the different types of magnetic ordering based on the exchange interaction.	**K1,K2,K3,K4**
CO3	To develop an understanding of the magnetic properties in ferro and anti-ferro materials.	**K2,K4,K5**
CO4	Analyze the optical properties of materials according to material type, structure and physical properties	**K3,K4,K5**
CO5	Endeavor to create connections and routes leading from basic science on the one hand to clean-energy technologies on the other.	**K2,K4,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 =26					**Correlation = HIGH**			

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
PBPY4002	DSE14	THIN FILMS AND SURFACE ANALYSIS	6	4

Course Objectives

1. Acquire the knowledge of thin film preparation by various techniques.
2. Analyse the behavior of the thin films by different characterization methods
3. Apply the knowledge to develop a device.

Unit-I	Vacuum Technology	**15 Hours**

Basics of Vacuum – Principles of different vacuum pumps: Rotary, Roots, Diffusion, Turbomolecular, and Cryogenic pumps; Measurement of vacuum – Concept of Capacitance Manometer, Pirani and Penning gauges – Vacuum Systems & Applications.

Unit-II	Nucleation and Growth of Thin Films	**15 Hours**

Nucleation and growth of thin films – four stages of film growth - Directionality of evaporation molecules - Cosine law of emission. Emission from a point source. Mass of material condensing on the substrate. Properties of Thin Films: Adhesion, Thickness, Surface, Physical, Chemical and Mechanical.

Unit-III	Methods of thin film preparation	**15 Hours**

Physical Vapor Deposition (PVD) Techniques:
Evaporation: Thermal evaporation, Electron beam evaporation, Laser ablation, and Cathode arc deposition. Sputtering: DC sputtering, RF Sputtering, Magnetron sputtering, Reactive Sputtering, and Ion beam sputtering.
Chemical Vapor Deposition (CVD) Techniques: Conventional CVD, Plasma Enhance CVD (PECVD) and Atomic layer deposition (ALD).
Other Chemical Methods: Spin coating and Spray Pyrolysis.

Unit-IV	Electrical and Optical Properties	**15 Hours**

Electrical Properties: Sheet resistance - size effect - Electrical conduction in thin metallic films. Effect of ageing and annealing - Oxidation - Agglomeration.
Optical Properties: Optical constants of thin films – spectrophotometer- Transmittance, absorption, determination of band gap.

Unit-V	Thin Film Applications	**15 Hours**

Electrodes: Deposition of a Metal film, Ex: Aluminum
Transparent conducting oxides (TCO) –
Preparation and Optimization of a semiconducting film, Ex: AZO
Optimization of a dielectric film, Ex: Al2O3 or Si3N4.
Thin Film Devices: Transistors (TFT), Sensors and Solar cells,
Thin film Coatings: Diamond-like carbon (DLC) coating
Bio-Medical coatings (TiN, DLC)
EMI Shielding and RF transparent Coatings for telecommunication applications
Hard Transparent Protective Coatings
Optical /Decorative Coatings

Coatings on Plastics/Polymers.
Books for Study: 1) Vacuum Technology by A. Roth. 2) Thin Film Phenomenon by K.L. Chopra, McGraw-Hill. 3) Materials Science of Thin Films by Milton Ohring.
Books for Reference: 1) Thin-Film Deposition: Principles and Practice by Donald Smith. 2) Principles of Plasma Discharges and Materials Processing , 2nd Edition by Michael A. Lieberman.
E-Resources: 1) https://www.fulviofrisone.com/attachments/article/402/Bubert,%20Jenett%20-%20Surface%20&%20Thin%20Film%20Analysis%20(Wiley%202002).pdf 2) 2.https://www.youtube.com/watch?v=61F0Q_EaI00&list=RDCMUCwCunw0e4YQmmuwPEF7-VsA&start_radio=1&rv=61F0Q_EaI00&t=5 3) https://uomustansiriyah.edu.iq/media/lectures/6/6_2020_08_27!09_52_58_PM.pdf 4) https://www.worldscientific.com/doi/pdf/10.1142/S2010194513010696 5) https://arshadnotes.files.wordpress.com/2018/02/the_materials_science_of_thin_films.pdf 6) https://www.ndsu.edu/pubweb/~qifzhang/Tech_Sputter-01.pdf 7) https://www.tf.uni-kiel.de/matwis/amat/semitech_en/kap_3/backbone/r3_1_3.html

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the differences and similarities between different vacuum used in deposition techniques	**K2,K3,K5**
CO2	evaluate and use models for nucleating and growth of thin films	**K4,K5,K6**
CO3	Complete understanding of thin film growth kinetics in physical vapour deposition. Basic principles of different vapour deposition techniques.	**K2,K5,K6**
CO4	Analyze the electrical and optical properties of thin films	**K4,K5**
CO5	Gaining the knowledge of thin films application in different sectors.	**K3,K4,K5**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Learning Outcomes (COs)	Programme Learning Outcomes (PLOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PLO8
CO1	✓	✓	✓	✓	✓			
CO2	✓	✓	✓	✓	✓	✓		
CO3	✓		✓			✓	✓	
CO4	✓	✓		✓		✓	✓	
CO5	✓	✓	✓		✓	✓		✓
Number of matches = 26,					Correlations: High			

SEMESTER IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBPYPR41	DSC15	MICROPROCESSOR& MICROCONTROLLER	5	4

Course Objectives

1. *To develop an understanding of fundamentals of Microprocessor and microcontroller in order to rehash the understanding of processor and controller that is part of the technologies that surround us.*

2.*To study programming based on 8085, 8086 microprocessor and 8051 microcontroller*
3.To study to interface 8085 with I/O and other devices.

LIST OF EXPERIMENTS

MICROPROCESSOR& MICROCONTROLLER
(To Perform 10 out of 15)

1. Number conversion - 8 bit : BCD to binary, Binary to BCD, Hex to ASCII using 8085.
2. Square and square root of BCD and HEX numbers 8 bit and 16 bit using 8085&8086.
3. Addition and subtraction using 8085, 8086&8051 Microcontroller
4. Multiplication and division using 8085 & 8051Microcontroller
5. Sum of a simple series.
6. Ascending order / descending order using 8085, 8086 &8051 Microcontroller
7. Time delay subroutine and a clock programme.
8. multiprecision addition and subtraction using 8086.
9. Switching an array of LED's by programming.

10. Op-Amp 8-bit DAC.
11. ADC interfacing 0809 with MPU.
12. Interfacing and programming 0810 with MPU.
13. Analog to digital conversion using DAC comparator and MPU system.
14. Wave form generation – square wave and ramp.
15. Interfacing a stepper motor to the MPU system – clockwise and anticlockwise – full stepping and half stepping.

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Provide a hands-on learning experience and understand the basic concepts and applications of microprocessor and microcontroller.	**K1,K2,K3,K4**
CO2	Demonstrate ability to handle arithmetic, logical operations using assembly language programming in 8085, 8086 microprocessor trainer kit	**K3,K4,K5,K6**
CO3	Demonstrate ability to handle arithmetic, logical operations using assembly language programming in 8051 microcontroller trainer kit	**K3,K4,K5,K6**
CO4	Execute time delay subroutine and a clock programme using 8085 interface trainer kit	**K3,K4,K5,K6**
CO5	Able to interface with microprocessor trainer kit to perform stepper motor to the MPU system and design clockwise, anticlockwise, full stepping and half stepping rotation	**K3,K4,K5,K6**
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 =25					**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 IV				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
PBPYPJ41	PROJECT	PROJECT WITH VIVA-VOCE	4	2

COURSE WORK

1. Projects would be allotted to III Semester students which have to be carried out and completed in Semester IV.

2. A list of projects will be finalized and announced by the Department. The students will have an option to select the project in their field of interest.

3. The project will comprise of the following:

a. Study of background material
b. Collection of data, procurement and fabrication of experimental set up and
c. Writing of computer programs if needed.
d. Giving a preliminary seminar in the III semester for the purpose of internal assessment.

d. Writing a dissertation or project report. This will be submitted by thestudents at the end of IV semester.

VIVA-VOCE

The Final evaluation of the project work completed will be done by external and internal examiners appointed by the Board on the basis of an oral presentation and the submitted Project-Report.

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBPYNM41	**OEC1**	**BIOMEDICAL INSTRUMENTATION**	**3**	**2**

Course Objectives

1. Students can learn the principle and classification of transducers
2. To know the principle, block diagram and working of some digital instruments
3. To study the working and applications of analytical instrumentation techniques
4. To teach the some basics of bio-medical instruments
5. To acquire the knowledge about X-ray machine and Thermography

Unit-I	**Biomedical signals and Transducers**	**8 Hours**

Bioelectric Signals - Electrodes - Surface, Needle and Micro Electrodes - Biosensors - Pulse Sensors - Optical fiber sensors - Photometric sensors - Physical sensors - Chemical sensors - Classification of Transducers - Principle, construction and working of Thermistors - LVDT - Electrical strain gauges and capacitive transducers - **Photo diode detectors.**

Unit-II	**Digital Instrumentation**	**8 Hours**

Principle, block diagram and working of Digital frequency counter - digital multimeter - digital pH meter - digital conductivity meter - digital storage oscilloscope - **digital subtraction angiography - Introduction to digital LCR meters, Working of LCR.**

Unit-III	**Analytical Instrumentation**	**8 Hours**

Principle, block diagram, description, working and applications of UV-VIS spectrometer - FT-IR Spectrometer – **X-ray photoelectron spectroscopy (XPS) - Auger Electron Spectroscopy (AES) - Atomic Absorption Spectroscopy (AAS) - Secondary Ion Mass spectroscopy (SIMS) spectrometer -** Basic concepts of Gas and Liquid Chromatography.

Unit-IV	**Bio-Medical Instrumentation**	**8 Hours**

Sources of biomedical signals – Physiological transducers to measure blood pressure, body temperature - Sources of Bioelectric potentials - **Nervous system** - bio potentials electrodes - Principle, block diagram and operation of ECG and EEG Recorders - **Principle-block diagram and operation of CT Scanner –MRI Machine.**

Unit-V	**X-ray machine and Thermography**	**8 Hours**

Basis of Diagnostic Radiology - Block diagram and operation of X-ray machine - X-ray film – fluorescent Screen - Digital X-ray imaging system - Basic principle and operation of X-ray computed tomography - **Endoscopes – Thermography - Liquid Crystal thermography - Microwave thermography.**

Books for study:

1) Dr. Rajendra Prasad, Electronic Measurements and Instrumentation, Khanna

Publications.
2) S. Ramambhadran, Electronic Measurements and Instrumentation Khanna Publications.
3) R S Khandpur, Hand book of Biomedical Instrumentation II ndEdition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi (2005).
4) Dr. M. Arumugam, Biomedical Instrumentation, Anuratha Agencies (2002).
5) K.Venkata Ram, Bio-Medical Electronics and Instrumentation, Galgotia Publications, New Delhi (2001).
6) R. Lakshmi Rekha., C. Ravikumar, Biomedical Instrumentation and Medical electronics, Lakshmi Publications, Chennai (2009).

Books for Reference:

1) S.M .Dhir, Electronics and Instrumentation, Khanna Publisher, Khandpur.
2) Saifullah Khalid, Mukesh Jain, Neetu Agrawal, Basic Electronics and Instrumentation, University Science Press, Laxmi publications, New Delhi.
3) Albert D. Heltrick, William D. Cooper, Modern Electronics Instrumentation and measurement Techniques, PHI, New Delhi.

E-Resources:

1) https://en.wikipedia.org/wiki/Transducer
2) https://www.youtube.com/watch?v=AZdCXJx4xSA
3) https://www.youtube.com/watch?v=CJ6YWBuHoes
4) https://en.wikipedia.org/wiki/Multimeter
5) https://en.wikipedia.org/wiki/X-ray_photoelectron_spectroscopy
6) https://www.youtube.com/watch?v=XpDqJfybma4
7) https://www.youtube.com/watch?v=xIZQRjkwV9Q
8) https://en.wikipedia.org/wiki/Electrocardiography

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the principle and classification of transducers	**K1, K2**
CO2	Apply the principle, block diagram and working of some digital instruments	**K1, K2, K3**
CO3	Analyse and create the working and applications of analytical instrumentation techniques	**K1, K3, K4, K5**
CO4	Understand the some basics of bio-medical instruments and evaluate the source odbiosignals	**K1, K3, K4, K5**
CO5	Knowledge about X-ray machine and Thermography	**K1, K2, K3, K4**
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 =27 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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBPYDE41	**DSC14**	**MICROPROCESSOR AND MICROCONTROLLER**	**5**	**4**

Course Objectives

1. To develop background knowledge and core expertise on Microprocessor 8085.
2. Also provides a basic understanding of design and operation of Microprocessor 8086.
3. To write assembly language programs of Microprocessor for various applications.
4. To know the architecture aspects of microcontrollers.
5. To know the importance of different peripheral device and their interfacing to Microcontrollers

Unit-I	**8085 MICROPROCESSOR**	**12 Hours**

Internal Architecture and Flags-Addressing modes- Classification of instructions and format : data transfer, arithmetic – Addressing modes- stack and subroutine instructions - Logical rotate and compare instructions special instruction and branch instructions- interfacing 8-bit D/A and successive approximation A/D converters.

Unit-II	**8086 MICROPROCESSOR**	**12 Hours**

Introduction –Pin functions of 8086- Internal Architecture of the 8086-Flag Register-Segment register- Instruction pointer.

INTERRUPTS: Interrupt Address PointerTable – Interruptrelated instructions – Minimum Mode-Software and Priority interrupt –Internal interrupt.

Unit-III	**Applications of Microprocessors**	**12 Hours**

Analog to digital conversion using ADC 0809 interfacing through PPI 8255 - Block Diagram-Stepper motor interface-Successive approximation A/D convertor-Virtual memory, Memory Management Unit(MMU) - Difference between 8086 and 80386/80486 microprocessors

Unit-IV	**Architecture of Microcontroller 8051**	**12 Hours**

Introduction - Comparison between microcontroller and microprocessors – Types of microcontroller - Pin out functions of 8051-Internal Architecture of 8051- Memory Organization-Program Memory-Data Memory-Interrupt Structure-Interrupt Enables-Interrupt Priorities-External interrupts.

Unit-V	Programming – Microcontroller 8051	12 Hours

Instruction set -– Data transfer instructions – Arithmetic-logical operations on bits and bytes-Program branching-Addressing modes-PUSH and POPdirect- Simple programs to illustrate arithmetic and logical operations (Sum of numbers, biggest andsmallest in an array)

Books for study:

1) Ramesh Goanker: Microprocessor Architecture, Programming & Applications with the 8085/8080A – Wiley Eastern Ltd.
2) Vijayendran, Fundamentals of Microprocessor –8085/ 8086 Architecture, Programming and Interfacing,Chennai.
3) Douglas V. Hall: Microprocessors Interfacing, Programming & Hardware – Tata McGraw-Hill.
4) B.Brey – Intel Microprocessors: 8086/8088, 80186, 80286, 80386, and 80486: Architecture, Programming and Interfacing, 3rd Ed, EEE, 1995.
5) Mohamed Rafiquizzman: Microprocessors and Microcomputer Based System Design UBS, 1990.
6) Microcontrollers Architecture, Programming, Interfacing and System Design – Raj Kamal, PearsonEducation, 2005.
7) The 8051 Microcontroller and Embedded Systems – Mazidi and Mazidi, PHI,2000.

Books for Reference:

1) Glenn A. Gibson & Yu-Cheng Liu: Microcomputers for engineers and Scientists – Presentic-Hall Inc.
2) Dougles V. Hall: Microprocessors & Digital Systems –McGraw- Hill Book Company.
3) StwartM.Asser: Microcomputer servicing – Practical systems and trouble shooting – All India Traveller Book Company.
4) Yu – Chang Liu & Glenn A. Gibson: Microcomputer systems: The 8086/8088 family Architecture programming & design – Printice-Hall of India.

E-Resources:

1) https://en.wikipedia.org/wiki/Intel_8085
2) https://www.youtube.com/watch?v=fS7FFOaC_iQ
3) https://www.youtube.com/watch?v=tC4WvbM3hZA
4) http://www.uomisan.edu.iq/eng/ar/admin/pdf/90949589293.pdf
5) https://www.pantechsolutions.net/how-to-interface-stepper-motor-with-8085-labtrainer-kit
6) http://www.8085projects.info/Stepper-Motor-control-Program70.html
7) https://www.youtube.com/watch?v=shJAszu34xY
8) https://www.elprocus.com/8051-microcontroller-architecture-and-applications/
9) https://www.youtube.com/watch?v=iXSXIJn_Xwc
10) https://www.electronicshub.org/stepper-motor-control-using-8051-microcontroller/
11) https://circuitdigest.com/microcontroller-projects/stepper-motor-interfacing-with8051

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Discuss architecture of 8085 microprocessor and implement programs in 8085.	**K1,K2,K3,K4**
CO2	Learn the architecture of 8086 microprocessor.	**K1,K2,K3**
CO3	Discuss concept of interfacing in microprocessor 8085.	**K3,K4,K5**
CO4	Understand the architecture and to explore the memories of 8051 microcontroller	**K1,K2,K3,K4**
CO5	Acquire the knowledge on instructions and able to write basic assembly language programming in 8051.	**K3,K4,K5,K6**
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 =27				**Correlation = High**				

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBPYDE42	**DSE4**	**Biophysics**	**5**	**4**

Course Objectives

1. To study the basics of bioelectronics potentials
2. To acquire the knowledge on introduction to device production
3. To understand the metals, alloys and polymers composite materials
4. To study the basic information on various types of biosensor
5. To know about the fundamentals of Electrical signal transduction

Unit-I	**Introduction**	**12 Hours**

Nature of Biomedical signals - Bio Electronic potentials - Necessity of Bio Electronics - Components; Scope and Application - Basics of cell biology; Structure of the cell -the nervous system and the neuron- function of enzymes; nucleus and role of DNA and RNA, adhesion of cell to surfaces.

Unit-II	**Bio electronic device production**	**12 Hours**

Elements in contact with the surface of a biomaterial: blood composition, plasma proteins, cells, tissues – Phenomena at the bio interfaces. Molecular and cellular processes with living environment, blood-materials interaction, short and long term reactions to the body – Testing of biomaterials: in vitro, in vivo preclinical and in vivo clinical tests – Technologies of biomaterials processing, as implants and medical devices; improvement of materials biocompatibility by plasma processing.

Unit-III	**Materials in clinical devices**	**12 Hours**

Metals: Sulzer recall of prosthetic hip implant – Composition of stainless steel and Fe/Co/Ti alloys; Mechanical – properties – Hard Materials: Bio ceramics and Bio glasses, Carbons, Polymers as Biomaterials – Biodegradable Polymers – Composites.

Unit-IV	**Biosensors**	**12 Hours**

Introduction to Biosensors – Types of sensors – target analytes – various recognition – signals and device types – basic design consideration – calibration – dynamic range – signal to noise – sensitivity – selectivity – interference – immobilization – adsorption – encapsulation– covalent attachment – device integration: micro scale and nano scale – Bio MEMS – nano wires – Quantum dots – magnetic beads, PEBBLE sensors.

Unit-V	**Electrical signal transduction**	**12 Hours**

Seismic (mass) and thermal sensors: Electromechanical resonance – electrochemical forces – Henry's and ideal gas laws – Surface acoustic wave (SAW) devices – atomic force microscopy – manometric sensors – thermometric detection – Electrochemical sensors: Redox potentials, membrane potential, Gauss's Law, basic electrochemistry; conductimetric sensors;

potentiometric sensors (ISE's and ISFETs); amperometric sensors; Charge sensing with FET.

Books for study:

1) H. Boenig, Fundamentals of Plasma Chemistry and Technology, Technomic Publishing Co.Inc. Lancaster Basel (1990).
2) ItamarWillner and Eugenii Katz, Bioelectronics: From Theory to Applications, John Wiley (2005).
3) S. Bone and B. Zebba, Bioelectronics, Wiley (2012).
4) J. Koryta, Ions, Electrodes and Membranes, Second Edition, John Wiley (1991).
5) B. D. Ratner and A. S. Hoffman, Biomaterials Science: An Introduction to Materials in Medicine, Academic Press, New York (1996)

Books for Reference:

1) B.R. Eggins, Chemical Sensors and Biosensors, John Wiley and Sons (2002).
2) E.A. Hell, Biosensors, John Wiley and Sons, New York (1997).
3) J. B. Park and J.D. Bronzion, Biomaterials: Principles and Applications, CRC Press (2003).
4) J. W. Gardner, V.K. Varadan, and O. O. Awadelkarim, Micro Sensors, MEMS and Smart Devices, Wiley (2001).
5) Sujatha V. Bhat, Biomaterials, Narosa Publishing House, New Delhi (2002).

E-Resources:

1) https://en.wikipedia.org/wiki/Laser
2) https://en.wikipedia.org/wiki/Helium%E2%80%93neon_laser
3) https://www.physics-and-radio-electronics.com/physics/laser/ndyaglaser.html
4) https://en.wikipedia.org/wiki/Nonlinear_optics
5) https://www.youtube.com/watch?v=3WevI1A2Bdk
6) https://shodhganga.inflibnet.ac.in/bitstream/10603/35888/1/chapter1.pdf
7) https://www.photonics.com/Articles/Fiber_Optics_Understanding_the_Basics/a25151
8) http://www.infocobuild.com/education/audio-video-courses/physics/IntroToNonlinearOptics-IIT-Kharagpur/lecture-12.html
9) https://www.slideshare.net/krishslide/nonlinear-optical-materials
10) https://en.wikipedia.org/wiki/Graded-index_fiber

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basics of bioelectronics potentials and cell biology	**K1, K2, K3**
CO2	Knowledge from bio electronic device productionto molecular and cellular processes with living environment	**K1, K3, K4**
CO3	Understand the basic nature of metals, alloys and polymers composite materials	**K1, K2, K4**
CO4	Analyze and create the knowledge of biosensor, its types	**K1, K3, K6**
CO5	Apply the fundamentals of electromechanical mechanism and evaluate henry's and ideal gas	**K1, K3, 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 =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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBPYDE43	**DSE4**	**INTRODUCTION TO SPINTRONICS**	**5**	**4**

Course Objectives

Studentacquires basic understanding of various topics in spin electronics with a special focus on spintronics. The course starts with an introduction of the basic physics required to understand principle and operation of spin-electronic devices as well as conventional silicon based devices. Different applications of spinelectronics will be further elaborated by covering the role of spintronics in biomedical field. The topic of spintronics will be discussed in more detail.

Unit-I	**Basics of Magnetism**	**Hours**

Definition and Units - Experimental Methods - Diamagnetism and Paramagnetism – Antiferromagnetism – Ferrimagnetisms – Ferromagnetism - Magnetization and the magnetic moment - Magnetic hysteresis loop - magnetic ordering and the Curie temperature - Different types of magnetic anisotropy - Magnetostriction and the effect of stress - Nano-magnetic materials thermal stability - Size effect of fine particles and thin films - Domains and Domains walls - soft Magnetic and Hard Magnetic Materials.

Unit-II	**Spin Valves**	**Hours**

Giant magnetoresistance effect - semiclassical theory of CIP giant magnetoresistance - current perpendicular to plane giant magnetoresistance – basic properties of spin valves - magnetic properties exchange anisotropy – interlayer coupling - CIP transport properties - spin valves optimization - improved spinvalve design (dual spin valves, spin filter spin valves) - spin valves in magnetoresistive read heads.

Unit-III	**Spin-Polarized Tunneling**	**Hours**

Spin-filter effect - Ferromagnetic-Ferromagnetic tunneling - bias voltage dependence - exchange biasing of tunnel junctions - temperature effect - temperature stability and annealing effect - Half-metallic ferromagnets, observation of resonant effects in MTJs - Tunneling role of the interface.

Unit-IV	**Magnetoresistive random access memories**	**Hours**

History of MRAM - pseudo-spin valve MRAM - Magnetic tunnel junction MRAM - MRAM developments - extending density/reducing write currents – spin momentum switch - new spintronics effects - potential MRAM enhancements.

Unit-V	**Magnetic tunnel junction based magnetoresistive random access memory**	**Hours**

MTJ – MRAM, basic cell operation - MTJ material for MRAM – magnetic switching - high speed switching behavior - single MTJ/single transistor(ITIMTJ) MRAM cell - 1MB MRAM circuit - Magnetoelectronics application: spin injected FET - spin injected semiconductor - spin diodes - spin bipolar transistor. Magnetoresistive DNA Chips: Magnetoresistive biochips - sensor characteristics - MR biochips prototype fabrication - Biological applications – Surface functionalization - DNA- cDNA hybridization detection
Books for study: 1) Introduction to Magnetism and Magnetic Materials, 2nd edition, David Jiles, Chapman& Hall/CRC 2) Modern Magnetic Materials: Principles and Applications, Robert C. O'Handley, John Wiley & sons. Inc 3) Nanomagnetism and spintronics, Edited by Teruyashinjo, 2009, Elsevier 4) Magnetoelectronics, Edited by Mark Johnson, Elsevier Academic Press, 2004 5) Introduction to spintronics, Supriyo Bandyopadhyay and Marc Cahay, Taylor & Francis, CRC press. 6) Spin Electronics, David D. Awschalom, Kluwer Academic Publisher.
Books for Reference: 1) Thin film Magnetoresistive Sensors, S. Tumanski, IOP publishing 2) Spin dependent Transport in Magnetic Nanostructures, Sadamichi Maekawa and Teruyashinjo, Taylor & Francis 3) Spintronic Materials and Technology, Y B Xu and S. M. Thompson, Taylor & Francis.
E-Resources: 1) https://www.spintronics-info.com 2) https://www.pdfdrive.com/introduction-to-spintronics-e186652152.html 3) https://www.sciencedirect.com/topics/physics-and-astronomy/spintronics 4) 4.https://www.youtube.com/watch?v=1vSQ9u1SP2M&list=PLF1h7eFXS6AhfC0APUq6YoFh8zoQCs2QV 5) https://www.youtube.com/watch?v=uE-3VvUDgHg&list=PLpcC9tC-H1RV37bYdPxyTj6EySa1Tiew_ 6) https://www.youtube.com/watch?v=N72g0CcKT3Y

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basic concepts of magnetism and magnetically ordered materials (ferromagnets, ferrimagnets, and antiferromagnets), spin-dependent electron transport in materials	**K2,K4,K5**
CO2	Gain the knowledge about spin valves, Laws of spintronics and spin orbit.	**K4,K5**
CO3	Apply the quantum mechanical approach to analyze the tunneling effect in the interfaces	**K3,K4,K5**
CO4	Students will learn the main functionality and applications of the devices	**K3,K4,K5**
CO5	Focus on the spintronics applications in devices such as magnetic data storage, magnetic random access memory (MRAM), neuromorphic computing, sensors, microwave, magnonic, and quantum devices.	**K3,K5,K6**
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 =28					**Correlation = High**			

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

DEPARTMENT OF CHEMISTRY

PROGRAMME OUTCOME FOR B.Sc.

PO1	Communicate in English, the ideas, findings, and results effectively through conversations, meetings, and reports, especially through digital means. Develop linguistic skills in one Indian/Regional language
PO2	Demonstrate knowledge of the concepts, principles, theories, and techniques of the domain and allied subject areas.
PO3	Synergise knowledge with Analytical & Experimental skills to systematically, create & run programs/carry out experiments/formulate & prove theories to enrich the body of knowledge
PO4	Synthesize learned knowledge and acquired skills to Identify and critically analyze pertinent problems in the relevant discipline using appropriate tools and techniques.
PO5	Exhibit potential to accomplish tasks independently or as a member or leader of a team
PO6	Utilize specialized instruments and equipment, Computers, Software, Internet, and other ICT tools to carry out experiments
PO7	Demonstrate knowledge and scientific understanding to design experiments, use appropriate methodologies, analyze and interpret data and provide solutions, and Exhibit organizational skills, and the ability to manage time and resources.
PO8	Create Compounds/Products/Software or Design experiments and/or collaborate to help Society in building a Sustainable Environment
PO9	Discover a passion for Lifelong Learning through MOOCs, ODL, and Self -Learning techniques through optimum use of ICT
PO10	Identify and assess various issues in Environment and suggest measures to overcome them. Exhibit Ethics and Values in professional, Social, and Personal spheres of life, caring for the underprivileged, leading to a better sustainable future

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

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 concept learnt from theory and practical work.
PSO2	Apply principles, theories and technique of the core subjects to other 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 over industrial process development and their applications.
PSO5	Pursue his higher education in various inter disciplinary subjects connected with technology and research.
PSO6	Handle chemicals, apparatus and instruments by 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.

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCH3001	**Discipline Specific Core Course**	**GENERAL CHEMISTRY - III**	**6**	**4**

Course Objectives

1. To understand the calculations of concentration terms and to acquire the knowledge of titrations and types of solvents.
2. To learn the mechanisms of different organic reactions and the nature of aromaticity.
3. To analyse the concept of second law of thermodynamics and the working of Carnot cycle.
4. To study the properties of Boron family elements and the mechanisms of elimination reactions
5. To understand the concept of free energy and Helmoltz equation

Unit-I	**STOICHIOMETRY**	**9 Hours**

1.1 Definitions of molarity – normality – molality and mole fraction – their calculations – definition and examples for primary and secondary standards. Calculation of equivalent weights

1.2 Theories of Titration – acid-base – redox – complexometric, iodimetric and iodometric titrations. Theories of indicators – acid-base – redox – metal ion and adsorption indicators and choice of indicators.

1.3 Types of solvents – Physical properties of solvent – Protic and aprotic solvents – Amphi-protic / amphoteric solvents – aqueous and non-aqueous solvents – Liquid ammonia and Liquid SO_2 as solvent.

Unit-II	**AROMATICITY & REACTIONS OF ORGANIC COMPOUNDS**	**9 Hours**

2.1 Aromaticity – Modern theory of aromaticity – Huckel's (4n+2) π electron rule and its applications – **Structure and stability of benzene – aromaticity of naphthalene, anthracene** and non benzenoid compounds , nonaromatic and antiaromatic compounds.

2.2 Electrophilic substitution reactions in aromatic compounds – General mechanisms – nitration – halogenation – sulphonation – **Friedel-Craft's reactions.**

2.3 Aliphatic nucleophilic substitutions – SN1, **Evidences of SN1, Ion pairs in SN1,** SN2, **Evidences of SN2,** SNi reactions and mechanism.

Unit-III	**THERMODYNAMICS**	**9 Hours**

3.1 Second law of thermodynamics – Need for the II law – Spontaneous processes - different forms of statements of the second law.

3.2 Carnot's cycle – Heat engine - Efficiency – Carnot's theorem (Statement only) – Thermodynamic scale of temperature – Clausius inequality – Concept of entropy – physical significance of entropy –. Entropy changes in reversible and irreversible processes – Entropy changes in physical transformations – Numerical problems

3.3 Entropy change of an ideal gas during isothermal process — Calculation of entropy changes with changes in T,V and P – entropy of mixing of ideal gases

Unit-IV	**BORON FAMILY AND ORGANIC REACTIONS**	**9 Hours**

4.1 'p' block elements – Boron family – group discussion – anomalous behaviour of Boron – diagonal relationship between B and Si – Electron deficiency and electron acceptor behavior of Boron trihalides – bonding (banana bond) in diborane.

4.2 Directive influence – Orientation and reactivity in aromatic electropilic substitution – Ortho / para ratio – Nuclear and side chain Halogenations

4.3 Elimination reactions – Bimolecular elimination reaction (E_2) – Unimolecular Elimination reaction (E_1) – mechanisms of E_1, E_2 and E_1CB, **E1CB Spectrum** – Hoffmann and Saytzeff's rule – **Chugaev elimination**.

Unit-V	CARBON FAMILY AND THERMODYNAMICS	9 Hours

5.1 Carbon family – Group discussion – catenation – Comparison of properties of carbon and silicon valencies – oxides – halides – hydrides and oxy acids. Classification – preparation – properties and uses of carbides.

5.2 Free energy and work function – Gibb's free energy – Helmholtz work function – their variations with temperature – pressure and volume – Numerical problems – Criteria for spontaneity Maxwell's relationships – application – thermodynamic equation of state.

5.3 Gibbs-Helmholtz equations – derivation and applications. Clausius - Clapeyron Derivation and Application.

Books for Study

1. Text book of Inorganic Chemistry by Puri & sharma.
2. Text book of Inorganic Chemistry by JD. Lee.
3. Text book of Organic Chemistry by Bahl & Arunbahl.
4. Text book of Physical Chemistry by Puri & Sharma.
5. Thermo dynamics by Glasston & lewis.

Books for Reference:

1. Text book of Inorganic Chemistry by PL Sony.
2. Text book of Organic Chemistry by PL Sony.
3. Text book of Organic Chemistry by Morison & Boyd.
4. Text book of Physical Chemistry by PL Sony.

E-Resources:

Unit-I
https://drive.google.com/file/d/1IPzULjG2jsanp6eLZD65ppRjDlfZEQ1A/view?usp=share_link
Unit-II
https://drive.google.com/file/d/103MeNPsdPsQAhoB-DQcIUrfCy5K81c4W/view?usp=sharing
Unit III and V
https://drive.google.com/file/d/1QycuE3cwYKULN0NHZzq0XuHErFzq974q/view?usp=sharing
Unit-IV
https://drive.google.com/file/d/1gJbGWXKeRJKeXhYceMruULryoOblfpUZ/view?usp=sharing

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Illustrate and prepare the solutions needed in various Industries, Labs etc.	**K1, K2, K3, K6**
CO2	Describe the Aromaticity principle and apply the concept of substititution reactions on aromatic compounds	**K1,K2,K3**
CO3	Explain the second law of thermodynamics and the concept of entropy.	**K1, K2, K3, K4**
CO4	Apply elimination reaction concept with various examples	**K1, K2, K3 ,K4**
CO5	Describe carbon family and Gibbs free energy and apply Maxwell relationships and Gibbs-Helmholtz equation using various examples.	**K1, K2, K3, K5**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program 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	1-30%	31-60%	61-70%	71-100%
Matches	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCHPR31	**Discipline Specific Core Practical**	**VOLUMETRIC ESTIMATION - I**	**3**	**3**

Course Objectives

1. To learn the practical techniques of Acidimetry, Permanganometry & Iodometry.
2. To gain the laboratory skill in volumetric estimation.
3. To develop the skill of estimating the substances present in solutions.
4. To acquire the knowledge of usage of various substances as standard andlink solutions.

EXPERIMENTS

1. Estimation of Borax – Standard Sodium Carbonate.
2. Estimation of Sodium Hydroxide – Standard Sodium Carbonate.
3. Estimation of Ferrous Sulphate - Standard Ferrous ammonium sulphate.
4. Estimation of Copper Sulphate – Standard Copper Sulphate.
5. Estimation of Potassium dichromate – Standard Potassium dichromate
6. Estimation of Oxalic acid – Standard Ferrous ammonium sulphate

Marks Allotment

Marks 75

1. Short procedure	10 Marks
2. Titration 1	20 Marks
3. Titration 2	20 Marks
4. Result	30 Marks
5. Record	10 Marks
6. Viva-voce	10 Marks
Total	100 Marks

Students must write short procedure for the given estimation in ten minutes during the examinations and submit the paper for evaluation.

Error Calculation:

< 2%	-	30 Marks
2 – 3%	-	25 Marks
3 – 4%	-	20 Marks
>4%	-	10 Marks

Books for Study

1. Inorganic Quantitative Analysis by Vogel.

Books for Reference:

1. Inorganic Quantitative Analysis by Vogel.

E-Resources:

https://drive.google.com/file/d/12cQt4GGBiT0ri31W8NQ2l3mH8c1ARZL6/view?usp=share_link

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Handle the apparatus and chemicals involved in titrations.	**K1, K2, K3**
CO2	Apply the concept of indicators and their applications in volumetric esimations	**K3, K4**
CO3	Demonstrate the practical techniques in volumetric estimation	**K4, K5**
CO4	Analyse the chemical reactions involved in various titrations	**K4, K5**
CO5	Get placement in the Quality Control Departments of various industries.	**K5, K6**
K1- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓	✓	✓		✓
CO2	✓	✓	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓	✓		✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓
CO5			✓	✓	✓	✓	✓	✓
Number of matches = 34, 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

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCH4001	**Discipline Specific Core Course**	**GENERAL CHEMISTRY IV**	**6**	**5**

Course Objectives

1. To study the properties of nitrogen family elements and structures of oxy acids of sulphur
2. To acquire the knowledge on phenols and its various reactions
3. To understand the concept of third law of thermodynamics and the properties of colloidal solutions
4. To understand the properties of inert gases and clathrate compounds and also learn the mechanisms of polymerization.
5. To learn the nature of poly hydric alcohols and the concept of acids and bases

Unit-I	**NITROGEN AND OXYGEN FAMILY**	**18 Hours**

1.1 'p' block elements – Nitrogen family – Comparative study of N,P,As,Sb and Bi – elementsoxides – oxyacids – halides and hydrides – valency states.

1.2 Oxygen family – Comparative study of O,S,Se and Te-elements-catenation – Oxides – halides – hydrides and oxy acids – anomalous behaviour of oxygen.

1.3 Oxy-acids of sulphur including Peroxy acids and Thionic acids.

Unit-II	**REACTIONS OF ORGANIC COMPOUNDS**	**18 Hours**

2.1 Aromatic nucleophilic substitutions – **SNAr (Addition- elimination) mechanisms, SN1 encountered with Diazonium salts. Benzyne mechanism**.

2.2 Phenols – acidic character of phenols- **Preparation, properties and applications of phenol** – Kolbe's reaction, Reimer – Tiemann reaction, Gattermann, Lederer- Manasse and Houben – Hoesh reactions.

2.3 Ring substitution in phenol – nitration - Sulphonation – halogenation – coupling with diazonium salts - Di and tri-hydric phenols - alpha and beta naphthols – preparation, properties and uses.

Unit-III	**THERMODYNAMICS AND COLLOIDAL CHEMISTRY**	**18 Hours**

3.1 Nernst heat theorem – Third law of thermodynamics – determination of absolute entropy from heat capacity measurement - exceptions to III law – Residual entropy – applications of III law.

3.2 Partial molar properties – Chemical potential – Gibbs-Duhem equation - effect of temperature and pressure – chemical potential of ideal gases and ideal liquid solutions – Duhem-Margules equation and Applications.

3.3 Colloids – classification – Solid in liquid (sols) – Properties – Kinetics, Optical and electrical – Stability of Colloids, Protective action, Hardy – Schulze law, Gold number – Liquid in liquid (emulsion) – Types of emulsion, Preparation, Emulsifier – Liquid in Solid (Gels) – Types, Preparations and Properties, Inhibition, General inhibition of Colloids.

Unit-IV	NOBLE GASES AND POLYMERISATION	18 Hours

4.1 Noble gases – Electronic configurations – position in the periodic table – Chemical inertness - reasons and its applications – Clathrate Compounds - Compounds of Xenon – hybridization and geometries of XeF_2 , XeF_4, XeF_6, $XeOF_4$.

4.2 Oxidation number – oxidation state – general rules for calculating oxidation number of elements – oxidizing agent and reducing agent – examples – balancing the redox reaction.

4.3 Polymerisation – Types – addition and condensation polymerization – mechanism of polymerisation – free radical, cationic and anionic polymerisations - addition polymers and condensation polymers with examples – thermoplastic and thermosetting polymers.

Unit-V	POLYHYDRIC ALCOHOLS AND THEORY OF ACIDS AND BASES	18 Hours

5.1 Polyhydric alcohols – Unsaturated alcohols – Preparation, Properties and uses of Glycol, Glycerol and allyl alcohol.

5.2 Relative activity of alkyl halide versus allyl, vinyl and aryl halides – synthesis and uses of DDT and BHC.

5.3 Acid and Bases – Arrhenius concept – Bronsted Lowry concept – conjugate acid base pairs – leveling and differentiating effects - relative order of acidic strength of oxyacids – basicity of anion derived from non-metal – auto ionization concept – Lewis concept – Usanovich concept – hard and soft acid – application.

Books for Study

1. Text book of Physical Chemistry by Puri, Sharma & Pathania.
2. Text book of Inorganic Chemistry by PL Soni.
3. Text book of Inorganic Chemistry by JD.Lee.
4. Text book of Organic Chemistry by PL Soni.

Books for Reference:

1. Text book of Organic Chemistry by Morison & Boyd
2. Text book of Organic Chemistry by Bahl & Arunbahl.
3. Text book of Physical Chemistry by PL Soni.
4. Thermodynamics by Glasston & Lewis.

E-Resources:

Unit-I
https://drive.google.com/file/d/1yYHPYVgoWhnHMUJOiVs2GTPY4ajzXZ/view?usp=drivesdk
Unit-II
https://drive.google.com/file/d/103MeNPsdPsQAhoB-DQcIUrfCy5K81c4W/view?usp=sharing
Unit-IV
https://drive.google.com/file/d/1Y3SpqW_g3ALVOZQFgCpxRGcTW7LvcKBF/view?usp=share_link
Unit III and V
https://drive.google.com/file/d/1iwS-QNk64duH3Hb370Zv_W6M8BksbCYI/view?usp=sharing

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Describe the comparitive study of p-block elements such as nitrogen and oxygen family	**K1, K2, K3**
CO2	Illudtrste aromatic nucleophilic substitution reactions with examples such as phenols	**K1,K2,,K3**
CO3	Restate the third law thermodynamics and determine various chemical potential equations and apply the knowledge of colloids in day today life.	**K1, K2, K3, K4, K5**
CO4	Describe the concept of noble gases, oxidation numbers and apply the polymerization techniques	**K1, K2, K3, K4**
CO5	Describe the knowledge on polyhydric alcohols and acids and bases	**K1,K2,,K3**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCHPR41	**Discipline Specific Core Course**	**VOLUMETRIC ESTIMATION-II**	**3**	**3**

Course Objectives

1. To learn the practical techniques of Complexometry Titrations.
2. To develop the skill of estimating the metal ions present in the solutions
3. To understand the usage of complexing agents in estimation of metal ions.
4. To gain the laboratory skill in complexometric titrations
5. To develop the skill of determining the hardness of water.

Experiments

COMPLEXOMETRY:

1. Estimation of Magnesium using EDTA.
2. Estimation of Zinc using EDTA.
3. Estimation of Nickel using EDTA.
4. Estimation of Calcium using EDTA.
5. Determination of total hardness of water.
6. Estimation of ferrous iron using Diphenyl amine /N-Phenylanthranillic acid as indicator.
7. Estimation of Chlorine in the bleaching powder

Mark Distribution

Marks 75

1. Short procedure 10 Marks
2. Titration 1 20 Marks
3. Titration 2 20 Marks

4. Result	30 Marks
5. Record	10 Marks
6. Viva-voce	10 Marks

Total	100 Marks

Students must write short procedure for the given estimation in ten minutes during the examinations and submit the paper for evaluation.

Error Calculation:

< 2%	-	30 Marks
2 – 3%	-	25 Marks
3 – 4%	-	20 Marks
>4%	-	10 Marks

Books for Study

1. Inorganic Quantitative Analysis by Vogel.

Books for Reference:

1. Inorganic Quantitative Analysis by Vogel.

E-Resources:

https://drive.google.com/file/d/1DXOpsLMh9zQPBbyVBXaxJC39cf57IrDv/view?usp=share_link

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

Course Outcomes (Cos)	Program 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	1-30%	31-60%	61-70%	71-100%
Matches	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquire laboratory skill of handling the apparatus and chemicals involved in complexometric titrations.	**K1, K2, K3**
CO2	Apply the concept of metal ion indicators and their applications in complexometric titrations.	**K3, K4**
CO3	Understand the practical techniques in complexometric titrations	**K4, K5**
CO4	Analyse the chemical reactions involved in complexometry.	**K4, K5**
CO5	Get placement in the Quality Control Depatments of varius industries.	**K5, K6**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓	✓	✓		✓
CO2	✓	✓	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓	✓		✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓
CO5			✓	✓	✓	✓	✓	✓
Number of matches = 34, 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

PROGRAMME OUTCOME FOR M.Sc. CHEMISTRY

PO1	Demonstrate knowledge and scientific understanding to identify research problems, design experiments, use appropriate methodologies, analyze and interpret data and provide solutions, and Exhibit organizational skills, and the ability to manage time and resources.
PO2	Demonstrate knowledge of the concepts, principles, theories, and techniques of the domain and allied subject areas.
PO3	Synergies knowledge with Analytical & Experimental skills to systematically, create & run programs / carry out experiments / formulate & prove theories to enrich the body of knowledge
PO4	Identify and critically analyze pertinent problems in the relevant discipline using appropriate tools and techniques.
PO5	Exhibit potential to accomplish tasks independently or as a member or leader of a team
PO6	Utilize specialized instruments and Equipment, Computers, Software, Internet, and other ICT tools to carry out experiments
PO7	Create Compounds/Products/Software or Design experiments 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 optimum use of ICT
PO9	Identify the need and importance of Human Rights, especially for Women, Children, Bonded Laborers, 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 (PSO) On completion of the M.Sc Chemistry Programme, 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 modeling, Drug discovery and Process Development.
PSO3	Utilize the basic knowledge on 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 mechanism in the synthesis of new chemicals, their analysis and applications.
PSO7	Carry out any kind of project in the quality control, research and process development in 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**

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCH3001	**Discipline Specific Core Course**	**INORGANIC CHEMISTRY -III**	**6**	**4**

Course Objectives

1. To learn the synthesis ,structure and bonding of simple inorganic donors and its reactions
2. To understand the various processes of hydrogenation and oxidation with transition metal catalyst.
3.To understand the photochemistry of coordination complexes
4. To learn the fundamental of hardware and software and the fundamental of computational chemistry.
5. To apply the various concepts of theoretical chemistry in computational chemistry.

Unit-I	**ORGANOMETALLIC CHEMISTRY I**	**18 Hours**

1.1 Synthesis, structure and bonding: Anionic sigma donors – alkyls and aryls; neutral sigma donors – carbonyls and nitrosyls; chain pi donors – olefins (Zieses salt), acetylenes and allyls – cyclic pi donors – metallocenes.

1.2 Reactions: Association – ligand protonation; Substitution – electrophilic and nucleophilic attack on ligands – Addition and elimination – carbonylation and decarbonylation – Rearrangements – oxidative addition and reductive elimination – Fluxinol isomerism.

Unit-II	**ORGANOMETALLIC CHEMISTRY II**	**18 Hours**

2.1 Catalysis: Hydrogenation of olefins [Wilkinson`s catalyst], hydroformylation of olefins using cobalt and Rhodium catalysts [Oxo process].

2.2 Oxidation of olefins to aldehydes and ketones [Wacker`s process] Polymerization of olefins [Zeigler-Natta catalyst], cyclooligomerisation of olefins and acetylenes [Reppe`s and Wilke`s catalyst], polymer bound catalysts.

Unit-III	**PHOTOCHEMISTRY AND OCTAHEDRAL COMPLEXES**	**18 Hours**

3.1 Inorganic Photochemistry: Photosubstitution, Photoredox and isomerization process, application of metal complexes in solar energy conversions.

3.2 Substitution of Octahedral complexes of Cobalt and Chromium, replacement of coordinated water, solvolysis (acids and bases) reaction applications in synthesis. Solar energy: Panels used in them and the developments.

Unit-IV	**COMPUTATIONAL CHEMISTRY –I**	**18 Hours**

4.1 Basics of Computers: Hardware and Software definitions. Languages – Higher level and lower level. Basics of Internet: DNS, ISP, DSL, https, www, URL, LAN and WAN, Repeater / Modem. Open Source software on web, Workstation / Cloud computing.

4.2 Fundamentals of Computational Chemistry: Semi-empirical and Ab-initio methods, Molecular Mechanics and Density Functional Theory (Basic) Software like MOPAC / GAMESS. Visualization of results - Properties predictable and their Significance.

4.3 Geometry optimization: Construction of z-matrix of some simple molecules such as water/HCHO/CH_4/C2H5/C6H6 – saving into formats – Cartesian/unique/smiles/pdb/gjf – Finding transition states and use of symmetry.

Unit-V	**COMPUTATIONAL CHEMISTRY –II**	**18 Hours**

5.1 Quantum Chemical Descriptors, Fukui Function, Calculation of Chemical Potential, Electron Affinity, Hardness and Softness - Fukui Function and other properties (FMO Approach).

5.2 Drug Designing basics: Modeling a drug and predicting activity - Mechanism of action of

drug – Docking concept (basic) and its significance, Lipinski Rule and Online portals for drug-likeness.

5.3 Quantitative Structure Activity Relationship –Significance of Hammet-Taft equation. Elucidation with an example using Molecular Descriptors like LogP, Polarizability, Dipole moment, Surface Area, MESP, HOMO, LUMO, Mulliken and Lowden Charges - Ramachandran Plot- Torsional Angles, Phi & Psi using any example.

Books for Study

1. Computational Chemistry – Introduction to the Theory and Applications of Molecular and Quantum Mechanics, Springer, ISBN: 978-81-8128-476-1.
2. Inorganic Chemistry, Gary Wulfsberg, Viva books pvt. Ltd. ISBN: 81-7649-288-4.
3. Bio-informatics, S C Rastogi, N Mendiratta and P Rastogi, Prentice Hall India, ISBN:978-81-203-3595-0.
4. Physical Chemistry- A molecular Approach, Donald A MQuarrie and John D Simon, Viva books pvt ltd. ISBN: 81-7649-001-6.

Books for Reference:

1. Computational Chemistry – A practical guide for applying techniques to real world problems – David Young, Wiley Interscience, ISBN-0-471-33368-9.
2. Essentials of Computational Chemistry, Theories and Models – Christopher J Cramer, Wiley, ISBN: 0-470-09182-7.
3. Computational Organic Chemistry, Steven M Bachrach, Wiley Interscience, ISBN: 978-0-471-71342-5.
4. Molecular Modelling – Principles and Applications, Andrew R Leach, Pearson Education Ltd. ISBN:978-0-582-38210-7.

E-Resources:

Unit – I
https://docs.google.com/document/d/1f17hNXVpWf84IaOeUxVv9MMKvySOSiCGP8dsWYZtts/edit?usp=sharing

Unit – II
https://docs.google.com/document/d/1nsKk1b1cNHoPFVhajx6ht7uTiKQOexbxiz7bzdemth4/edit?usp=sharing

Unit-III
https://docs.google.com/document/d/1f17hNXVpWf84IaOeUxVv9MMKvySOSiCGP8dsWYZtts/edit?usp=sharing

Unit IV and V
https://docs.google.com/document/d/1GHTHnWVGFiZHLOeDRPPBK3uScRJdKVPtcMnIVTM5JeY/edit#heading=h.oxoyai3hva2s

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	identify the basic fundamental reactions in organometallic chemistry	**K4, K5**
CO2	gain knowledge of the chemical bonds and the theories that explain the electronic properties within organometallic compounds	**K1**
CO3	understand and conceptualization of theory and its applications of reaction mechanisms of octahedral metal complexes by photochemical methods	**K2, K5**
CO4	visualize the molecule by group theoretical approach and its symmetrical analysis.	**K4,K5**
CO5	obtain theoretical understanding of how the computational chemistry reactions taking place.	**K2, K6**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO 1	✓	✓	✓		✓	✓	✓	✓
CO 2	✓	✓	✓		✓	✓	✓	✓
CO 3	✓	✓	✓		✓	✓	✓	✓
CO 4	✓	✓	✓		✓	✓	✓	✓
CO 5	✓	✓	✓		✓	✓	✓	✓
Number of matches = 35, 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

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCH3002	**Discipline Specific Core Course**	**ORGANIC CHEMISTRY - III**	**6**	**4**

Course Objectives

1. To understand the concepts of spectral techniques and to apply these techniques for structural analysis of organic compounds.
2. To learn the importance of alkaloids and steroids and their synthesis
3. To understand the techniques involved in extraction and methods of determination of structure of alkaloids and terpenes.
4. To understand the chemical and photochemical organic reactions.
5. To know the nature of pericyclic reactions.

Unit-I	**ORGANIC SPECTROSCOPY**	**18 Hours**

1.1 UV – Visible spectroscopy – types of electronic transitions – chromophores and auxochromes – factors influencing positions and intensity of absorption bands – absorption spectra of dienes, polyenes and α, β - unsaturated carbonyl compounds – Woodward – Fischer rules – Theoretical calculations of wavelength of absorption of C=C and C=O chromophore and its applications

1.2 IR Spectroscopy – vibrational frequencies and factors affecting them – identification of functional groups – intra and inter molecular hydrogen bonding – finger print region- Application in organic chemistry

1.3 Nuclear spin- magnetic moment of a nucleus – nuclear energy levels in the presence of magnetic field– basic principles of NMR Spectroscopy – CW and FT NMR – ^{1}H NMR – solvents and reference compounds in NMR - chemical shift and coupling constant – factors influencing proton chemical shift – proton coupling constant – ^{1}H NMR spectra of simple organic molecules AX and AMX spin system – spin decoupling – nuclear over Hauser effect- chemical exchange. ^{13}C NMR – proton decoupled and off – resonance ^{13}C NMR spectra – factors affecting ^{13}C chemical shift – ^{13}C NMR spectra of simple organic molecules.

Unit-II	**PHYSICAL METHODS OF STRUCTURAL DETERMINATION**	**18 Hours**

2.1 Mass Spectrometry – Principles – measurement techniques – (EI, CI) – presentation of spectral data – molecular ions – isotope ions – fragment ions of odd and even electron types.

2.2 Rearrangement of molecular ions factors affecting cleavage pattern – simple and multicenter fragmentation – McLafferty rearrangement. Mass spectra of hydrocarbons, alcohols, phenols, **selected nitrogen and sulphur compounds, amines and** aldehydes and ketones.

2.3 ORD and CD- Octant rule, Cotton effect, axial halo ketone rule, and its applications. **Problems solving using all spectral data, NMR, UV, IR and Mass spectral data** (limited to 10 carbon atoms).

Unit-III	**ALKALOIDS AND STEROIDS**	**18 Hours**

3.1 Total synthesis of quinine, morphine, reserpine and vincristine.

3.2 Synthesis of cholesterol, ergosterol, oestrone, carotenes, conversion of cholesterol to progesterone, Oestrone and testosterone. Structural elucidation of cholesterol.

Unit-IV	**PROTEINS, VITAMINS AND TERPENES**	**18 Hours**

4.1 PROTEINS: Peptides and their synthesis - synthesis of tripeptide. Merrifield synthesis, Determination of tertiary structure of proteins.

4.2 VITAMINS: Synthesis of vitamin A1 (Reformatsky and Wittig reaction methods only).

4.3 TERPENES: Introduction, Nomenclature, classification, isoprene rule, structural determination of geraniol, α-pinene and camphor.

Unit-V	ORGANIC PHOTOCHEMISTRY AND AROMATICITY	18 Hours

5.1 Photochemical excitation –Experimental technique, electronic transition – Jablonski diagram – intersystem crossing, energy transfer, quantum yield, solvent effects - study of photochemical reactions of ketone – Photoreduction – photocyclo addition – Paterno – Buchi reaction – Norrish type I and II reactions - Di-pi-methane rearrangement.

5.2 Pericyclic reactions – classification – orbital symmetry – Woodward Hoffman rules – Analysis of electrocyclic, cyclo addition and sigmatropic reactions – correlation diagrams for 1,3 butadiene – cyclobutene system - inter conversion of 1,3,5 hexatrienes to cyclohexadienes – Cope and Claisen rearrangement – General pericyclic reaction and its application.

5.3 Aromaticity of benzenoid, heterocyclic, and non-benzenoid compounds, Huckel's rule – Aromatic systems with pi electron numbers other than six – non-aromatic (cyclooctatetraene etc.,) and anti-aromatic system (cyclobutadiene etc.) – system with more than 10π electrons – Annulenes C_{12}-C_{18} (synthesis of all these compounds is not expected).

Books for Study

1. Spectrometric identification of organic compounds by R.M. Silverstein, G.d. Bassler and Monsu. John Wiley and Sons, New York.
2. Organic Chemistry, Vol. II, I.L. Finar, 5th edition ELBS publication.
3. Molecular reaction and photochemistry by Charles H.Depuy and Orville, L. Chapmann, Prentice Hall of India Pvt., Ltd., New Delhi.
4. Advanced organic chemistry III Edition by J. March.
5. Physical organic chemistry by Neil S. Issac, ELBS publication 1987.
6. Organic reaction mechanism, Macmillan India, 1999.
7. Chemistry of Organic Natural products Vol. 1 & 2 by OP Agarwal.

Books for Reference:

1. Application of absorption spectroscopy of organic compounds by J. Dyer, Prentice – Hall of India, Pvt., New Delhi.,
2. Introduction to the spectroscopic methods for the identification organic compounds – 2 volumes, Schiemann Pergamman Press.
3. Spectroscopy of Organic compounds by P.S. Kalsi, Wiley Eastern Ltd., Chennai.
4. Advanced organic Chemistry by Francis A. Carey and Richard J. Sundberg, 3rd Edition (1990).
5. Spectroscopy W. Kemp, Macmillan Ltd.,
6. Organic Reaction & Mechanism by OP Agarwal.
7. Chemistry of organic natural products by Agarwal, Geol Publishing House.
8. Structural identification of organic compounds Y.R. Sharma, S. Chand & Co.

E-Resources:

Unit-I
https://drive.google.com/file/d/1J8SyxYCBByrRIVG8oSNvHKEDKgn93t8U/view?usp=sharing
Unit-II
https://drive.google.com/file/d/1PWgnJO6QhOrlnOMZFGz2iWVkrY7BEhtR/view?usp=sharing
Unit-III
https://drive.google.com/file/d/1PWgnJO6QhOrlnOMZFGz2iWVkrY7BEhtR/view?usp=sharing
Unit-IV
https://drive.google.com/file/d/1CY97aiGF63DNwkjiFsTxt8PVyxTBh_nk/view?usp=drivesdk
Unit-V
https://drive.google.com/file/d/1ODw97_xmrGh04u904V_y2d-vGJ-jj23s/view?usp=drivesdk

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Identify the various functional groups and finger print regions.	**K4**
CO2	Analyse the hydrocarbons like phenols, aldehydes and ketones by Mass spectroscopy.	**K4,K5**
CO3	Synthesize the hormones such as oestrone and testerone.	**K5**
CO4	Determine the structure of terpenes like alpha pinene and camphor.	**K2,K5**
CO5	Evaluate photochemical reaction in organic chemistry and its mechanism.	**K1,K3,K5**
KI- 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

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

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

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 Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓	✓	✓		✓	✓	✓	✓
CO2	✓	✓		✓	✓	✓		✓
CO3			✓	✓		✓	✓	✓
CO4	✓	✓		✓	✓	✓		✓
CO5	✓	✓	✓	✓		✓	✓	✓
Number of matches = 31, Correlation:Very High								

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCH3003	**Discipline Specific Core Course**	**PHYSICAL CHEMISTRY - III**	**5**	**4**

Course Objectives

1. To apply perturbation theory and variation methods to hydrogen and helium atoms
2. To understand the concept of mean ionic activity, activity coefficient and the concept of Debye Huckle theory, Debye Huckle limiting law
3. To study different theories of electrical double layer and the concept of Zeta potential, Ficks law of diffusion
4. To learn the concept of kinetics and mechanism of polymerization and molecular weight determination by advanced methods
5. To understand the basic concepts of Resonance spectroscopy particularly proton NMR

Unit-I	**QUANTUM CHEMISTRY**	**18 Hours**

1.1 Approximation methods – The time independent perturbation theory - Application of perturbation method to Helium atom. The Variation method (Variation theorem) – Application of variation method to hydrogen and helium atoms. Application of Born – Oppenheimer approximation to Hydrogen molecular ion. Term symbols for atoms in the ground state.

1.2 Slater determinant for n electron atoms - Valence bond theory for hydrogen molecule – LCAO – MO theory for di- and polyatomic molecules. Concept of hybridization – Huckel theory for conjugated molecules (Ethylene, butadiene and benzene) – semi – empirical methods – HF-SCF method.

Unit-II	**ELECTROCHEMISTRY - I**	**18 Hours**

2.1 Mean ionic activity and mean ionic activity coefficient of different types of electrolytes and calculations – concept of ionic strength, Debye – Huckel theory of strong electrolytes – activity coefficient of strong electrolytes – determination of activity coefficient by electrochemical method – Debye – Huckel –Onsagar equation.

2.2 Debye Huckel limiting law – qualitative and quantitative verification – limitations.

Unit-III	**ELECTROCHEMISTRY- II**	**18 Hours**

3.1 Electrode – electrolyte interface – adsorption at electrical interface – electrical double layer – electro capillary phenomenon – Lippmann equation – Structure of double layers – Helmholtz – Perrin, Guoy –Chappmann and Stern model of electrical double layers – Zeta potential and its applications.

3.2 Diffusion – Fick's law of diffusion – Effect of ionic association on conductance-electrokinetic phenomena-membrane potential.

Unit-IV	**MACROMOLECULES**	**18 Hours**

4.1 Introduction – Definitions -Monomer – polymer – repeating unit - back bone-homo polymer-copolymer-heterochain polymer- Classification of polymers – Based on source – arrangement of units – application to heat –Kinetics and mechanism of chain (addition) polymerization - Chain Initiation- Propagation – Termination –Inhibition and Retardation.

Kinetics and mechanism of co-polymerization – Derivation of Co-polymer equation – Reactivity ratios in polymer systems.

4.2 Molecular weight of polymers – Number average – weight average molecular weight - Determination of Molecular weight of polymers – Osmometry- Viscometry- Ultracentrifuge, GPC, MALDI-TOF.

Unit-V	SPECTROSCOPY - II	18 Hours

5.1 Resonance spectroscopy – Zeeman effect – Nature of spinning particles – interaction between spin and magnetic fields – chemical shift in NMR – shielding and deshielding – TMS – advantage of TMS – Chemical shift in ethanol.

5.2 Spin-spin coupling - NMR of simple AX and AMX type molecules - Brief concepts about – ^{13}C NMR spectra – FT NMR.

Books for Study

1. R.K. Prasad, Quantum Chemistry, WileyEastern,New Delhi,1992.
2. M.W. Hanna, Quantum Mechanics In Chemistry,W.A. Benjamin Inc.London,1965.
3. S. Glasstone, Introduction To Electrochemistry, Affiliated East West Press, New Delhi, 1960.
4. D.R. Crow, Principles And Applications To Electrochemistry, Chapman And Hall,1991.
5. J. Rajaram And J.C. Kuriacose, Thermodynamics For Students Of Chemistry, LalNagin Chand, New Delhi,1986.
6. F.W. Billmeyar, Text Book Of Polymer Science, Wiley Interscience, 1984.
7. A.Rudin, The Elements Of Polymer Science And Engineering, An Introductory Text For Engineers And Chemists, Academic Press, New York, 1973.
8. G.Odian Principles Of Polymerization, McGraw Hill Book Company, New York,1973.
9. Caringtion and Ad. Mclachlan, Introduction To Magnetic Resonance Harper And Row, New York,1967.
10. Gawarikar, Polymer Science, New age publication.

Books for Reference:

1. R.L.De Koch And H.B.Gray,Chemical Structure and Bonding,Benjamin/Cumming,MenloPark,California.
2. A.K.Chandra,Introductory Quantum Chemistry,TataMcgraw Hill.
3. D.A.McQuarrie,QuantumChemistry,University Science Books, Mill Valley,California,1983.
4. P.W.Atkins,Molecular Quantum Mechanics,Oxford University Press,Oxford,1983.
5. J.O.M.Bokris and A. K. N Reddy,Electrochemistry,Vols 1and 2 Plenum,New York,1977.
6. P.Dalahay,Electrode Kinetics And Structure Of Double Layer,InterScience,New York,1965.
7. H.Reiger,Electrochemistry,Chapman And Hall,New York,1994.
8. I.C.E.H.Brawn,The Chemistry Of High Polymers,Butterworth And Co.,London,1948.
9. E.A.Coolins,J.Bares And E.W.Billmeyer,Experiments In Polymer Science,WileyInterscience,New York,1973.

E-Resources:

Unit-I
https://drive.google.com/file/d/1eVdxEqZOC9A0jJUh_GJggu8vo56zL-6d/view?usp=share_link
Unit-II
https://drive.google.com/file/d/1I037bCukPwV_5wzQyawiUhUDS_fhoSvt/view?ts=63887b69
Unit-III
https://drive.google.com/file/d/18hSHPqBJ7Fyt7BLqDRDFq77qVUG9yPIi/view?ts=6388a939
Unit IV
https://drive.google.com/file/d/1fxWcC5566ugJDS9ONx0kgTPWOSr_uHBJ/view?usp=share_li

nk Unit-V https://drive.google.com/file/d/1fxWcC5566ugJDS9ONx0kgTPWOSr_uHBJ/view?usp=share_link

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

on Problems

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Apply the knowledge of perturbation theory and variation method for hydrogen and helium atom and understand the concept of slater determinant and LCAO and MO theory.	**K1, K2, K3**
CO2	Apply the knowledge of mean ionic activity , activity coefficient and Debye Huckel limiting law	**K1, K2, K3**
CO3	Describe the different theories of electrical double layer and understand the concept of Lippmann equation and Fick's law of diffusion.	**K2, K3,K4, K5**
CO4	Describe the kinetics and mechanism of polymerization and determine the molecular weight of polymers by different methods	**K2, K3,K4, K5**
CO5	Understand the concept and principles of Raman, NMR and C^{13} NMR.	**K1, K2,**
K1- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	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	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBCHPR31	Discipline Specific Core Pract	INORGANIC CHEMISTRY PRACTICAL	5	4

Course Objectives

This course aims to impart to the student, knowledge of:

1. Basic advanced techniques required for the separation of metal ions of a binary Solution
2. Techniques of volumetric and gravimetric estimation of ions
3. Preparation of solutions required for an experiment
4. The various techniques involved in the preparation of coordination complexes

I - QUANTITATIVE ANALYSIS

1. Estimation of Copper volumetrically and Nickel gravimetrically.
2. Estimation of Copper volumetrically and Zinc gravimetrically.
3. Estimation of Ferric ion volumetrically and Magnesium ion Gravimetrically.
4. Estimation of Ferric ion volumetrically and Nickel ion Gravimetrically.

II - PREPARATIONS

1) Tetrammine copper (II) sulphate
2) Potassium tetrachlorocuprate(II)
3) Tris (ethylenediammine) Cobalt (III) chloride
4) Hexammine Cobalt (III) chloride

SCHEME OF MARKS

EXPERIMENT	50 Marks
PREPARATION	25 Marks
RECORD	10 Marks
VIVA VOCE	15 Marks
Total	100 Marks

Books for Study

1. Vogel's Text book of Quantitative Inorganic Analysis.

Books for Reference:

1. Vogel's Text book of Quantitative Inorganic Analysis.

E-Resources: https://drive.google.com/file/d/1Okd8zTucdrASOvk7PoOaUv6HzGIOPZ2h/view?usp=sharing

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquire the knowledge and principle of volumetric and gravimetric analysis in analytical chemistry	**K1, K2**
CO2	Estimate quantitatively the amount of zinc Gravimetrically	**K3, K4, K4, K5**
CO3	Determine the amount of copper by iodimetric method	**K3, K4, K4, K5**
CO4	Prepare the maximum quantity of Tetrammine copper (II) sulphate	**K3, K6**
CO5	Prepare crystalline samples of metal complexes	**K3, K6**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓	✓	✓			✓	✓	✓
CO2	✓	✓	✓		✓		✓	✓
CO3	✓	✓	✓	✓		✓		✓
CO4	✓	✓	✓		✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓
Number of matches = 32, 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

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCHVB31	**VALUE BASED COURSE**	**Research Methodology & Ethics**	**3**	**3**

Course Objectives

At the end of this course the learner is expected:

1. To understand the philosophy of science and ethics, research integrity and publication ethics.
2. To identify research misconduct and predatory publications
3. To understand indexing and citation databases, open access publications, research metrics (citations, h-index, impact Factor,etc.). To understand the usage of plagiarism tools.

Unit-I	**Introduction to Research**	**9 Hours**

Meaning of Research and Scope of Research Methodology - Significance of research in Social and business Science Identification of the problem area - Selection of the problem - Formulation of research question(s) - Pilot study - Meaning and Components of research design.

Unit- II	***Research Ethics***	**9 Hours**

Ethics with respect to science and research - Intellectual honesty and research integrity - Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) - Redundant Publications: duplicate and overlapping publications, salami slicing - Selective reporting and misrepresentation of data.

Unit-III	**Data Collection & Types**	**9 Hours**

Data Collection - Sources : Primary and Secondary - Data matrix - Unit of data collection and unit of data analysis - Methods and tools of data collection : Interview and questionnaires and their types - observation and its types - Audio visual aids in data collection - Scaling and Testing Techniques - Reliability and validity of instruments - Uses of information technology in data collection.

Unit-IV	**Publication ethics**	**9 Hours**

Types of publications. Publication ethics: definition, introduction and importance - Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. - Conflicts of interest - Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types - Violation of publication ethics, authorship and contributor ship - Identification of publication misconduct, complaints and appeals - Predatory publisher and journals.

Unit-V	**Research Writing**	**9 Hours**

Report writing - Meaning, Techniques and precautions of interpretation - significance of report writing - Target audience - Different steps in writing report - Layout of research report - Types: Technical report, popular report - Mechanics of writing a research report. Tools for reference organization- zotero, mendeley, endnote. Online statistical tools.

Books for study:

1. The Student's Guide to Research Ethics By Paul Oliver Open University Press, 2003
2. Responsible Conduct of Research By Adil E. Shamoo; David B. Resnik Oxford University Press, 2003
3. Ethics in Science Education, Research and Governance Edited by Kambadur Muralidhar, Amit Ghosh Ashok Kumar Singhvi. Indian National Science Academy, 2019. ISBN : 978-81-939482-1-7.
4. Amarchand D, Research Methods in Commerce - Emerald Publishers, Chennai
5. C.R.Kothari, Research Methodology: Methods and Techniques, New Age Intenational Publishers,New Delhi. 4th edition, 2019
6. N. Gurumani, Research Methodology: For Biological Sciences, MJP Publishers, 2019.

Books for Reference:

5. Anderson B.H., Dursaton, and Poole M.: Thesis and assignment writing, Wiley Eastern 1997.
6. Bijorn Gustavii: How to write and illustrate scientific papers? Cambridge University Press.
7. Bordens K.S. and Abbott, B.b.: Research Design and Methods, Mc Graw Hill, 2008.
8. Graziano, A., M., and Raulin, M.,L.: Research Methods – A Process of Inquiry, Sixth Edition, Pearson, 2007.

E-Resources:

2. Nicholas H. Steneck. Introduction to the Responsible Conduct of Research. Office of Research Integrity. 2007. Available at: https://ori.hhs.gov/sites/default/files/rcrintro.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understrand the concept and significance of research	K2
CO2	Recognize the ethical issues in research and publications	K1
CO3	Collect, correlate and collaborate different types of data	K3, K4, K6
CO4	Classify, develop and apprise various modes of research writings	K2, K5, K6
CO5	Identify, solve and develop protocols for existing and future research problems.	K1, K3, K6
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 =					Correlation =			

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
PBCHDEP5	Discipline Specific Elective Course	CONDUCTOMETRIC TITRATIONS & ORGANIC ESTIMATIONS --Practical	5	3

Course Objectives

To study the principle and experimental procedure conductrometric titration of

1. Strong acid and strong base
2. Strong acid and weak base
3. Mixture of acids
4. Precipitation
5. Verification of Debye Huckel Onsoger Equation
6. Study of Oswalds dilution law
7. Estimation of Organic compounds

Any Six preparations from the following

1. Determination of strength of an unknown strong acid by using a standard base.
2. Determination of strength of the individual concentrations of the two acids in the mixture (Strong and weak) by using a standard strong base.
3. Determination of strength of an unknown weak acid by using a standard base.
4. Analysis of an unknown KI using a standard silver nitrate by precipitation method.
5. Determination of strength of KCl by using a standard silver nitrate solution by precipitation method.
6. Analysis of a mixture of KCl and KI (individual concentrations) by using standard silver nitrate solution.
7. Determination of strength of barium chloride by using a standard magnesium sulphate by precipitation method.

8. Determination of strength of barium hydroxide by using a standard magnesium sulphate by double precipitation method.
9. Verification of Ostwald's dilution law using not less than five different dilute solutions of weak acid and determination of dissociation constant of weak acid.
10. Determination of Equivalent conductance (λα) at infinite dilution of strong electrolyte using five different dilutions using Debye –Huckel Onsager's equation.
11. Determination of solubility of a sparingly soluble salt by conductance method.

SPECTROSCOPY

Interpretation of simple IR and Raman spectra of simple molecules for the calculation of molecular data and identification of functional groups.

ORGANIC ESTIMATIONS

ESTIMATIONS:

1. Estimation of Aniline
2. Estimation of Phenol
3. Estimation of Glucose
4. Estimation of Ascorbic acid
5. Saponification of oil
6. Estimation of Ethyl methyl ketone
7. Estimation of Glycine
8. Iodine value of an oil
9. Estimation of aldehyde

Total Marks: 100

External marks distribution

Spectra	=	15
Practical	=	45
Procedure	=	10
Record	=	10
Viva-voce	=	10
Result	=	10

Books for Study

1. J.B.Yadav, "Advanced Practical Physical chemistry", 20 edn. GOEL publishing House, Krishna Pakashan Media Ltd., (2001).
2. Findlay's "Practical Physical Chemistry" Revised and edited by B.P. Levitt 9 ed., Longman, London, 1985.

Books for Reference:

1. J.N. Gurtu and R.Kapoor, "Advanced Experimental chemistry", Vol.I. Chand & Co., Ltd, New Delhi.

E-Resources:

https://www.Sciencedirect.com

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Determine the strength of acid and bases by electrochemical methods	**K1, K2**
CO2	Determine the conductance of electrolytes by precipitation titrations	**K4, K5**
CO3	Verify standard laws of electrochemistry by electrochemical methods	**K4, K5**
CO4	Estimate the organic compounds like phenols, aniline, benzaldehyde, glucose, etc.,	**K4, K5**
CO5	Analyse and estimate important organic raw materials for industries	**K4, K5**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓		✓	✓	✓		✓	✓
CO2	✓	✓		✓		✓		
CO3	✓		✓	✓	✓		✓	✓
CO4		✓	✓			✓	✓	✓
CO5	✓	✓		✓	✓	✓	✓	
Number of matches = 27, 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 III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCHDEP6	**Discipline Specific Elective Course**	**EXPERIMENTAL METHODS IN ELECTROCHEMISTRY AND ESTIMATION OF ORGANIC COMPOUNDS -PRACTICAL**	**5**	**3**

Course Objectives

To study the principle and experimental procedure conductrometric titration of

1. Strong acid and strong base
2. Strong acid and weak base
3. Mixture of acids
4. Precipitation
5. Verification of Debye Huckel Onsoger Equation
6. Study of Oswalds dilution law
7. Estimation of Organic compounds

Any Six experiments from the following

1. Conductometric determination of strength of strong acid by a standard base.
2. Conductometric determination of strength of mixture of acids (Strong and weak) by using a standard strong base.
3. Conductometric determination of strength of weak acid by using a standard base.
4. Conductometric prepcipitation titration Analysis of KI using a standard silver nitrate.
5. Determination of strength of KCl by using a standard silver nitrate solution by precipitation method.
6. Conductometric analysis of a mixture of KCl and KI (individual concentrations) by using standard silver nitrate solution.
7. Conductometric determination of strength of barium chloride by using a standard magnesium sulphate by precipitation method.
8. Conductomeric determination of strength of barium hydroxide by using a standard magnesium sulphate by double precipitation method.
9. Conductometric verification of Ostwald's dilution law using not less than five different dilute solutions of weak acid and determination of dissociation constant of weak acid.
10. Conductometric determination of Equivalent conductance ($\lambda\alpha$) at infinite dilution of strong electrolyte using five different dilutions using Debye –Huckel Onsager's equation.
11. Determination of solubility of a sparingly soluble salt by conductance method.

SPECTROSCOPY

Interpretation of IR and Raman spectra of simple molecules for the calculation of spectral data and identification of functional groups.

ORGANIC ESTIMATION

ESTIMATIONS:

1. Estimation of amino organics
2. Estimation of phenolic compounds
3. Estimation of carbohydrates
4. Estimation of Ascorbic acid
5. Estimation of Nitro benzene
6. Estimation of carbonyl compounds

7. Estimation of sulphur content in organic compounds
8. Determination of Iodine value of an oil

Total Marks: 100 (External 75 + Internal 25)

External marks distribution

Spectra (5+5)	=	10
Practical	=	50
Procedure	=	10
Record	=	10
Viva-voce	=	10
Result	=	10

Books for Study

1. J.B.Yadav, "Advanced Practical Physical chemistry", 20 edn. GOEL publishing House, Krishna Pakashan Media Ltd., (2001).
2. Findlay's "Practical Physical Chemistry" Revised and edited by B.P. Levitt 9 ed., Longman, London, 1985.

Books for Reference:

1. J.N. Gurtu and R.Kapoor, "Advanced Experimental chemistry", Vol.I. Chand & Co., Ltd, New Delhi.

E-Resources:

https://www.Sciencedirect.com

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquire the knowledge of conductometric neutralization titrations	**K1, K2**
CO2	Determine the conductance in conductometric precipitation titrations	**K4, K5**
CO3	Verify Ostwald's dilution law and Debye Huckle Onsagar equation	**K4, K5**
CO4	Estimate the organic compounds with various functional groups	**K4, K5**
CO5	Estimate industrially important organic compounds	**K4, K5**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓		✓	✓	✓		✓	✓
CO2	✓	✓		✓		✓		
CO3	✓		✓	✓	✓		✓	✓
CO4		✓	✓			✓	✓	✓
CO5	✓	✓		✓	✓	✓	✓	
Number of matches = 27, 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 III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCHDEP7	**Discipline Specific Elective Course**	**INDUSTRIAL CHEMISTRY PRACTICALS**	**5**	**3**

Course Objectives

1. To compare the experimental and standard values of certain commercial substances.
2. To check the purity of same samples.

EXPERIMENT

1. Estimation of total hardness of water using EDTA.
2. Determination of Iodine value of an oil by Hanus method.
3. Estimation of Ascorbic acid (Vitamin C).
4. Determination of saponification value of an oil.
5. Determination of percentage purify of washing soda.
6. Estimation of available chlorine in bleaching powder.
7. Determination of percentage of calcium in lime stone.
8. Determination of acid value of an edible oil.

SCHEME

EXPERIMENT	80 Marks
RECORD	10 Marks
VIVA VOCE	10 Marks
Total	100 Marks

Books for Study

1. Venkateswaran V., Veeraswamy R., Kulandivelu A.R. Basic principles of practical chemistry, 2nd Edition, New Delhi, Sultan Chand & Sons (1997).

Books for Reference:

1. Venkateswaran V., Veeraswamy R., Kulandivelu A.R. Basic principles of practical chemistry, 2nd Edition, New Delhi, Sultan Chand & Sons (1997).

E-Resources:

https://www.Sciencedirect.com

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Estimate the hardness and determines the quality of water	**K1,K2,K3,**
CO2	Carry out the estimations of industrial chemicals and determine their quality.	**K3,K4,K5,**
CO3	Apply the methods in the industrial production of chemicals.	**K3,K4,K5,**
CO4	Differentiate the quality of chemicals in marketing and sales.	**K3,K4,K5,**
CO5	Produce new chemicals by innovative methods.	**K5,K6**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓
CO4					✓	✓	✓	✓
CO5					✓	✓	✓	✓
Number of matches = 32, 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

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCH4001	**Discipline Specific Core Course**	**INORGANIC CHEMISTRY – IV**	**6**	**5**

Course Objectives

1. To learn the fundamentals of UV visible and X-RAY spectroscopy and apply them to inorganic systems.
2. To learn the fundamentals of IR and Raman spectroscopy of inorganic compounds.
3. To learns the fundamentals of NMR, NQR and ESR spectroscopy techniques and their application in inorganic chemistry.
4. To understand the chemistry of F- block elements and learn the fundamental of nanotechnology
5. To learn biological importance of inorganic compound in living system.

Unit-I	**UV VISIBLE AND X-RAY SPECTROSCOPY**	**18 Hours**

1.1 Applications to Inorganic systems of the following: ultra/visible. Term symbols for ground state transition metals, energies of molecular states - isosbestic point. Geometrical isomerism in complexes, method of continuous variation (Job's method).

1.2 Morse potential energy diagram, Charge transfer spectra, Photoelectron spectroscopy [UV and X ray] – Koopmann`s theorem, fine structure in PES, chemical shift and correlation with electronic charges, Auger Effect – polymorphism in XRD.

Unit-II	**IR AND RAMAN SPECTROSCOPY**	**18 Hours**

2.1 Infra-red and Raman spectra: Selection Rules, Use of Symmetry considerations (point group) to determine the number of lines in IR and Raman Spectra – Quantum Mechanical description of Raman effect, comparison with fluorescence, resonance Raman effect.

2.2 Applications to metal complexes, Organometallic compounds, Metal carbonyls and simple inorganic compounds with special reference to coordination site, isomerism. Metal-Ligand stretching vibrations for metal carbonyls, sulphates, cyanides, isocyanides nitro - nitrito complexes, N_2O_5, B_2H_6, and ClF_3.

Unit-III	**NMR, NQR, AND ESR SPECTROSCOPY**	**18 Hours**

3.1 NMR, NQR and Mossbauer spectra – NMR of P^{31},F^{19},N^{15}; shift reagents, NQR – principle and applications; Mossbauer spectra – principles and applications to Iron and Tin systems.

3.2 ESR – Introduction- Zeeman equation, g-value, nuclear hyperfine splitting, interpretation of the spectrum, simple carbon centered free radicals. Anisotropy – McConnel`s equation. Kramer`s theorem, ESR of transition metal complexes of Copper, Manganese and Vanadium complex.

Unit-IV	**LANTHANIDES AND ACTINIDES – NANOTECHNOLOGY**	**18 Hours**

4.1 The chemistry of Lanthanides and Actinides - oxidation states, spectral and magnetic characteristics, coordination numbers, separation of lanthanide elements, Geiger-Muller counter, stereochemistry, nuclear and non-nuclear applications. Role of lanthanides and actinides in nuclear chemistry.

4.2 Nanotechnology - Introduction, preparatory methods, characterization, application as sensors, biomedical applications, application in optoelectronics.

Unit-V	**BIOINORGANIC CHEMISTRY**	**18 Hours**

5.1 Biological importance of Iron, Magnesium, Zinc, Cobalt, Copper, Sodium, Potassium and

Calcium. Iron - Heme and non-heme proteins – Haemoglobin, myoglobin, iron-sulphur proteins, catalase and peroxidase, transport mechanism. Ferredoxins, Cytochromes, Magnesium - chlorophyll, salient features of photosynthesis.

5.2 Zinc metalloenzymes – Carbonic anhydrase and carboxypeptidase. Cobalt - Cobalamines, coenzymatic actions; Copper proteins; biological functions of Na, K and Ca. Nitrogen fixation – Nitrogen cycle.

Books for Study

1. K.F. Purcell and J.C. Kotz - Inorganic Chemistry, WB Saunders Co., 1977.
2. C.N.R. Rao, I.R. Fellalo - Spectroscopy in Inorganic Chemistry, Vol. I and Vol. II, Academic Press, 1970.
3. G. Aruldhas - Molecular Structure and Spectroscopy - Prantice Hall.
4. N. Greenwood and A. Earnshaw - Chemistry of Elements pergamon, NY, 1984.4.
5. G.T. Seaborg - Transuranium elements, Dowden Hitchinson and Ross, 1978.
6. K. Hussain Reddy - Bioinorganic Chemistry, , New Age International Publishers, Delhi , 1978.
7. Vibrational spectroscopy – Theory and applications, D. N. Sathyanarayana – New Age International Publishers, 1st Edition 2004.

Books for Reference:

1. R. Drago - Physical methods in inorganic Chemistry, Reeindhod, NY, 1968.
2. K. Burger - Coordination Chemistry, Experimental methods, Butterworths, 1973.
3. G.T. Seaborg, J. J. Katz - The Chemistry of Acitinide Elements, Metheun, 1957.
4. ManasiKarkare - Nanotechnology, Fundamentals and Applications, I.K international,Royal Society of Chemistry, 2nd edition, 2005
5. T. Pradeep - NANO - The essentials: Understanding nanoscience and nanotechnology
6. S.F.A. Kettle - Spectral interpretation
7. Geoffry.AOzin, Andre C Arsenault- Nanochemistry, A chemical approach a nano materials,2005.
8. Stephen. J. Lippard, Jeremy. M. Berg – Principles of BioInorganic Chemistry, University Science books, 2008.

E-Resources:

Unit I and II

https://www.slideshare.net/christophsontag/spectroscopic-methods-in-inorganic-chemistry
https://docs.google.com/presentation/d/1G-Xgp0OuErq6m6ujrZF7Kt4L8pJRfLQGxQ4Q0aBObrI/edit#slide=id.p
https://chem.libretexts.org/Courses/Johns_Hopkins_University/030.356_Advanced_Inorganic_Laboratory/04%3A_Spectroscopy_Techniques_for_Inorganic_Chemistry

Unit III

https://docs.google.com/document/d/1w6-rUB0_vJPT6CA7Ft7fl0MmVo6bApgTGaDWQFXVy7U/edit?usp=sharing

Unit IV

https://docs.google.com/document/d/1EWcz0Kze8zRa6tz8oxmVowCHlo3qyl9GcHKb3Pwbb54/edit?usp=sharing

Unit V

https://docs.google.com/document/d/1YPbsbKfkiujBWFTD7lG967dhS-1DlltdGJ25RPvCnXs/edit?usp=sharing

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	understand Instrumentation, experimental techniques, Interferences, analytical applications of UV Visible and X-ray Spectroscopy	**K2,K6**
CO2	understand concepts of IR and Raman Spectroscopy with their Applications of metal complexes	**K2,K5**
CO3	understand the concepts and principal of NMR, NQR, and ESR spectroscopy	**K1,K2, K3**
CO4	Analyze the methods of separation and applications of spectral and magnetic characteristics of Lanthanides, Actinides series	**K4**
CO5	Learn the biological importance and functions of bioinorganic chemistry in day today life	**K5,K6**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓	✓	✓		✓	✓	✓	✓
CO2	✓	✓	✓		✓	✓	✓	✓
CO3	✓	✓	✓		✓	✓	✓	✓
CO4	✓	✓	✓	✓		✓	✓	✓
CO5	✓	✓	✓	✓		✓	✓	✓
Number of matches = 35, 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

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCH4002	**Discipline Specific Core Course**	**ORGANIC CHEMISTRY – IV**	**6**	**4**

Course Objectives

1. To apply the concept of chemical reactions in organic synthesis
2. To know retro synthetic techniques in organic synthesis
3. To enable the students to understand the importance of hetroyclic compounds
4. To learn the reactions and importance various synthetically important organic compounds
5. To learn importance and reactions of free radicals

Unit-I	**MODERN SYNTHETIC METHODS, REACTIONS AND REAGENTS**	**18 Hours**

1.1 Principles and synthetic processes involving phase transfer catalysis, (nitriles from alkyl halides, alcohol from alkyl halides) polymer supported reagents (synthesis of oligo-saccharides), micro wave assisted reaction, esterification, deacetylation and hydrolysis.

1.2 Synthesis of simple organic molecules using standard reactions like acetylation alkylation of enamines and active methylene compounds, Grignard reactions, Phosphorus and sulphur ylides Robinson annulation, Diels Alder reactions.

1.3 Uses of the following reagents: DCC, Trimethylsilyl iodide, 1,3-Dithiane (umpolung), diisobutylaluminimumhydride (DIBAL), 9BBN, Trimethylsilylchloride, Lithium aluminium hydride (LAH). Green Chemistry – Introduction and methodology

Unit-II	**RETROSYNTHETIC ANALYSIS**	**18 Hours**

2.1 An introduction to retrosynthesis – Synthon, Synthetic equivalent, Target molecule, Functional group interconversion – Disconnection approach – One group disconnection – Disconnection of alcohols, olefins and ketones – Logical and illogical disconnections, Two group disconnection – 1,2 – 1,3 – 1,4 – 1,5 – and 1,6 – deoxygenated skeletons and dicarbonyls.

2.2 Protection and deprotection of hydroxyl, carbonyls in aldehydes and ketones, amines, carboxylic acids, alkenes and alkynes

2.3 Retro Diels Alder reaction – pericyclic reactions – Retrosynthesis of some heterocycles containing nitrogen atoms. (not exceeding two nitrogen atoms as examples).

Unit-III	**SYNTHESIS OF ORGANIC COMPOUNDS**	**18 Hours**

3.1 Synthesis, sources and uses of longifolene, cubane, 5-hexenoic acid, trans-9-methyl-1-decalone, bicyclo[4:1:0] – hept-2-one and α-onocerin.

Unit-IV	**HETERO CYCLIC COMPOUNDS**	**18 Hours**

4.1 Nomenclature – reactivity, aromaticity, and spectral properties - Synthesis and reactions: Five membered heterocyclic compound with more than one heteroatom - imidazole, oxazole, thiazole.

4.2 Synthesis and reactions: Six membered heterocyclic compound with one heteroatom flavones, isoflavones, anthocyanins.

4.3 Synthesis and reactions: Six membered heterocyclic compound with more than one heteroatom - pyrimidines (cytocine, thymine and uracil only) and purines (adenine, guanine only).

Unit-V	**FREE RADICALS**	**18 Hours**

5.1 Long and short-lived free radicals, methods of generation of free radicals. Addition of free radicals to olefinic double bonds.

5.2 Reactivity – reactivity on aliphatic and aromatic subrate reactivity in the attacking radical, effect of solvents

5.3 Aromatic radical substitutions - decomposition of diazocompounds, phenol - coupling - Sandmeyer reaction Gomberg reaction, Pschorr reation, Ulmann reaction, mechanism of Hunsdiecker reaction.

Books for Study

1. Organic Chemistry V Edition, 1986, VolII by I.L. Finar, ELBS Publication
2. Principles of Biochemistry General aspects by L. Smith, Robert L. Hill I. Robert Lehman, Robert J. Let Rowitz, Philip Handlar and Abrahim white. McGraw Hill Int. (7th Edition)
3. Introduction to Chemistry of heterocyclic compounds by R.M. Acheson, Interscience Publishers.
4. Principles of Modern heterocyclic chemistry by L.A. Pacquette, Benjamin Cummings Publishing Co., London 1978.
5. Principles of Organic synthesis by R.O.C. Norman, Champan and Hall, NY, 1980.
6. Advanced Organic Chemistry by Jerry March, IV edition Wiley Eastern Ltd., New Delhi.
7. Organic Chemistry, 6th Edition, 1992. RT.Morrison, R.S. Boy, Prentice Hall of India Pvt. Ltd., New Delhi.
8. Micheal B. Smith, Organic Syntheis, McGraw Hill, International Editor, 1994.
9. Stuart Warren, Work book for organic synthesis, The Disconnection Approach John Wiley & Sons (Asia) Pvt. Ltd.,
10. Organic Chemistry – Reactions and Mechanisms by Balaji rao- Vishal Publications.

Books for Reference:

1. Guide book to Organic synthesis by Ramond K. Mackie and David M. Smith, ELBS Publication.
2. Outlines of Biochemistry V Edition by Eric E. Conn, Paul. R. Stumpf, George Bruening and Roy H. Dole, John Wiley and Sons.
3. Biochemistry by LubertStryer, WH. Freeman and Co., New York
4. Organic synthesis by R.E. Ireland, Prentice Hall of India, Geol Publishing House.
5. Organic synthesis by Michael Smith
6. W. Carruther, Jain Coldham, Modern Methods of organic synthesis, 4th Edition.
7. Instrumental methods of Chemical Analysis by H. Kaur- Pragati Pragasam Publications, Meerut.

E-Resources:

Unit-I
https://drive.google.com/file/d/1qdRKxMCwjzxrTVpxUgIlTuL0Pvbxjdt9/view?usp=sharing
Unit-II
https://drive.google.com/file/d/1PWgnJO6QhOrlnOMZFGz2iWVkrY7BEhtR/view?usp=sharing
Unit-III
https://drive.google.com/file/d/1PWgnJO6QhOrlnOMZFGz2iWVkrY7BEhtR/view?usp=sharing
Unit-IV
https://drive.google.com/file/d/1V5ZARDai9IuNg_fEN-4zvdFtwF_AHNLu/view?usp=drivesdk
Unit-V

https://drive.google.com/file/d/1aXuDdVCvl_PjzHNE3l7hoqmJhKWtPHCc/view?usp=drivesdk

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Synthesize the simple organic molecules by green chemical standard reactions.	**K4, K5**
CO2	Execute the disconnection approach and retro synthesis of organic compounds.	**K3,K5**
CO3	Utilize the synthesis of Longi folene, cubane and alpha onocerin.	**K4**
CO4	Synthesize of five and six membered heterocyclic compounds with one or more hetero atom.	**K4**
CO5	Carry out the methods of free radical generator and used for various preparations.	**K1, K2, K3**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	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	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCH4003	**Discipline Specific Core Course**	**PHYSICAL CHEMISTRY - IV**	**5**	**4**

Course Objectives

1. To understand the mechanism of electrode reaction and corrosion of metals
2. To study the objectives of statistical thermodynamics, partition functions and heat capacity of gases
3. To differentiate Fermi Dirac, Bose Einstein, Maxwell boltzman statistics
4. To learn the mechanism of various photo physical processes and study the kinetics of uni-molecular and bimolecular photo physical process
5. To apply the photo chemistry principles in energy storage and conversion processes.

Unit-I	**ELECTROCHEMISTRY - III**	**18 Hours**

1.1 Mechanism of electrode reactions – polarization and overpotential – the Butler-Volmer equation for one step and multistep electron transfer reactions –- current density and symmetry factor – transfer coefficient and its significance – mechanism of the hydrogen and oxygen evolution reactions.

1.2 Corrosion and passivation of metals – Construction of Pourbaix diagram for Iron and Zinc – Evan's diagram - prevention of corrosion – electrodeposition- principle and applications - Fuel cells.

Unit-II	**STATISTICAL THEMODYNAMICS - I**	**18 Hours**

2.1 Objectives of statistical thermodynamics – macrostate and microstate – concept of thermodynamics and mathematical probabilities – distribution of distinguishable and non-distinguishable particles.

2.2 Maxwell–Boltzmann distribution law – Partition function – evaluation of translational, vibrational and rotational partition functions for mono, diatomic and polyatomic ideal gases – thermodynamic functions in terms of partition functions-application of partition function to heat capacity of ideal gases –Heat capacity of solids(Einstein's and Debye's) ortho and para hydrogen.

Unit-III	**STATISTICAL THEMODYNAMICS - II**	**18 Hours**

3.1 Fermi - Dirac and Bose - Einstein statistics - comparison with Maxwell–Boltzmann distribution law and their applications – Planks radiation laws.

3.2 Irreversible Thermodynamics – Forces and fluxes – linear force, flux relation – phenomenological equations.

Unit-IV	**PHOTOCHEMISTRY – I**	**18 Hours**

4.1 Introduction - absorption and emission of radiation – decay of electronically excited states – Jablonski diagram - radiative and non-radiative processes – Theory of radiationless transition – internal conversion and intersystem crossing - fluorescence and phosphorescence – factors influencing fluorescence and phosphorescence.

4.2 Kinetics of unimolecular and bimolecular photophysical processes - Stern – Volmer equation - excimers and exciplexes.

Unit-V	**PHOTOCHEMISTRY - II**	**18 Hours**

5.1 Quantum yield measurement –Physical and Chemical actinometry – Life time measurements- Non steady state method - Pulse methods.

5.2 Aspects of solar energy conversion and storage – Photodecomposition reaction- photo rearrangement reaction- Photosynthesis - photogalvanic cells, photoelectrochemical cells - photo assisted electrolysis of water.

Books for Study

1. S.Glasstone,Introduction To Electrochemistry,Affliated East West Press ,New Delhi,1960.
2. R.Crow, Principles and Applications to Electrochemistry,Chapman And Hall,1991.
3. P.H.Rieger ,Electrochemistry,Chapman And Hall,New York,1994.
4. M.C.Gupta,Statisticaltheromdynamics,WileyEaster,New Delhi,1990.
5. R.Hasee,Thermodynamics Of Irreversible Process,Addition Wesley,Reading,Mass,1969.
6. N.J.Turro,Modern Molecular Photochemistry,Benjamin,Cumming,Menlo Park,California,1978.
7. K.K.RohatgiMukherjee,Fundamentals Of Photochemistry,Wiley Eastern Ltd.,1978.
8. S.Glasston,Text Book Of Physical Chemistry.

Books for Reference:

1. J.O.M.Bokris And Ak.NReddy,Electrochemistry,Vols 1and 2 Plenum,New York,1977.
2. P.Dalahay,Electrode Kinetics And Structure Of Double Layer,InterScience,New York,1965.
3. J.Robbins,Ions In Solution-An Introduction In Electrochemistry,Clarendon Press,Oxford,1972.
4. C.M.A.Brett And As.MsO.Brett,ElectrochemistryPrinciples,Methods And Applications,Oup,Oxford,1993.
5. Dole,Themodyanamics,PrenticeHall,New York,1954.
6. B.J.McClenlland,StatisticalThermodyanamics,Chapman And Hall,London,1973.
7. I.Prigogine,Introduction To Themodyanamics Of Irreversible Process,Interscience,New York,1961.
8. N.O.Smith,Elementary Statistical Thermodyanamics,A Problem Approach,PlenumPress,New York,1961.
9. Cleyde,PhysicalChemistry,SchaumSeries,McGraw Hill,1976.
10. Seans,StatisticalThermodyanamics,Salinyar And Tangodie.
11. J.G.Clavert and J.N.Pitts,Photochemistry,Wiley,London,1966.
12. R.P.Wayne,Photochemistry,Butterworths,London,1970.
13. R.Cundell and A.Gilbert,Photochemist Thomas Nelson,10

E-Resources:

Unit-I
https://drive.google.com/file/d/1XcMBG6l2qG3PVshAmNrO1wkqXA8RENP_/view?usp=sharelink
Unit-II
https://drive.google.com/file/d/1JrIv4YebFTJxQCLFJmfe1k0rNqxzjQFd/view?ts=6388a970
Unit-III
https://drive.google.com/file/d/1yChqLBjLJmMKC675xtKnJmmg9vsUHjJW/view?ts=638d9a84
Unit-IV

https://drive.google.com/file/d/1g8aETx8_O0_dV7C6ZVZ1DAiXOBEgrr5/view?usp=share_link Unit-V https://drive.google.com/file/d/1g8aETx8_O0_dV7C6ZVZ1DAiXOBEgrr5/view?usp=share_link

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the Electrode reactions in detail and apply the knowledge in corrosion prevention	**K1, K2, K3**
CO2	Acquire the basic knowledge in statistical thermodynamics and evaluate various partition functions	**K1, K2, K5**
CO3	Analyse and compare various BE, MB and FD statistics	**K4, K5, K6**
CO4	Understand the radiative and non-radiative transitions in photo chemistry	**K1, K2**
CO5	Apply the knowledge of photochemistry in solar energy conversion and photo electrochemical cells	**K1,K2,K3**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	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	1-24	25-50	51-56	57-80
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCHPR41	**Skill Enhancement Course**	**PREPARATION OF ORGANIC COMPOUNDS AND SPECTRAL INTERPRETATION - PRACTICAL**	**5**	**4**

Course Objectives

1. To learn the preparative techniques of Organic compounds
2. To acquire the knowledge and practical skill of recrystallization technique
3. To learn the technique of two stage preparations of organic compounds
4. To analyse the spectral data of different organic compounds

Unit-I	**ORGANIC PREPARATIONS**	**18 Hours**

1. sym-Tribromo benzene from aniline.
2. Benzanilide from benzophenone (Beckmann Rearrangement)
3. m-Nitro benzoic acid from methyl benzoate
4. m-Nitroaniline from Nitrobenzene
5. β-Naphthol from Naphthalene
6. Benzilic acid from benzoin
7. Anthraquinone from phthalic anhydride
8. p-Nitroaniline from Acetanilide
9. Acetylesalicylic acid from methylsalicylate
10. Eosin from phthalic anhydride

Unit-II	**SPECTRAL INTERPRETATION OF ORGANIC COMPOUNDS UV, IR, PMR AND MASS SPECTRA OF COMPOUNDS**	**18 Hours**

1. Acetone
2. Benzyl bromide
3. Phenylacetone
4. N, N-Dimethylamino ethanol
5. Pinacolone
6. Cinnamaldehyde
7. Isopropyl alcohol
8. Pyridine
9. 1,3,5- Trimethyl benzene
10. n-Propylamine
11. p-Methoxy benzyl alchol
12. 2-Methoxyethyl acetate
13. 3-bromo-1,1-dichloropropene
14. Acetaldehyde diacetate
15. 4-Picoline
16. Diethyl malonate
17. Propionic anhydride
18. m-hydroxy anisole

SCHEME

Spectra	:	20 marks
Preparation	:	45 marks
Recrystallization	:	15 marks

Viva Voce	:	10 marks
Record	:	10 marks
Total	:	100 marks

Books for Study

1. A text book of Practical Organic Chemistry by Arthur I.Vogel
2. Laboratory Manual of Organic Chemistry Raj K. Bansal, Wiley Eastern limited.
3. Laboratory manual of Organic Chemistry by Mann and Saunders.

Books for Reference:

1. A text book of Practical Organic Chemistry by Arthur I.Vogel
2. Laboratory Manual of Organic Chemistry Raj K. Bansal, Wiley Eastern limited.
3. Laboratory manual of Organic Chemistry by Mann and Saunders.

E-Resources:

https://www.uspto.gov
https://ncert.nic.in
https://www.masterorganicchemistry.com

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Prepare organic compounds in small quantities.	**K1,K2,k3**
CO2	Carry out molecular rearrangements in the methods of preparation of organic compounds.	**K1,K2,k3**
CO3	Recrystallize organic compounds and determine their melting point.	**K2,K3,K4**
CO4	Interpret the spectrum and identify the organic compounds	**K5,K6**
CO5	Elucidate the structure of synthetic as well as natural products.	**K5,K6**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓	✓	✓		✓	✓	✓	✓
CO2	✓	✓	✓		✓	✓	✓	
CO3	✓	✓	✓					
CO4			✓	✓	✓	✓	✓	✓
CO5		✓	✓	✓	✓	✓	✓	✓
Number of matches = 29 , 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 IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBCHNMP4	Other elective Course	POTENTIOMETRY AND SPECTRAL INTERPRETATION-PRACTICAL	3	2

Course Objectives

To study the basic principle and experimental procedure of potentiometric titration

1. Neutralization
2. Mixture of acids
3. Precipitation
4. Redox titration.
5. UV, NMR, ESR Spectral interpretation of simple molecules

Unit-I	LIST OF EXPERIMENTS	18 Hours

1. Determination of strength of an unknown strong acid by using a standard base.
2. Determination of strength of an unknown weak acid by using a standard base.
3. Determination of strength of the individual concentrations of the two acids in the mixture (Strong and weak) by using a standard strong base.
4. Determination of strength of FAS by using a standard potassium dichromate (redox titration).
5. Determination of strength of KI by using a standard potassium permanganate.
6. Determination of strength of ferrous sulphate by using a standard potassium dichromate (redox titration).
7. Determination of strength of sodium chloride by using a standard silver nitrate solution.
8. Determination of strength of KI by using a standard silver nitrate solution.
9. Determination of strength of individual concentrations of mixture of halides (KCI+KI) using standard silver nitrate solution.

10. Determination of P^H of different buffer solutions by emf method.
11. Determination of strength of weak acid by using a standard base and from the titration curve, the emf at ¼, 1/3, 1/2, 2/3 and ¾ neutralization and hence the dissociation constant of a given weak acid is calculated.

Unit-II	**SPECTROSCOPY**	

Interpretation of simple UV – Visible, NMR and ESR spectra of simple molecules for the calculation of molecular data and identification of functional groups.

Total Marks: 100 (External 75 + Internal 25)

External marks distribution

Spectra	20 Marks
Practical	50 Marks
Procedure	10 Marks
Record	10 Marks
Viva-voce	10 Marks
Total	100 Marks

Books for Study

1. R. Drago - Physical methods in inorganic Chemistry, Reeindhod, NY, 1968

Books for Reference:

1. R. Drago - Physical methods in inorganic Chemistry, Reeindhod, NY, 1968.

E-Resources:

1. https://infinitylearn.com
2. https://www.rsc.org

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Determine the strength of acids and bases by Potentiometric methods	**K1, K2, K3, K4, K5**
CO2	Determine the concentrations of electrolytes by Potentiometry	**K4, K5**
CO3	Analyse and determine the P^H of the various electrolytic solutions	**K4, K5**
CO4	Interpret the spectrum and evaluate the spectral data	**K4, K5, K6**
CO5	Find placements in the R&D laboratories	**K4, K5**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓
CO4			✓	✓	✓	✓	✓	✓
CO5			✓	✓	✓	✓	✓	✓
Number of matches = 36 , 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

SEMESTER IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBCHPJ41	Discipline Specific Elective Course	PROJECT WORK, RESEARCH METHODOLOGY AND SPECTRAL INTERPRETATION	5	4

Course Objectives

1. To carry out a project work to gain knowledge of industries or quality control laboratories
2. To impart the knowledge of fundamentals of Research Methodology.
3. To learn data analysis and literature survey.
4. To impart the knowledge about illustration of spectra of inorganic compounds

PROJECT WORK

Project work has to be carried out by each student in consultation with the guide from the department and the report of the project work has to be submitted for the viva voce with the approval of the guide teacher.

RESEARCH METHODOLOGY

Research Problem: Selecting the problem – Necessity of defining the problem – Techniques involved in defining the problem – Research design – Needs and features of good design – Different research design – Basic principles of experimental designs. Data collection methods – Data types – Processing and presentation of data – Techniques of ordering data – Meaning of primary and secondary data – The uses of computers in research – The library and Internet – Uses of search engines – virtual libraries – common software for documentation and presentation.

LIST OF SPECTRA TO BE GIVEN FOR INTERPRETATION

P^{31} NMR Spectra of methylphosphate.
P^{31} NMR Spectra of HPF_2.
F^{19} NMR Spectra of CIF_3.
H^1 NMR Spectra of Tris (ethythioacctoacetanato) cobalt (III).
ESR Spectra of the aqueous ON $(SO_3)^{2-}$ ion.
ESR Spectra of the H atoms in CaF_2.
ESR Spectra of the $[Mn (H_2O)_6]^{2+}$.
ESR Spectra of the bis (salicyladiminato) copper (II).
IR Spectra of the sulphato ligand.
IR Spectra of the dimethylglyoxime ligand and its Nickel (II) complex.
IR Spectra of carbonyls.
Mossbauer spectra of $FeSO_4$ $7H_2O$.
Mossbauer spectra of $FeCl_3$.
Mossbauer spectra of $[Fe(CN)_6]^{3-}$
Mossbauer spectra of $[Fe (CN)_6]^{4-}$

SCHEME

PROJECT WORK & VIVA VOCE	70 Marks
RESEARCH METHODOLOGY & SPEC. INTERPRETATION	30 Marks
Total	100 Marks

Books for Study

1. Introduction to Molecular Structure and Spectroscopy by W A Gullory
2. Fundamentals of Molecular Spectroscopy by Banwell

Books for Reference:

1. Basic Principles of Spectroscopy by R Chang
2. Molecular Structure and Spectroscopy by Arulhas

E-Resources:

https://drive.google.com/file/d/1ZtjdIGAYqTJjEaRFo6IKxti0I-Zcltxc/view?usp=sharing

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

on problems

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Interpret the Spectral data of Different inorganic compounds	**K1, K2, K3**
CO2	Analyse and elucidate the structure of inorganic compounds.	**K3, K4, K5**
CO3	Collect the relevant details from the literature to carry out a project work in chemistry	**K1, K2, K3**
CO4	Carryout a project works in any kind of industry/Research organization.	**K3, K4, K5, K6**
CO5	Take up any kind of assignment in his future endeavors in the field of higher education	**K1, K2, K3, K4, K5**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓	✓	✓			✓	✓	
CO2	✓	✓	✓		✓	✓	✓	
CO3	✓		✓	✓	✓	✓	✓	✓
CO4			✓	✓		✓	✓	✓
CO5			✓	✓		✓	✓	✓
Number of matches =33 , 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

SEMESTER IV				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBCHPJ42	Discipline Specific Elective Course	INDUSTRIAL TRAINING, RESEARCH METHODOLOGY AND SPECTRAL INTERPRETATION	5	4

Course Objectives

1. To train the students in any kind of industry connected with chemistry so that a student can carry out any kind of work in QC & RD
2. To learn the methodology of research to carryout research work in academic institutions
3. To gain the knowledge on spectroscopic examination and analysis of inorganic compounds

INDUSTRIAL TRAINING

Industrial training has to be carried out by each student in a industry connected with chemistry in consultation with a trainer from the industry and the guide from the department. The report of the Industrial training has to be submitted for the viva voce with the approval of the guide teacher and the trainer from the industry.

RESEARCH METHODOLOGY

Research Problem: Selecting the problem – Necessity of defining the problem – Techniques involved in defining the problem – Research design – Needs and features of good design – Different research design – Basic principles of experimental designs. Data collection methods – Data types – Processing and presentation of data – Techniques of ordering data – Meaning of primary and secondary data – The uses of computers in research – The library and Internet – Uses of search engines – virtual libraries – common software for documentation and

presentation.

SPECTRAL INTERPRETATION

P^{31} NMR Spectra of methylphosphate.
P^{31} NMR Spectra of HPF_2.
F^{19} NMR Spectra of CIF_3.
H^1 NMR Spectra of Tris (ethythioacctoacetanato) cobalt (III).
ESR Spectra of the aqueous ON $(SO_3)^{2-}$ ion.
ESR Spectra of the H atoms in CaF_2.
ESR Spectra of the $[Mn (H_2O)_6]^{2+}$.
ESR Spectra of the bis (salicyladiminato) copper (II).
IR Spectra of the sulphato ligand.
IR Spectra of the dimethylglyoxime ligand and its Nickel (II) complex.
IR Spectra of carbonyls.
Mossbauer spectra of $FeSO_4$ $7H_2O$.
Mossbauer spectra of $FeCl_3$.
Mossbauer spectra of $[Fe(CN)_6]^{3-}$
Mossbauer spectra of $[Fe (CN)_6]^{4-}$

SCHEME

PROJECT WORK & VIVA VOCE	70 Marks
RESEARCH METHODOLOGY & SPEC. INTERPRETATION	30 Marks
Total	100 Marks

Books for Study

1. Statistics and Research & Education by Rajammal P.Devadas
2. Industrial Hygiene and Chemical Safety-M.K.Fulekar

Books for Reference:

1. Research Methodology by Kothari C.R
2. Industrial Safety,Health and Environment Management Systems-R.K.Jain &Sunil

E-Resources:

https://drive.google.com/file/d/1ZtjdIGAYqTJjEaRFo6IKxti0I-Zcltxc/view?usp=sharing

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

on problems

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Interpret the Spectral data of Different inorganic compounds	**K1, K2, K3**
CO2	Analyse and elucidate the structure of inorganic compounds.	**K3, K4, K5**
CO3	Collect the relevant details from the industry to carry out any kind of work connected with the industry.	**K1, K2, K3**
CO4	Carryout a research work in any kind of industry.	**K3, K4, K5, K6**
CO5	Take up any kind of assignment in his future endeavors in	**K1, K2, K3,**

	the field of industrial production, quality control and research and development of various industry.	**K4, K5**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	**Program Specific Outcomes (PSOs)**							
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO8**
CO1	✓		✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓		✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓
CO5		✓		✓	✓	✓	✓	✓
Number of matches =36 , 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**

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBCHSEP8	**Discipline Specific Elective Course**	**PREPARATION OF DOMESTIC PRODUCTS -PRACTICAL**	**5**	**4**

Course Objectives

Preparation of Domestic products.

1. To develop self-employment skills
2. To become entrepreneur.

Unit-I	**EXPERIMENT**	**18 Hours**

1. Preparation of Detergent washing powder.
2. Preparation of Utensils cleaning powder.
3. Preparation of Normal shampoo.
4. Preparation of Polyvinyl alcohol adhesive.
5. Preparation of Room freshner.
6. Preparation of Liquid blue.
7. Preparation of Pain relieving balm.
8. Preparation of Jasmine perfume liquid.
9. Preparation of Tooth powder.
10. Preparation of Face powder.
11. Preparation of White phenol.
12. Preparation of automobile decarboniser.
13. Preparation of Tooth paste
14. Preparation of Talcum powder.

SCHEME

EXPERIMENT	80 Marks
RECORD	10 Marks
VIVA VOCE	10 Marks
Total	100 Marks

Books for Study

1. Venkateswaran V., Veeraswamy R., Kulandivelu A.R. Basic principles of practical chemistry, 2nd Edition, New Delhi, Sultan Chand & Sons (1997).

Books for Reference:

1. Venkateswaran V., Veeraswamy R., Kulandivelu A.R. Basic principles of practical chemistry, 2nd Edition, New Delhi, Sultan Chand & Sons (1997).

E-Resources:

https://drive.google.com/file/d/1ZtjdIGAYqTJjEaRFo6IKxti0I-Zcltxc/view?usp=sharing

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

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Manufacture various domestic products.	**K1,K2,K3**
CO2	Determine the quality of domestic products	**K3,K4,K5**
CO3	Find a job in large scale manufacturing industries of consumer products.	**K3,K4,K5**
CO4	Develop new products through R&D	**K3,K4,K5**
CO5	Create innovative methods in the advertisement, sales, and marketing of consumer products.	**K3,K4,K5,K6**
KI- Remembering/Knowledge, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create		

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

Course Outcomes (Cos)	Program Specific Outcomes (PSOs)							
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓
CO4			✓	✓	✓	✓	✓	✓
CO5			✓	✓	✓	✓	✓	✓
Number of matches = 36, 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**

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
UBBI3001	**Discipline Specific Core Course**	**ANALYTICAL BIOCHEMISTRY**	**6**	**4**

Course Objectives:

1. To explain the principles, instrumentations and biological applications of various biochemical techniques.
2. To make use of knowledge of analytical biochemistry for the separation, purification and characterization of biomolecules using various analytical methods.
3. To illustrate skills and practical skills on various techniques involved in analytical biochemistry.

Unit I	**UNITS OF MEASUREMENT**	**20 Hours**

Units of measurements of solutes in solution (Normality, Molality, Molarity, Ionic strength, Milli moles). Osmosis and its biological importance, Osmotic pressure, Osmolarity and its applications. Concept of isotonic, hyper and hypotonic solution and its importance in biology. Concept of pH, pOH, biological importance of pH, pH value of bodily fluids, buffer, buffer capacity, Henderson – Hassel Balch equation and its importance. Buffers in body fluid- Bicarbonate, Phosphate, haemoglobin and protein buffer. Dialysis and its biomedical importance, colloids and their biomedical importance.

Unit II	**UNIT- II: MEASUREMENT OF pH**	**20 Hours**

Principles of electrochemical techniques- EMF, Nernst equation, Reference electrodes – Silver and Calomel electrode. Determination of pH using Hydrogen electrode, glass electrode and pH meter. Principle, instrumentation and applications of Clark oxygen electrode.

Unit III	**HOMOGENISATION & CENTRIFUGATION**	**15 Hours**

Methods of cell disruption and tissue homogenisation. Basic principles of centrifugation, sedimentation rate, Svedberg unit, sedimentation coefficient, Method and applications of differential centrifugation & density gradient centrifugation (rate zonal, isopycnic, equilibrium isodensity centrifugation).

Unit IV	**CHROMATOGRAPHY**	**20 Hours**

General principles of chromatography, classification, Principle, operation procedure and applications of paper chromatography, thin layer chromatography and column chromatography (ion exchange chromatography, molecular sieve chromatography, affinity chromatography), basic concepts and applications of gas liquid chromatography and HPLC.

Unit V	**ELECTROPHORESIS**	**15 Hours**

General principles of electrophoresis, Factor affecting electrophoretic mobility – sample, electric field, supporting medium, buffer. Tiselius moving boundary, paper, cellulose acetate electrophoresis. Native PAGE, SDS-PAGE, agarose gel electrophoresis and immunoelectrophoresis.

Books for study:

1. Biophysical Chemistry – Upadhyay and Upadhyay Nath, Himalayan 2009 revised edition.

2. Introduction to Practical Biochemistry – Shawney, Randhir, Singh, Narosa.
Books for References:
1. Practical Biochemistry- Principles and Techniques, Keith Wilson and John Walker, Cambridge Press 4th Edition. 2. Practical Biochemistry by K. Wilson and I. Walker. 7th edition, Cambridge University press (2010) 3.Introduction to Instrumental Analysis by Robert D. Braun, Pharma Book Syndicate (2006) 4. Analytical Biochemistry – R.B. Turner, Elsevier, N.Y. 5. Biomedical Instrumentation – M. Arumugam, Anuradha Agencies, Chennai. 6. Instrumental Methods of Analysis – Chatwal and Anand, Himalayan Publication.
E-Resources: 1. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/chromatography 2. https://nptel.ac.in/courses/103105060

Course Outcomes **(COs):**	Course Name: **ANALYTICAL BIOCHEMISTRY**	Code: **UBBI3001**	**Credit: 7**	**Knowledge Level**
CO1	Explain the biomedical importance of pH, buffers, osmosis and dialysis. Determine the pH using various electrochemical techniques.			K1, K2
CO2	Summarise and apply the basic principles, operational methods, and biological applications different centrifugation techniques.			K2, K3
CO3	Chooseand apply thebasic principles, methods, instrumentation and biological applications of various chromatography techniques.			K2, K3
CO4	Apply the basic principles, techniques, instrumentation and biological applications of electrophoresis.			K2, K3
CO5	Plan how each of the techniques taught in this course can be applied to solve problems in biochemistry andcorrelate various analytical techniques in biochemistry.			K3

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

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

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓		✓	✓			✓	✓
CO2	✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓	✓			✓	✓
CO4	✓	✓	✓	✓		✓	✓	✓
CO5	✓	✓	✓	✓			✓	✓
Number of matches = 30	Mapping = 75%			Correlation = Very High				

SEMESTER III				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
UBBIPR31	CORE PRACTICAL 2	VOLUMETRIC ANALYSIS & BIOLOGICAL PREPARATION	3	3

Course Objectives

1.To experiment with titrimetric analysis.

2. To demonstrate the isolation of macromolecules from natural source.

I. I SOLUTION PREPARATION

1. Normal, Molar and Molal solution
2. Saturated solution, Percentage solution and dilute solution.

II. VOLUMETRIC ANALYSIS

1. Estimation of oxalate.
2. Estimation of iron.
3. Estimation of nitrite.
4. Estimation of chloride by Mohr's method
5. Estimation of calcium by oxalate method.

III. ISOLATION /BIOCHEMICAL PREPARATIONS

1. Preparation of starch from potatoes.
2. Preparation of casein from milk.
3. Preparation of lactalbumin from milk.
4. Preparation of ovalbumin from egg.
5. Preparation of lecithin from egg yolk.
6. Isolation of haemoglobin from animal blood.
7. Isolation of RBC and haemolysis study.

Books for study:

1. Text book of Medical Biochemistry –MN.Chatterjee, Rana Shine, Jaypee Publications, 4th Edition, 2012. 2. Practical Clinical Biochemistry- Harold Varley, CBS, NewDelhi, 6th Edition, 2006. 3. Laboratory manual in Biochemistry – Jayaraman3rd Edition, 2011
Books for Reference: 1. Practical Clinical Biochemistry – Harold Varley, 5th edition, WH Medical Books, 2002. 2. Medical Laboratory Technology – Kanai L. Mukherjee, 3rd edition, Tata McGraw Hill., Vol. I, II, III. 2017.
E-Resources:

Methodology of Teaching: Laboratory Experiments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Calculate and prepare molarity, normality and percentage solutions.	K2
CO2	Analyze chemical compounds titrimetrically.	K3
CO3	Apply basic techniques used in the organic laboratory for isolation/extraction, purification and preparation of biological compounds from food.	K3
CO4	Apply the practical skills to analyze biological sample.	K3
CO5	Prepare and standardize chemical solutions.	K3

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓		✓			✓		✓
CO2	✓		✓			✓		✓
CO3	✓		✓			✓		✓
CO4	✓		✓			✓		✓
CO5	✓		✓			✓		✓
Number of matches = 20 Mapping = 50% Correlation = Moderate								

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
UBBI4001	**Discipline Specific Core Course**	**ANALYTICAL BIOCHEMISTRY & BIOINFORMATICS**	**6**	**5**

Course Objectives:

1. To illustrate the principles, instrumentation and biological applications of various biochemical techniques.
2. To explain the basic concepts in bioinformatics and demonstrate basic tools in bioinformatics.
3. To summarize the fundamentals of computers.

Unit I	**ABSORPTION SPECTRUM**	**20 Hours**

Basic properties of electromagnetic radiation, energy, wave length, wave number, frequency. Absorption and emission spectra. Beer lamberts' law. Light absorption and its transmittance. Molar extinction coefficient. Principle, instrumentation, application of Colorimeter. Principle, instrumentation, application of UV- visible spectroscopy - Protein and nucleic acid structural studies and enzyme assay.

Unit II	**EMISSION SPECTRUM**	**20 Hours**

Spectrofluorimetric techniques- principle, instrumentation and applications -vitamin assay-riboflavin, enzyme assays, fluorescent probes in the study of proteins and membranes. Atomic absorption spectroscopy- Principle, instrumentation and application. Flame photometry- principle, instrumentation and applications - analysis of trace elements- sodium and potassium.

Unit III	**RADIO ISOTOPIC TECHNIQUES**	**15 Hours**

Atomic structure, radiation, type of radioactive decay, half-life, units of radioactivity. Detection and measurement of radioactivity. Methods based on ionization (GM Counter), excitation (Scintillation counter). Autoradiography. Applications of radioisotopes in the elucidation of metabolic pathways, dilution technique, clinical scanning, radio dating, and RIA. Biological hazards of radiation and safety measures in handling radio isotopes.

Unit IV	**COMPUTER FUNDAMENTALS**	**15 Hours**

Functional components of a computer (input & output devices, CPU & storage devices), applications of computers, computer operating systems, introduction to internet/World Wide Web, useful search engines. Introduction to E-resources- e-books/e-journals.

Unit V	**FUNDAMENTALS OF BIOINFORMATICS**	**20 Hours**

Introduction to bioinformatics, applications and scope of bioinformatics, Biological databases- nucleic acid and protein sequence data bases, NCBI, GENBANK, PDB introduction to genomics and proteomics, PubMed-finding scientific articles.

Books for study:

1. Biophysical Chemistry - Upadhyay and Upadhyay Nath, Himalayan 2009 revised edition.
2. Introduction to Practical Biochemistry - Shawney, Randhir, Singh, Narosa.
3. Lesk, A.M. Introduction to Bioinformatics Oxford 2002.

Books for References:

1Practical Biochemistry- Principles and Techniques, Keith Wilson and John Walker, Cambridge Press 4th Edition.

2. Practical Biochemistry by K. Wilson and I. Walker. 7th edition, Cambridge University press (2010)

3. Instrumental Methods of Analysis- Chatwal and Himalayan Publication.

4. Physical Biochemistry- David Friefelder.

5. Internet& World Wide Web, third edition, Dietel, Dietel, Gold Berg.
6. Multimedia, System design, Prabhat k. Andleigh, Kiran Thakrar.
7.Bergeron BP 2002 Bioinformatics Computing 1st Edition, Prentice Hall
8. Bioinformatics: sequence and genome analysis, by David Mount, second edition. Cold spring harbour lab press (2004).

E-Resources:

1. www.https://www.ncbi.nlm.nih.gov/
2. www.https://www.rcsb.org/
3. www.https://www.ncbi.nlm.nih.gov/genbank/

Course Outcomes **(COs):**	Course Name: **Analytical Biochemistry and Bioinformatics**	**Code: UBBI4001**	**Credit: 7**	**Knowledge level**
CO1	Relate the basic principles, methods, instrumentation, biological applications of colorimeter, and UV-Visible spectroscopy.			K3
CO2	Discuss the instrumentation and applications ofSpectrofluorimetry.			K1,k2
CO3	Explain the principles, instrumentation and biological applications of atomic absorption spectroscopy, radio isotopic techniques and flame photometry techniques.			K1, K2
CO4	Apply the fundamentals of computers and handle computers.			K2, K3
CO5	Correlate various tools in computational biology,apply E-resources for scientific study and analyze biological databases using bioinformatics tools and resources.			K2,K3

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

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO 1	**PSO2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**
CO1	✓	✓	✓	✓			✓	✓
CO2	✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓	✓			✓	✓
CO4	✓	✓	✓	✓		✓	✓	✓
CO5	✓	✓	✓	✓		✓	✓	✓
Number of matches = 32			**Mapping = 80%**			**Correlation = Very High**		

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
UBBIPR41	**Discipline Specific Core Course**	**Colorimetric Techniques & Preparation of Buffers**	**3**	**3**

Course Objectives:

1. To explain the principles, theory and calculation of colorimetric experiment.
2. To demonstrate buffer preparations.
3. To develop skills related to biochemistry laboratory.

COLORIMETRIC ESTIMATION

1. Estimation of potassium dichromate.
2. Estimation of Amino acid by ninhydrin method.
3. Estimation of Protein by Biuret method
4. Estimation of Carbohydrate by Anthrone method.
5. Estimation of DNA by diphenyl amine method
6. Estimation of RNA by orcinol method
7. Estimation of inorganic phosphorus by Fiske and Subbarow method.

PREPARATION OF BUFFERS

1. Preparation of Phosphate Buffer and determination of pH.
2. Preparation of Tris Buffer and determination of pH.
3. Preparation of Citrate Buffer and determination of pH.
4. Preparation of Acetate Buffer and determination of pH.
5. pH meter.

Books for study:

1. Text book of Medical Biochemistry –MN.Chatterjee, Rana Shine, Jaypee Publications, 4th Edition, 2012.
2. Practical Clinical Biochemistry- Harold Varley, CBS, NewDelhi, 6th Edition, 2006.
3. Biochemical methods by S.Sadasivam, 2nd edition 2005.

Books for References:

1. Practical Clinical Biochemistry – Harold Varley, 5th edition, WH Medical Books, 2002.
2. Medical Laboratory Technology – Kanai L. Mukherjee, 3rd edition, Tata McGraw Hill., Vol. I, II, III. 2017.

Course Outcomes (COs) By the end of the course, the students will be able to:		
Course Outcomes **(COs):**	Course Name: **COLORIMETRIC TECHNIQUES & PREPARATION OF BUFFERS**	**Knowledge Level**
CO1	Operate colorimeter instrument used in biochemistry labs.	K2
CO2	Analyze the biological macromolecules proteins, nucleic acids and carbohydrates by colorimetric techniques	K3
CO3	Prepare different buffer solutions.	K3,
CO4	Apply the practical skills to analyze biological sample.	K3
CO5	Develop skills required for biochemical labs	K3

Methodology of Teaching: Laboratory Experiments

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO 1	**PSO2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**
CO1	✓		✓			✓		✓
CO2	✓		✓			✓		✓
CO3	✓		✓			✓		✓
CO4	✓		✓			✓		✓
CO5	✓		✓			✓		✓
Number of matches = 20			**Mapping = 50%**			**Correlation = Moderate**		

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBI3001	**Discipline Specific Core Course**	**ENZYMOLOGY**	**6**	**4**

Course Objectives

1. Discuss fundamental properties of enzymes, enzyme catalytic mechanisms and enzyme kinetics.
2. DiscussTechniques employed in enzymes purification and characterization are also emphasized in this course.
3. Select theory as well as applications of enzyme technology in various industries.

Unit-I	**OVERVIEW OF ENZYMOLOGY**	**15 Hours**

Brief description of general aspects of enzymes; apoenzyme – holoenzyme – cofactors and coenzymes – ribozymes – abzymes – nomenclature and classification. Isolation and purification. Enzyme localization, Units of enzyme activity, IU and Katal, specific activity, turnover number. Investigation of active site structure. Enzyme Specificity- Lock & Key and Induced Fit hypothesis.

Unit-II	***ENZYME KINETICS***	**20 Hours**

Kinetics of single substrate enzyme catalyzed reactions, Michaelis – Menten equation, Lineweaver - Burk, Eadie – Hofstee and Hanes plots. Significance of Vmax, Km, Kcat, specificity constant (Kcat/Km) Kinetics of multisubstate reaction – Classification with examples. Rate expression for non-sequential (ping-pong) and sequential (ordered and random) mechanisms. Michaelis- Mentenequation as rectangular hyperbola, asymptote, linear transformation, calculation of slope, intercept. Effect of pH, temperature and substrate concentration.

Unit-III	**ENZYME CATALYSIS AND INHIBITION**	**20 Hours**

Mechanism of Enzyme Action – Acid-base catalysis, covalent catalysis and electrostatic catalysis. Mechanism of action of chymotrypsin, lysozyme, ribonuclease, aldolase, carboxypeptidase, and alcohol dehydrogenase.
Enzyme Inhibition: Types of reversible inhibitors - competitive, non-competitive, un-competitiveand mixed inhibitors. Partial inhibition, substrate inhibition and allosteric inhibition. Irreversibleinhibition.

Unit-IV	**COENZYMES & ISOENZYMES**	**15 Hours**

Coenzymes - prosthetic group, classification - vitamin and non vitamin coenzymes, thiamine pyrophosphate - mechanism of oxidative and non-oxidative decarboxylation, transketolase reaction, FMN and FAD - flavoprotein enzymes, mechanism of oxidation and reduction of: flavin enzymes, NAD and NADP role in enzyme catalysis, PALP, and PAMP - role of PALP in transamination and decarboxylation reaction, Coenzyme A-involved reactions, biotin-carboxylation reaction, folate coenzymes, coenzyme role of vitamin Bl2 . Isoenzymes-LDH.

Unit-V	**ENZYME TECHNOLOGY**	**20 Hours**

Industrial uses of enzymes - sources of industrial enzymes, thermophilic enzymes, amylases, glucose isomerases, cellulose degrading enzymes, lipases, proteolytic enzymes in meat and leather industry, detergents and cheese production. Clinical enzymology - Enzymes as thrombolytic agents, antiinflammatory agents, digestive aids. Immobilization of enzymes

including nano encapsulation using biomaterials and their applications
Books for study: 1. Understanding Enzymes: An Introductory Text by Dr. Aditya Arya , Dr. Amit Kumar, JayantiJha, , 2018th edition. 2018 ,Drawing Pin Publishing . 2. Harper's Illustrated Biochemistry, 31st Edition. 2018,publisherMcGraw Hill / Medical 3. Understanding enzymes by Palmer, 2 edition.2008, East West publisher
Books for Reference: 1. Introduction to Enzyme and Coenzyme Chemistry by T. D. H. Bugg, 3rd Edition., 2012 2. Principles of enzyme technology, khan, m. Y., khan, farha phi learning pvt. Ltd., 2015 3. Biochemistry by U. Satyanarayana, 6th edition.2021, Publisher Elsevier. 4. Lippincott Illustrated Reviews: Biochemistry, 7th edition.2016, North American, Publisher Lippincott Williams and Wilkins. 5. Lehninger Principles of Biochemistry, 7thedition. 2017 Publisher WH Freeman 6. LubertStryer – Biochemistry, 9th Edition. 2019 Publisher WH Freeman 7. Voet's Biochemistry, Adapted ed 2021
E-Resources: 1. https://wou.edu/chemistry/courses/online-chemistry-textbooks/ch450-and-ch451-biochemistry-defining-life-at-the-molecular-level/chapter-7-enzyme-kinetics/ 2. https://youtu.be/f7jRpniCsaw 3. https://youtu.be/KCG5fDKr9HQ 4. https://youtu.be/jUUeR4o_2-0 5. https://youtu.be/2HaFHUAwVyQ 6. https://www.youtube.com/watch?v=PVvpEKeOzEM

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Summaris the basics of enzymes and nomenclature and classification of enzymes	**K2**
CO2	Explain the knowledge of enzymes classifications, mechanism of action, and kinetics	**K2**
CO3	Illustrate the principles of enzyme inhibition.	**K2**
CO4	Develop knowledge of the biological function and structure of coenzymes and isoenzymes.	**K3**
CO5	Analyze the applications of enzymes in different industries.	**K4**

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓				
CO2	✓	✓	✓	✓				
CO3	✓	✓	✓	✓				
CO4	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 27 Mapping = 67.5% Correlation = High								

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
PBBI3002	**CORE 6**	**CLINICAL BIOCHEMISTRY**	**6**	**5**

Course Objectives

1. This course is designed to impart knowledge about the different methods of collection of body fluid and importance of diagnostic markers.
2. Student will differentiate and interpret diagnostic test for liver, kidney, heart, GIT disease,inflammatory diseases, oxidative stress and cancer.

Unit-I	**SPECIMEN COLLECTION AND ANALYSIS**	**15 Hours**

Specimen collection and Processing, Collection of blood – Venipuncture, skin puncture, arterial puncture. Anticoagulants. Point of care testing (POCT), Collection and analysis of urine–timed urine specimens, preservatives, Sources of variation in test results, Concepts of accuracy, sensitivity, precision, reproducibility, reliability, and other factors in quality control. Normal values. Clinical significance of sugars, proteins, ketone bodies, bilirubin and porphyrins. CSF, Amniotic fluid, semen, collection, composition and analysis.

Unit-II	**DISORDERS OF CARBOHYDRATES AND LIPID METABOLISM**	**20 Hours**

A. Disorders of carbohydrate metabolism - blood sugar levels, hyper and hypoglycemia, regulation of blood glucose, diabetes mellitus-etiologic classification and diagnostic criteria, glucose tolerance test, HbA1c, Diabetic ketoacidosis, Ketone bodies, Insulinoma, Hypoglycaemia, Fasting hypoglycaemia, post-prandial hypoglycaemia, microalbuminuria

B. Plasma lipids, lipoproteins and apolipoproteins, diagnosis of myocardial infarction, Troponin, Creatine kinase, The diagnosis of heart failure, The diagnosis of thromboembolic disease, D-dimer, Cardiovascular risk factors, Investigation of plasma lipid abnormalities, lipid profile, The primary hyperlipoproteinaemias, Primary hypercholesterolaemia (Familial hypertriglyceridaemia, Familial combined hyperlipidaemia, Remnant hyperlipoproteinaemia), Secondary hyperlipidaemia, primary hypolipoproteinaemias, Secondary hypolipidaemia.

Unit-III	**INFLAMMATION, IMMUNITY AND PARAPROTEINAEMIA**	**20 Hours**

Plasma protein abnormalities, Changes in plasma proteins in trauma, infection and Inflammation, Albumin, Hypoalbuminaemia, C-reactive protein (CRP), Erythrocyte sedimentation rate (ESR), α1-Antitrypsin (AAT) (α1-anti-protease), immunoglobulins and disease, Hypogammaglobulinaemia, Polyclonal hypergammaglobulinaemia, Monoclonal hypergammaglobulinaemia (paraproteinaemia), Myeloma, lymphoid malignancies, Investigation of suspected myeloma, Amyloidosis.

Unit-IV	**HEPATIC, RENAL AND GASTRIC FUNCTION TESTS**	**15 Hours**

a. Liver - structure and functions of liver, bilirubin production and metabolism, liver function tests, serum bilirubin, test for Hepatocellular damage, aminotransferase, Cholestasis: alkaline phosphatase and γ-glutamyltransferase, test measuring protein synthesis by the liver, liver diseases, test for jaundiced patient, liver diseases- hepatitis, cirrhosis, alcoholic liver disease, Cholestatic liver disease, Nonalcoholic fatty liver disease (NAFLD) and nonalcoholic

steatohepatitis (NASH), Ascites.

b. Kidney and its function, Impaired renal function, Tests of glomerular function, creatinine clearance test, Plasma creatinine, Plasma urea, Cystatin C, Acute kidney injury, Chronic kidney disease, Proteinuria, Nephrotic syndrome, Renal stones.

c. Gastrointestinal tract disease, Peptic ulcer, Tests for H. pylori infection, Zollinger–Ellison syndrome, Acute and chronic pancreatitis, Serum amylase, Faecal elastase, Tests of absorptive function, Serological tests for coeliac disease, Gastrointestinal inflammation, Calprotectin, Faecal occult blood.

Unit-V	**FREE RADICALS, CANCER AND DISORDERS OF NUCLEIC ACID METABOLISM**	**20 Hours**

a. Free radicals in health and disease – oxidative stress, Endogenous and exogenous free radicals. ROS, Oxidative damage to lipids, proteins and DNA. Role of enzymatic and non-enzymatic antioxidants. Laboratory Diagnostics, malondialdehyde, myeloperoxidase, superoxide dismutase, glutathioneperoxidase, catalase.

a. Cancer, Tumour markers commonly used in clinical practice, Carcinoembryonic antigen (CEA), CA-125, Prostate-specific antigen (PSA), α-Foetoprotein (AFP), Human chorionic gonadotrophin, CA 19-9, Inhibin A and B, Thyroglobulin, Calcitonin.

b. Purine metabolism, serum uric acid, Hyperuricaemia, Gout, Hypouricaemia, LeschNyhan syndrome.

Books for Study:

1. Textbook of Medical Biochemistry, 8th edition M.N. Chatterjee and Rane Shinde, Jaypee Brothers medical publisher Pvt Ltd,2012.
2. Clinical Biochemistry, lecture notes by Peter Rae 10th ed John Wiley & Sons Ltd 2018.
3. Textbook of Biochemistry with clinical correlation, Thomas M. Devlin, 7rd edition, A. John Wiley-Liss Inc. Publication,2010.
4. Practical Clinical Biochemistry, Harold Varley, 4thedition, CBS Publication and Distributors Pvt Ltd, New Delhi,2005.

Books for Reference:

1. Clinical Biochemistry: Metabolic and Clinical Aspects: With Expert Consult access Churchill Livingstone 3rd ed 2014
2. Medical Laboratory technology – Kanai L. Mukherjee, Tata McGraw Hill Publication and Co. Ltd., Vol. I,II,III. 3rd Edition,2017
3. Clinical Chemistry in Diagnosis and Treatment 6th Edition - Joan F. Zilva , Peter R. Pannall, Philip D.Mayne. 1994
4. Medical Laboratory Science, Theory and Practice J. Ochei and A. Kolhatkar, Tata Mc Graw - Hill. 2000

E-Resources:

- https://www.mayoclinic.org/tests-procedures
- https://www.cdc.gov/diabetes/basics/diabetes.html
- https://www.healthline.com/health/hypoalbuminemia
- https://www.healthline.com/health/liver-function-tests#types
- https://medlineplus.gov/lab-tests/bun-blood-urea-nitrogen

Methodology of Teaching: Chalk and Talk, ICT Presentation, Assignments, Seminars

Course Outcomes (COs) By the end of the course, the students will be able to:		**Knowledge level**
CO1	Differentiate the different methods of collection, analysis and interpretation of various bodyfluids	K4
CO2	Assess the disorders of Carbohydrates andlipids metabolism.	K5
CO3	Summarize the disorders of Proteinmetabolism	K2
CO4	Discuss the different Organs functiontests and major diseases related to the liver, GIT and kidney.	K6
CO5	Identify the role of free radicals and cancer markers in health anddiseases.	K3

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

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO 1	**PSO2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**
CO1	✓		✓					✓
CO2	✓	✓	✓					✓
CO3	✓	✓	✓					✓
CO4	✓	✓	✓					✓
CO5	✓		✓					✓
Number of matches = 18 Mapping = 40% Correlation = Moderate								

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBIPR31	**Discipline Specific Core Practical**	**Practical – V CLINICAL ENZYMOLOGY& ANALYSIS OF URINE**	**5**	**4**

Course Objectives

1. Assay of diagnostically important enzymes with clinical interpretation.
2. Demonstrate the principles related to analysis of Urine and relating the abnormal constituent's with diseased conditions.
3. Estimate the quantitative and qualitative of urine constituents.

A. <u>Serum Analysis</u>

1. Assay of Acid Phosphatase Activity
2. Assay of Alkaline Phosphatase Activity
3. Assay of Alanine Aminotransferase Activity (SGOT)
4. Assay of Aspartate Aminotransferase Activity (SGPT)
5. Assay of Lactate dehydrogenase
6. Assay of Amylase

B. <u>Urine Analysis</u>

7. Collection, Preservation and Transportation of Urine
8. Physical analysis of Urine
9. Microscopic analysis of Urine
10. Estimation of Urea in Urine
11. Estimation of Creatinine in Urine
12. Estimation of Uric Acid in Urine
13. Qualitative chemical analysis of urine for normal and abnormal constituents
14. Analysis of urine using urine analyzer.

Books for study:

1. Medical Laboratory technology – kanai L. Mukherjee, Tata McGraw Hill Publication and Co. ltd., vol. I, II, III. 3rd Edition, 2017
2. Laboratory manual in Biochemistry – Jayaraman 3rd Edition, 2011
3. Biochemical methods – S.Sadasivan and Manickam 2018
4. Practical clinical Biochemistry – Harold Varley, CBS, New Delhi. 2006

Books for Reference:

1. Practical Clinical Biochemistry- Harold Varley, CBS, NewDelhi.
2. Medical Laboratory Science, Theory and Practice J. Ochei& A. Kolhatkar, Tata McGraw - Hill.
3. Clinical Laboratory-methods and diagnosis, Vol-I Grad Wohl.
4. Judith Ann Lewis, Illustrated guide to diagnostic tests-students version, Springhouse Corporation, Pennsylvenia, 1994.
5. Practical Clinical Biochemistry, Harold Varley, 4th edition, CBS Publication and Distributors Pvt Ltd, New Delhi, 2005.
6. Tietz Fundamentals of Clinical Chemistry- 5th edition C.A. Burtis, E.R. Ashwood (eds) Saunders WB Co.
7. Experimental Biochemistry: A Student Companion, BeeduSasidharRao& Vijay Deshpande (ed), I.K International Pvt. LTD, New Delhi.
8. Introductory Practical Biochemistry, S. K. Sawhney&Randhir Singh (eds) Narosa Publishing House, New Delhi.

E-Resources:

1. https://www.pdfdrive.com/practical-clinical-biochemistry-d187182591.html
2. https://ttk.elte.hu/dstore/document/871/book.pdf
3. https://www.pdfdrive.com/practical-textbook-of-biochemistry-for-medical-students-e187182647.html

Methodology of Teaching: Laboratory Experiments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Demonstrate skills to collect and process blood sample and the separation of serum.	**K2**
CO2	Estimate of diagnostically important enzymes with clinical interpretations.	**K2**
CO3	Carry out the physical and chemical examination of urine.	**K3**
CO4	Perform the microscopic examination of urine and quantitative analysis of urine.	**K6**
CO5	Demonstrate the urine analyzer.	**K2**

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

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓	✓	✓	✓				✓
CO2	✓	✓	✓	✓				✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓
CO4					✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 25 Mapping = 62.5% Correlation = High								

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
PBBIPR32	**CORE PRACTICAL 6**	**Practical – VI ENZYME ASSAYS**	**6**	**4**

Course Objectives

1. To make the students to experiment with the enzyme extraction, kinetics
2. Determinationof enzyme activities and learning the techniques concerned with clinically important enzyme detection inblood.

1. Estimation of serum alkaline phosphatase using a standard curve.
2. Variation of serum alkaline phosphatase activity with enzyme concentration
3. Determination of Optimum pH of Alkalinephosphatase
4. Effect of Substrate Concentration on Alkaline PhosphataseActivity
5. Assay of Acid Phosphatase activity fromPotato (p-nitrophenol phosphatase) and calculate specific activity.

6. β- Amylase assay from sweet potato.
7. Demonstration of catalase activity in bovine liver tissue.
8. Estimation of Aspartate transaminase in serum
9. Assay of Urease from jack bean powder
10. Estimation of alanine transaminase in serum
11. Estimation of lactate dehydrogenase in serum

Books for Study:

1. Laboratory manual in Biochemistry – Jayaraman 3rd Edition,2011.
2. Biochemical methods – S. Sadasivan and Manickam2018.
3. Practical Clinical Biochemistry: Methods and Interpretations, By Ranjna Chawla 4th ed JP publications 2014.

Books for Reference:

1. Medical Laboratory technology – KanaiL. Mukherjee, Tata McGraw Hill Publication and Co. ltd., vol. I, II, III. 3rd Edition,2017
2. Practical clinical biochemistry – Harold Varley, CBS, New Delhi. 2006

E-Resources:

https://medlineplus.gov/lab-tests/alkaline-phosphatase/
https://biochemden.com/assay-acid-phosphatase-enzyme-activity/

Methodology of Teaching: Laboratory Experiments

Course Outcomes (COs) By the end of the course, the students will be able to:		**Knowledge level**
CO1	Demonstrate the kinetics of enzyme-catalyzed reactions and enzyme inhibitory and regulatory processes.	K2
CO2	Calculate the enzyme units, specific activity, Vmax, and km of an enzyme	K3
CO3	Demonstrate the effect of pH and temperature on enzyme-catalyzedreaction.	K2
CO4	Prepare the basic steps involved in extraction, purification and assay of enzymeactivities.	K6
CO5	Examine the results of clinically important enzymes in biologicalsamples	K4

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

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓	✓	✓	✓	✓			✓
CO2			✓	✓	✓			✓
CO3			✓	✓	✓			✓
CO4	✓	✓	✓	✓	✓			✓
CO5	✓	✓	✓	✓	✓			✓
Number of matches = 26 Mapping = 65% Correlation = High								

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBIVB31	**VALUE BASED COURSE**	**Research Methodology & Ethics**	**3**	**3**
Course Objectives **At the end of this course the learner is expected:**				
1. To understand the philosophy of science and ethics, research integrity and publication ethics. 2. To identify research misconduct and predatory publications 3. To understand indexing and citation databases, open access publications, research metrics (citations, h-index, impact Factor,etc.). To understand the usage of plagiarism tools.				
Unit-I	**Introduction to Research**			**9 Hours**
Meaning of Research and Scope of Research Methodology - Significance of research in Social and business Science Identification of the problem area - Selection of the problem - Formulation of research question(s) - Pilot study - Meaning and Components of research design.				
Unit- II	***Research Ethics***			**9 Hours**
Ethics with respect to science and research - Intellectual honesty and research integrity - Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) - Redundant Publications: duplicate and overlapping publications, salami slicing - Selective reporting and misrepresentation of data.				
Unit-III	**Data Collection & Types**			**9 Hours**
Data Collection - Sources : Primary and Secondary - Data matrix - Unit of data collection and unit of data analysis - Methods and tools of data collection : Interview and questionnaires and their types - observation and its types - Audio visual aids in data collection - Scaling and Testing Techniques - Reliability and validity of instruments - Uses of information technology in data collection.				
Unit-IV	**Publication ethics**			**9 Hours**

Types of publications. Publication ethics: definition, introduction and importance - Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. - Conflicts of interest - Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types - Violation of publication ethics, authorship and contributor ship - Identification of publication misconduct, complaints and appeals - Predatory publisher and journals.		
Unit-V	**Research Writing**	**9 Hours**
Report writing - Meaning, Techniques and precautions of interpretation - significance of report writing - Target audience - Different steps in writing report - Layout of research report - Types: Technical report, popular report - Mechanics of writing a research report. Tools for reference organization- zotero, mendeley, endnote. Online statistical tools.		

Books for study:

1. The Student's Guide to Research Ethics By Paul Oliver Open University Press, 2003
2. Responsible Conduct of Research By Adil E. Shamoo; David B. Resnik Oxford University Press, 2003
3. Ethics in Science Education, Research and Governance Edited by Kambadur Muralidhar, Amit Ghosh Ashok Kumar Singhvi. Indian National Science Academy, 2019. ISBN : 978-81-939482-1-7.
4. Amarchand D, Research Methods in Commerce - Emerald Publishers, Chennai
5. C.R.Kothari, Research Methodology: Methods and Techniques, New Age Intenational Publishers,New Delhi. 4th edition, 2019
6. N. Gurumani, Research Methodology: For Biological Sciences, MJP Publishers, 2019.

Books for Reference:

9. Anderson B.H., Dursaton, and Poole M.: Thesis and assignment writing, Wiley Eastern 1997.
10. Bijorn Gustavii: How to write and illustrate scientific papers? Cambridge University Press.
11. Bordens K.S. and Abbott, B.b.: Research Design and Methods, Mc Graw Hill, 2008.
12. Graziano, A., M., and Raulin, M.,L.: Research Methods – A Process of Inquiry, Sixth Edition, Pearson, 2007.

E-Resources:

3. Nicholas H. Steneck. Introduction to the Responsible Conduct of Research. Office of Research Integrity. 2007. Available at: https://ori.hhs.gov/sites/default/files/rcrintro.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understrand the concept and significance of research	K2
CO2	Recognize the ethical issues in research and publications	K1
CO3	Collect, correlate and collaborate different types of data	K3, K4, K6
CO4	Classify, develop and apprise various modes of research writings	K2, K5, K6
CO5	Identify, solve and develop protocols for existing and future research problems.	K1, K3, K6

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO7	PSO8
CO1				✓	✓	✓	✓	✓
CO2				✓	✓	✓	✓	✓
CO3				✓	✓	✓	✓	✓
CO4				✓	✓	✓	✓	✓
CO5				✓	✓	✓	✓	✓
Number of matches = 25 Mapping = 62.5% Correlation = High								

SEMESTER III				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
PBBIDE31	Discipline Specific Elective Course	ECOLOGY, EVOLUTION AND BIODIVERSITY	5	3

Course Objectives

1. To study about the fundamental processes that cause or prevent adaptive evolution, speciation and extinction.
2. Classify the concepts of species, populations, communities, ecosystems and biomes
3. To study about the ecosystem and roles in an ecosystem
4. To study about environmental issues, ecological basis, ecological evolutionary & biodiversity consequences.

Unit-I	ECOLOGY & ECOSYSTEM	15 Hours

Ecology – Environment - atmosphere, hydrosphere, lithosphere, concept of ecosystem, biotic and abiotic components and function habitat, energy flow, food chain, food web, ecological pyramids. Biogeochemical cycle Carbon, Nitrogen, Phosphorus.
Structure and function of terrestrial - forest, grassland and aquatic ecosystem.
Ecological succession: Types; mechanisms; changes involved in succession.

Unit-II	EVOLUTION & TIME SCALE	15 Hours

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.

Unit-III	EVOLUTION OF PROKARYOTES AND EUKARYOTES	15 Hours

Concept of Oparin and Haldane. Evolution of prokaryotes – origin of prokaryotes, unicellular bacterial evolution, origin of Eukaryotes, endosymbiosis, Margulisendosymbiont theory of evolution, evolution of mitosis, evolution of meiosis, evolution of sex and fertilization.

Unit-IV	POPULATION GENETICS	15 Hours

Population genetics – Population characteristics, population density, Natality, Mortality, dispersion, Gene pool, Gene frequency, migration and random genetic drift. Species interactions – Mutualism, Commensalism, Amensalism, Predator /Parasite host interaction, competition.

Unit-V	BIODIVERSITY	15 Hours

Biodiversity – definition, levels and threats.Endemic and endangered species of India.Methods of taxonomy - Concepts of species and hierarchical taxa, biological nomenclature, classical & quantitative methods of taxonomy of plants, animals and microorganisms. Outline classification of plants, animals & microorganisms- Important criteria used for classification in each taxon.
Books for study: 1. The Ecology Book: Big Ideas Simply Explained, Tony Juniper 2019. 2. An introduction of Biodiversity Prithipalsingh, Ane's Student edition, 2007. 3. Essential environmental studies by S.P. Mishra S.N. PanueyAne books Pvt Ltd 2011. 4. Fundamentals of Ecology by Eugene Odum, Gary Barrett, 5th Edition, Brooks/Cole.2004 5. Cell biology, genetics, ecology, evolution – P.S. Verma& V.K. Agarwal – S. Chand Publication. Edition: 2021, 2021
Books for Reference: 1. Wildlife Biodiversity Conservation: Multidisciplinary and Forensic Approaches, Susan C. Underkoffler, 2021 2. Biodiversity of Microbial Life – Staley Reysenbach. 3. Evolution, adaption and Ethology, Sanjibchattopadhyay, Books and Allied Pvt Ltd. 4. Text book of Environmental Studies A. Joseph Thatheyus, Norasa publications, 2011.
E-Resources: **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/lnexamI/taxonomyClassification.pdf** **5. https://uomustansiriyah.edu.iq/media/lectures/6/6_2021_04_03!09_45_19_PM.pdf**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Able to explain the ecosystem and their roles	**K1**
CO2	Determine the evolutionary time scale theories	**K5**
CO3	Discuss the significance of evolution in prokaryotes and eukaryotes organisms.	**K6**
CO4	Demonstrate ecosystems and environmental issues and biodiversity consequences.	**K2**
CO5	Organize the taxonomical classification.	**K3**

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓				
CO2					✓	✓	✓	
CO3					✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓				
Number of matches = 22 Mapping = 55% Correlation = Moderate								

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBIDE32	**Discipline Specific Elective Course**	**PLANT BIOCHEMISTRY**	**5**	**3**

Course Objectives

1. To develop basic knowledge on plant cell and its physiological functions.
2. Compare Plant defense mechanism against pathogens.
3. Outline the role of different biosynthetic pathways in plant growth and development.

Unit-I	**PLANT PHYSIOLOGY**	**15 Hours**

Plant cell-Structure and Functions, Plant cell wall, Plant-Water Relations- Water Transport Processes-Diffusion, Osmosis, Transpiration-Types, Mechanism and Factors affecting transpiration, Mechanism of Water Absorption - Passive and Active.

Unit-II	**PLANT METABOLISM**	**15 Hours**

Photosynthesis–photosynthetic pigments and chloroplast. Light reaction - Photosystems, Cyclic and non-cyclic photophosphorylation, Calvin cycle, Hatch-Slack cycle.

Unit-III	**PLANT RESPIRATION**	**15 Hours**

Respiration: ATP -the biological energy currency, aerobic and anaerobic Electron transport mechanism (chemiosmotic theory), pentose phosphate pathway Cycles of Elements-N2 cycle, Biochemistry of symbiotic and non-symbiotic N2 fixation.

Unit-IV	**PLANT NUTRIENTS**	**15 Hours**

Defense mechanism in plants against pathogens – Structural and Biochemical defence. Production of biotechnological products – SCP (Algae, Yeast, Mushroom). Biofertilizers, Biopesticides. Biochemistry of seed dormancy, seed germination, fruit ripening and Senescence, Primary and Secondary metabolites in Plants - Definition and Function.

Unit-V	**PLANT HORMONES**	**15 Hours**

Plant growth regulators-Physiological effects of Auxins, Gibberellins, Cytokinins, ABA and Ethylene.

Books for study:

1. Plant Biology, Taylor & Francis, New York. Andrew Lack (2001)
2. P.J.Lea and R.C. Leegood (1999), 2nd Edition, Plant Biochemistry and Molecular Biology, Wiley and Sons, New York.

Books for Reference:

1. N.C. Gautam (2006), Plant Biotechnology, Shree Publishers.

2. Heldt HW (2005), 3rd Edition, Plant Biochemistry, Elsevier Academic Press Publication, USA.
3. H.S. Srivastava (2006), Plant Physiology, Biochemistry and Biotechnology, Rastogi
4. Publications,Merut.
5. A.J. Lack (2001).Plant Biology. Viva Books, New Delhi.
6. V. Verma, Plant Physiology, (2001) 7th revised edition. Emkay publications,
7. V.K. Jain, (2000) Fundamentals of Plant Physiology, S.Chand Publishing, New Delhi.

E-Resources:

1. **https://www.pdfdrive.com/plant-biochemistry-d165189725.html**
2. **https://www.pdfdrive.com/plant-biochemistry-4pdf-e39618886.html**
3. **http://site.iugaza.edu.ps/wp-content/uploads/Heldt%20-%20Plant%20Biochemistry%203e.pdf**
4. **https://agrigyan.in/bioch-311fundamentals-of-plant-biochemistry-sknau-notes/**
5. **https://www.helpforag.app/2018/02/plant-biochemistry.html**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Illustrate plant cell structure and biochemistry; plant water relations; plant mineral nutrition	**K3**
CO2	Demonstrate of the transport processes, light and dark reactions in photosynthesis.	**K2**
CO3	Relate the respiration of plant in aerobic and anaerobic.	**K3**
CO4	Summarize the concept of plant defense mechanism.	**K2**
CO5	Compare the basic knowledge about plant physiology and plant hormones.	**K2**

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓	✓	✓	✓	
CO2	✓	✓	✓	✓				
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓				
Number of matches = 29 Mapping = 72.5% Correlation = Very High								

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBIDE33	**Discipline Specific Elective Course**	**ANIMAL CELL CULTURE**	**5**	**3**

Course Objectives

1. To comprehend the fundamentals of maintaining and growing animal cells
2. Preparation of culture media for animal cell culture and plant tissue culture and their characterization.
3. Recognize the sterilising procedures used in the cultivation of plant and animal cells.
4. Discover about the methods used to produce transgenic animals and their uses.

Unit-I	**ANIMAL CELL CULTURE & TISSUE CULTURE**	**15 Hours**

Animal cell and tissue culture – History and scope – advantages and disadvantages, laboratory facilities, the substrate, culture media and culture procedures. Primary culture, cell lines, maintenance of cultures, cell lines. Cloning of cell lines. Cancer cell lines
Tissue culture- slide, flask and test tube culture. Embryo culture, Organ culture, Somatic cell hybridization and expression of cloned genes in cultured cells.
Stem cells – isolation, identification, expansion, differentiation and uses. Stem cell engineering.

Unit-II	**STERILIZATION AND PREPARATION OF MEDIA**	**15 Hours**

Preparation and Sterilization of cell culture media and reagents. Introduction to the balance salt solutions and simple growth medium. Chemical, physical and metabolic functions of different constituents of culture media. Role of carbon dioxide in animal cell culture.

Unit-III	**VIROLOGY**	**15 Hours**

Virus structures, animal and plant viruses, RNA , DNA Virus, HIV Virus, SARS Virus, Mers Virus, Hepatitis Virus and COVID Virus.

Unit-IV	**CHARACTERIZATION OF CULTURED CELLS**	**15 Hours**

Role of serum and supplements, Serum & protein free defined media and their applications. Measurement of viability and cytotoxicity. Biology and characterization of cultured cells, measuring parameters of growth.

Unit-V	**TRANSGENIC ANIMALS**	**15 Hours**

Methods for producing transgenic mice, Retroviral, DNA microinjection and engineered stem cell methods. Applications of transgenic mice. Transgenic cattle, sheep, goats, pigs and fish. Transgenic animals as models of human disease. Invitro fertilization.

Books for study:

1. Animal Cell Culture Techniques. Ed. Martin Clynes, Springer.
2. Animal Biotechnology, M. M. Ranga, III Revised edition, Agrobios (India), Jodhpur.
3. Animal Cell Culture- Practical Approach. John, R.W.Masters. 2000. 3rd Edi

Books for Reference:

1. Freshney. Culture of Animal Cells: A manual of basic techniques. 4th ed. Wiley – Liss 2000.
2. Culture of Animal cells, 3rd Edition, R. Ian Freshney. A John Wiley & Sons, Inc., publications.

3. Animal Cell Culture- Practical Approach, R.W. Masters, Oxford.
4. Animal Cell Biotechnology, Methods and protocols, Nigel Jenkins, Humana Press.
5. Biotechnology of Animal Tissue. P.R.Yadav& Rajiv Tyagi. 2006. Discovery Publishing House. New Delhi.

E-Resources:

1. http://lib.mzu.edu.in/wp-content/uploads/2020/11/Animal-Cell-Culture.pdf
2. https://www.corning.com/catalog/cls/documents/application-notes/CLS-AN-042.pdf
3. https://www.deshbandhucollege.ac.in/pdf/resources/1587726190_Z(H)-VI-Biotechnology.pdf
4. https://www.youtube.com/watch?v=g5B_bDN_w2g
5. https://www.youtube.com/watch?v=9BvTFowr0rI

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Demonstrate the different types of culture methods	K2
CO2	Analyze the steps involved in producing of transgenic animals.	K4
CO3	Apply practical knowledge in plant and animal cell culture.	K3
CO4	Develop the basic principles of plant and animal cell culture and its maintenance.	K5
CO5	Outline knowledge about plant and animal viruses.	K2

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓				
CO2	✓	✓	✓	✓				
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓				
Number of matches = 26 Mapping = 65% Correlation = High								

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
PBBI4001	**CORE 7**	**GENETICS AND MOLECULAR BIOLOGY**	**5**	**5**

Course Objectives

1. The major objective of the paper is to explain genetics,genome organizations in organisms and their mechanism of replication, transcription and translation.
2. To Recognize the basis of genetic code, genetic mutation and repairprocesses.

Unit-I	**ORIGIN OF GENETICS AND MOLECULAR BIOLOGY**	**15 Hours**

Mendel's Experiments – the principle of segregation - phenotype, genotype, alleles, homologues, heterologous us, the law of dominance, co-dominance, incomplete dominance, Principle of independent assortment – Gene, organization of gene on DNA, chromosome, experimental proof that DNA is the genetic material, transforming principle, bacteriophage gene made up of DNA. the central dogma

Unit-II	**REPLICATION OF DNA**	**15 Hours**

DNA replication - experimental evidence for semiconservative replication – Messelson and Stahl experiment. Enzymes and proteins of DNA replication - DNA helicases, Primer, primase, Primosome, DNA Topoisomerase, single strand DNA binding protein, DNA ligase, DNA polymerase, endonucleases, exonucleases, Reverse transcriptase, telomerase. Eukaryotic DNA replication – Initiation, elongation - leading strand synthesis, lagging strand synthesis, Okazaki fragments, termination. Inhibitors of replication.

Unit-III	**TRANSCRIPTION**	**15 Hours**

Transcription – Enzymes of transcription - RNA polymerase, promoter, enhancers, repressors, regulatory elements. Eukaryotic transcription initiation, elongation, termination, inhibitors of transcription. Post-transcriptional modification of mRNA in eukaryotes – RNA splicing.Non coding RNA and micro RNA.

Unit-IV	**GENETIC CODE AND TRANSLATION**	**15 Hours**

Genetic code –deciphering of the genetic code, codon, anticodon, Wobble hypothesis, and salientfeaturesof genetic code. Translation – formation of aminoacyl-tRNA, initiation, elongation, termination, regulation, post-translational modification in eukaryotes, Inhibitors of protein synthesis. Protein translocation – signal peptide, Endoplasmic and mitochondrial translocation of protein. Gene expression – Lac operon, tryptophan operon.

Unit-V	**MUTAGENESIS, DNA DAMAGE AND REPAIR**	**15 Hours**

Mutations – physical and chemical mutagens, types of mutations - point mutations and frameshift mutations, nonsense and missense mutation.
DNA repair – direct repair of nicks, nucleotide excision repair, mismatch repair, SOS repair and mutagenic repair. Recombination, role of recombination in genetics.

Books for Study:

1. Principles and Techniques of Biochemistry and Molecular Biology, 8th edition Keith Wilson and John Walker, Cambridge University Press-New Delhi,2018.
2. Molecular Biology by David Freifelder, Published by Jones & Bartlett Publishers2004.
3. Genes IX. by Benjamin M Lewin. New York: Oxford University Press2007.
4. Genetics a molecular approach TA brown 3nd Chapman and Hall. 1999

5. Instant Notes in Molecular Biology 2nd edition P.C. Turner, A.G. McLennan, A.D. Bates, M.R. H. White, Published by Bios Scientific Publishers Ltd 2000.
6. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology P.S. Verma and V.K.Agarwal, S. Chandpublication 2012.
7. Genetics - Manju yadavIstEdition, Discovery Publishing House2003.

Books for Reference:

1. Molecular Cell Biology 9th Edition by Harvey Lodish, Arnold Berk, Freeman publications,2021.
2. Molecular Biology by Robert F. Weaver Hardcover, FifthEdition Published 2011 by McGraw-Hill
3. Cell and molecular biology concepts and experiments (7th ed.): Karp, G. John Wiley &Sons, Inc., New York,2013.
4. Molecular Biology of the Gene, 7th Edition, James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick, Pearson publication2017.
5. Lehinger's principle of Biochemistry, Nelson and Cox 7th ed, 2017.

E-Resources:
https://www.yourgenome.org/facts/what-is-dna-replication/
https://www.genome.gov/genetics-glossary/Translation
https://serc.carleton.edu/microbelife/research_methods/genomics/translat.html
https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_Introductory_Biology_(CK-12)/04%3A_Molecular_Biology/4.07%3A_Translation_of_RNA_to_Protein

Methodology of Teaching: Chalk and Talk, ICT Presentation, Seminars

Course Outcomes (COs) By the end of the course, the students will be able to:		**Knowledge level**
CO1	Explain Mendelian'sgenetics and organization of genetic material in the cell	K5
CO2	Illustrate the role of enzymes involved in DNA replication and the mechanism ofreplication	K2
CO3	Discuss the mechanism of transcription	K6
CO4	Explain genetic code and mechanism oftranslation.	K2
CO5	Outline the causes of genetic mutation and various DNA repairmechanisms.	K2

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

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	✓	✓	✓					✓
CO2	✓	✓	✓					✓
CO3	✓	✓	✓					✓
CO4	✓	✓	✓					✓
CO5	✓	✓	✓					✓
Number of matches = 20 Mapping = 50% Correlation = Moderate								

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBI4002	**Discipline Specific Core Course**	**Molecular Endocrinology**	**6**	**4**

Course Objectives

1. To provide basic understanding of organization, physiology and regulation of endocrine glands along with the biological functions.
2.Study the molecular mechanisms of hormone and growth factors action.
3. To impart knowledge on molecular and cellular mechanisms in endocrinology.
4. To explain the consequences of under and over production of hormones.

Unit-I	**INTRODUCTION TO ENDOCRINOLOGY**	**15 Hours**

Functions of hormones and their regulation. Chemical signaling - endocrine, paracrine, autocrine, intracrine and neuroendocrine mechanisms. Chemical classification of hormones. Transport of hormones in the circulation and their half-lives. Hormone therapy; general introduction to endocrine methodology.

Unit-II	***HORMONES RECEPTORS***	**20 Hours**

Hormone receptors - general features, structure and regulation. Mechanism of hormone action. Signal transduction. - Role of Plasma membrane receptors- G protein coupled receptors, Receptor protein tyrosine kinases, Non Receptor protein tyrosine kinases, Steroid hormone receptors, inositol phosphates and calcium.

Unit-III	**HYPOTHALAMUS AND PITUITARY HORMONES**	**15 Hours**

Hypothalamic - pituitary axis; physiological and biochemical actions of hypothalamic hormones. Pituitary hormones - GH, prolactin, TSH, LH, FSH, POMC peptide family, oxytocin and vasopressin, feedback regulation cycle. Endocrine disorders- gigantism, acromegaly, dwarfs, pygmies and diabetes insipidus.

Unit-IV	**THYROID, PARATHYROID, PANCREATIC & GI HORMONES**	**20 Hours**

Hormones of Thyroid - Structure, synthesis, biochemical and physiologic actions of thyroxine, T3,T4.Pathophysiology–Hypo and hyperthyroidism. Hormones of Parathyroid - Structure, synthesis, biochemical and Physiologic actions of parathyroid hormone, pathophysiology and hyperparathyroidism. Regulation of synthesis and secretion of thyroxine and PTH. Hormones of Pancreas-Structure, synthesis, biochemical and physiological of Insulin, Glucagon. Gastrointestinal hormones- location of .peptide producing cells, synthesis, structure, functions and mechanism of action of secretin, Gastricinhibitorypolypeptide (GIP), Vasoactive Intestinal Peptide (VIP), gastrin, Cholecystokinin (CCK) and other peptides

Unit-V	**ADRENAL AND REPRODUCTIVE HORMONES**	**20 Hours**

Hormones of the Adrenal gland – chemical nature & functions of Adrenal Cortex hormones- Steroid hormones; mineralocorticoids, glucocorticoids and androgens. Adrenal medulla hormones- Epinephrine and Nor Epinephrine.

Hormones of the testis and ovaries - cortisol, aldosterone, testosterone, estrogens, progesterone and calcitriol, ovarian cycle and role of hormones. Clinical disorders of hypo and hyper secretion of hormones.

Books for study:

1. Understanding Enzymes: An Introductory Text by Dr. Aditya Arya , Dr. Amit Kumar, JayantiJha, , 2018th edition. 2018 , Drawing Pin Publishing .
2. Text book of Biochemistry (with clinical correlation) by Thomas M. Devlin, John Wiley & sons, 7th edition 2010.
3. 3.Willaim's Text book of Endocrinology by Wilson and Foster, 13th edition W.B. Saunders Co publications 2016.
4. Henry M. Kronenberg, ShlomoMelmed, Kenneth S. Polonsky, P. Reed Larsen. William Textbook of Endocrinology, 13th ed. Saunders Elsevier 2016
5. Bolander, F. F. Molecular Endocrinology, Kindle Edition. Academic Press, 2012.

Books for Reference:

1. Biochemistry by U. Satyanarayana, 6th edition.2021, Publisher Elsevier.
2. Lippincott Illustrated Reviews: Biochemistry, 7th edition.2016, North American, Publisher
3. Lippincott Williams and Wilkins.
4. Lehninger Principles of Biochemistry, 7thedition. 2017 Publisher WH Freeman
5. LubertStryer – Biochemistry, 9th Edition. 2019 Publisher WH Freeman
6. Voet's Biochemistry, Adapted ed 2021
7. Manual of Endocrinology and Metabolism,8th Edition.2018
8. clinical endocrinology. 2017
9. Principles of Endocrinology and Hormone Action, 2018

E-Resources:

1. **http://www.merckmanuals.com/professional/endocrine_and_metabolic_disorders.html**
2. **http://www.emedicine.com/endocrinology/index.shtml**
3. **http://www.cals.ncsu.edu/course/zo250/materials.htm**
4. **http://www.endotext.org/**
5. **www.ncbi.nlm.nih.gov › NCBI › Literature › Bookshelf**
6. **http://www.springer.com/medicine/internal/journal/12020**
7. **http://www.homone.org**
8. **http:// medlineplus.gov**
9. **http://www.mun.ca>/biology/desmid/brain/biol2060/biol/2060-14/cb14.html**

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Identify the organs involved in endocrine function, major hormones and their physiological effect.	**K1, K4**
CO2	Explain hormone receptors and chemical signaling pathways; Role of messenger; Receptor mediated gene regulation by hormones**.**	**K2**
CO3	Demostrate the function of pituitary and hypothalamus hormones and their disorders.	**K2**
CO4	Illustrate thyroid hormone, pancreatic, and gastrointestinal (GI) tract hormones their physiological and their biochemical actions	**K3, K4**
CO5	Illustrate the adrenal hormones and sex hormones their physiological and their biochemical actions	**K3, K4**

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**
CO1	✓	✓	✓	✓	✓	✓	✓	
CO2	✓	✓	✓	✓				
CO3	✓	✓	✓	✓				
CO4	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	
Number of matches = 29 Mapping = 72.5% Correlation = Very High								

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
PBBIPR41	**CORE PRACTICAL 7**	**Practical – VII MOLECULAR BIOLOGY/ENDOCRINOLOGY**	**6**	**4**

Course Objectives

1. Student will experiment with the molecular biologytechniques like electrophoresis, blotting and purification of DNA, RNA, proteins.
2. Demonstrate chromatographic technique and ELISA

1. Isolation of genomic DNA from blood
2. Isolation of eukaryotic mRNA
3. Estimation ofDNA.
4. Estimation ofRNA
5. Isolation and partial purification of Protease from plant leaves
6. Sodium Dodecyl Sulfate Poly Acrylamide Gel Electrophoresis (SDS -PAGE).
7. Study of proteins by native gel electrophoresis- SOD andCAT.
8. Agarose gel electrophoresis ofDNA.
9. DNALigation.
10. Restriction enzyme digestion of DNA.
11. Separation of Isoenzymes – LDH byelectrophoresis.
12. Semidry Blotting(Demonstration).
13. Polymerase chain reaction (Demonstration).
14. Estimation of TSH by ELISA
15. Gel exclusion chromatography

Books for Study:

1. Experimental procedures in Life Sciences by Dr.S.Rajan&Mrs.R.Selvi Christy. Anjaana Book House2005.
2. Medical Laboratory Science: Theory and Practice Arundhati Kolhatkar, J. Ochei Published by Tata McGraw-Hill Education Pvt. Ltd.,2000.
3. Practical Clinical Biochemistry, by Harold Varley Published by CBS Publishers& Distributors Pvt. Ltd., New Delhi 2005.

Books for Reference:

1. Molecular Cloning: A Laboratory Manual (Fourth Edition) Green and Sambrook Cold Spring Harbor Laboratory Press,2001
2. Medical Laboratory Technology, Vol. I,II,III: Procedure Manual for Routine Diagnostic Tests, Kanai L.Mukherjee &Swarajit Ghosh (Eds) Published by Tata McGraw-Hill Education Pvt. Ltd.,2010.
3. Textbook of Medical Biochemistry. 4th Edition by Shinde Rana, ChatterjeaMN, Jaypee Brothers Medical Publishers (P) Ltd,2000.
4. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th Edition By Carl A. Burtis, PhD, Edward R. Ashwood, MD and David E. Bruns, MD2012.
5. Practical Methods in Molecular Biology Robert F. Schleif, Pieter C. Wensink,2011.

E-Resources:

1. https://www.bio-rad.com/en-in/education/support/tutorials?ID=KVY70TCZF
2. https://www.bio-rad.com/en-in/product/size-exclusion-chromatography-kit?ID=7d8fb923-21a1-44ab-9077-a81c022cd6e8
3. **https://www.bio-rad.com/en-in/product/comparative-proteomics-kit-ii-western-blot-module?ID=512894ed-937e-4ee9-bc3f-b940c69a158d**

Methodology of Teaching: Chalk and Talk, Demonstration

Course Outcomes (COs) By the end of the course, the students will be able to:		**Knowledge level**
CO1	Prepare and identify the macromolecules (DNA, RNA and Protein) from plant and human cells	K6
CO2	Estimate the concentration of DNA, RNA and protein	K6
CO3	Demonstrate the separation of DNA and protein by electrophoresis	K2
CO4	Perform restriction digestion and ligation ofDNA molecules	K6
CO5	Illustrate the principles, instrumentation techniques and tools used in molecularbiology and immunology.	K2

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

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO 1	**PSO2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**
CO1	✓	✓	✓	✓	✓		✓	✓
CO2	✓		✓	✓	✓		✓	✓
CO3			✓	✓	✓		✓	✓
CO4		✓	✓	✓	✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓		✓
Number of matches = 26 Mapping = 65% Correlation =High								

SEMESTER IV				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
PBBIPJ41	PROJECT	PROJECT WITH VIVA-VOCE	4	2

COURSE WORK

1. Projects would be allotted to III Semester students which have to be carried out and completed in Semester IV.

2. A list of projects will be finalized and announced by the Department. The students will have an option to select the project in their field of interest.

4. The project will comprise of the following:

a. Study of background material
b. Collection of data, procurement, samples and Analysis
c. Experimental analysis of samples.
d. Giving a preliminary seminar in the III semester for the purpose of internal assessment.

d. Writing a dissertation or project report. This will be submitted by the students at the end of IV semester.

VIVA-VOCE

The Final evaluation of the project work completed will be done by external and internal examiners appointed by the Board on the basis of an oral presentation and the submitted Project-Report.

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBINM41	**Other Elective Course**	**CELL SIGNALING & COMMUNICATION**	**3**	**2**

Course Objectives

1. .To acquire knowledge about various aspects of signal transduction pathways.
2. In order to comprehend the function of signalling molecules in cell-cell communication.
3. To become familiar with the molecular processes that underlie carcinogenesis..
4. Read up on the interactions between the pathogen and the host.

Unit-I	**SIGNALING COMPONENTS**	**9 Hours**

Fundamental concepts and definitions of signal, ligands, and receptors, Endocrine, paracrine and autocrine signaling. Receptors and signaling pathways – cell surface receptors, ion channels, G – protein coupled receptors, receptor kinases (tyr, ser/thr). Signal transduction through cytoplasmic and nuclear receptors. The Ras – raf – MAP kinase cascade. Second messengers – cyclic nucleotides, lipids and calcium ions. Crosstalk in signaling pathways.

Unit-II	***CELL SIGNALING***	**9 Hours**

Hormones and their receptors, regulation of signaling pathways, bacterial and plant two-component systems, light signaling in plants, bacterial chemotaxis and quorum sensing. Signal cascade, inhibitors of signal cascade.

Unit-III	**HOST PATHOGEN INTERACTION**	**9 Hours**

Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.

Unit-IV	**CELLULAR COMMUNICATION**	**9 Hours**

Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation.

Unit-V	**CANCER**	**9 Hours**

Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.

Books for study:

1. Signal Transduction: Principles, Pathways, and Processes Hardcover (2014) by Lewis Cantley
2. Hormone Receptors (Advances in Experimental Medicine and Biology) Paperback (2014) by David Klachko
3. The biochemistry of cell signaling, Helmreich JM, Oxford press 2005

Books for Reference:

1. Introduction to Biological Membranes; William Stillwell, Elsevier (2013).
2. Molecular Biology of the Cell; 6th Edn. Bruce Alberts, Alexander Johnson, Julian Lewis, David

E-Resources:

1. **https://www.khanacademy.org/science/ap-biology/cell-communication-and-cell-cycle/cell-communication/a/introduction-to-cell-signaling**
2. **https://biosignaling.biomedcentral.com/about**

3. https://dosequis.colorado.edu/Courses/MCDB3145/Docs/Karp-617-660.pdf
4. http://medcell.med.yale.edu/lectures/files/cell_communication.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Describe the process of cell signaling and its role in cellular functions	**K1**
CO2	Explain the signaling components and pathways involved in cell signaling	**K2**
CO3	Distinguish with host pathogen interaction.	**K3**
CO4	Explain knowledge about carcinogenesis.	**K4**
CO5	Select knowledge in cell-cell communication and regulations.	**K3**

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓				
CO2	✓	✓	✓	✓				
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓				
Number of matches = 26 Mapping = 65% Correlation =High								

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBIDE41	**Discipline Specific Elective Course**	**APPLIED BIOTECHNOLOGY**	**5**	**4**

Course Objectives

1. To apply the genetic concepts into manipulating living things.
2. Become familiar with the various equipment and methods used in genetic engineering.
3. To develop understanding of industrial processes for production of antibiotics, enzymes etc.,

Unit-I	**TOOLS OF GENETIC ENGINEERING - I**	**15 Hours**

Recombinant DNA technology - Isolation of DNA from Genomic DNA and c DNA.Genomic DNA library, c DNA library.Restriction digestion- Exonucleases, Endonucleases. SI nuclease, DNA ligase, Alkaline phosphatase, Reverse transcriptase, DNA polymerase, T4 polynucleotide kinase, terminal transferase, use of Linkers and adaptors.

Unit-II	**TOOLS OF GENETIC ENGINEERING - II**	**15 Hours**

Cloning vectors - Plasmid PBR322, PUC19, Phage - Phage λ, M13, Cosmid, Yeast artificial chromosome vector.
Gene transfer methods – transformation, transfection, transduction, electroporation, microinjection, Biolistics, Episome fusion.
Screening methods – Direct selection, insertional selection, Blue white selection, colony hybridization method.

Unit-III	**TECHNIQUES OF GENETIC ENGINEERING**	**15 Hours**

DNA sequencing – Maxam-Gilbert's and Sanger dideoxy method. SDS PAGE, Agarose electrophoresis, Southern, Northern and Western blotting techniques, Autoradiography, RNA sequencing –site directed mutagenesis. Polymerase chain reaction.DNA chips and micro arrays.Gene cloning and Gene editing.

Unit-IV	**PLANT AND ANIMAL BIOTECHNOLOGY**	**15 Hours**

Agrobacterium mediated gene transfer, Ti-DNA plasmid vector, Production of transgenic plants and its applications - virus resistance, pest resistance, stress resistance, disease resistant plant, delayed fruit ripening. Gene transfer or transfection, Production of transgenic animals and its applications - transgenic sheep, fish, cattle, Goat.

Unit-V	**GENETIC ENGINEERING FOR HUMAN WELFARE**	**15 Hours**

Genetic engineering for human welfare – production of insulin, somatotropin, somatostatin, β-endorphin, human interferon, DNA vaccine, Hepatitis-B Vaccine, Tissue plasminogen activator (TPA).Gene therapy- types and its applications. Reproductive cloning – Dolly.

Books for study:

1. Biotechnology – U. Satyanarayanan, 2020.
2. A text book of Biotechnology – R.C. Dubey – S. Chand publications 2014
3. Concept in Biotechnology - D. Balasubraniam, Universal press India 1996.
4. Molecular biotechnology – principle and application of recombinant DNA 3rd edition by Bernard

J. Glick, Jack J. Pasternak, Cheryl L. Patten, 2003.
5. Molecular Biotechnology: Principles and Practices. Channarayappa, Universities Press, 2006.
6. Concept in biotechnology - D. Balasubraniam et al., Universal press India 1996.

Books for Reference:

1. Textbook of Biotechnology – April 25, 2019 by Dr. Prakash S. Lohar.
2. Animal Biotechnology A.K. Srivastava, R.K. Singh and M.P. Yadav Oxford and IBH 2005.
3. Introduction To Plant Tissue Culture 2nd edition By Razdan M K-English-Oxford &Ibh Publishing Co. Pvt Ltd-Paperback, 2006.
4. Animal cell culture - a practical approach. edited by R. I. Freshney, IRL Press at Oxford University Press, 1992.
5. Textbook Of Biotechnology DrPrakash S Lohar MJP Publishers, Chennai
6. Plant Tissue Culture: Theory and Practice, Volume 5 1st Edition S.S. Bhojwani M.K. Razdan, Elsevier Science, 1996.
7. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, 6th Edition Wiley Blackwell publications.

E-Resources:

1. https://www.heavenlyfuel.com/jbframework/uploads/2017/06/Molecular-Biotechnology.pdf
2. https://www2.nau.edu/fpm/bio205/Sp-10/chapter-10.pdf
3. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBT1305.pdf
4. https://pravara.in/wp-content/themes/twentyseventeen/essentials/pdf/elearn/Principles-of-Plant-Biotechnology.pdf
5. https://annamalaiuniversity.ac.in/studport/download/agri/gen/resources/GPB%20316%20PLANT%20BIOTECHNOLOGY%20(2+1)%20-%20Online%20Study%20Material.pdf

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Able to communicate various experimental techniques used in recombinant technology.	K1
CO2	Demonstrate plant tissue culture and mammalian tissue culture techniques.	K2
CO3	Illustrate the genetic engineering	K3
CO4	Compare cecombinant production of transgenic plants and animals for human welfare.	K2
CO5	Exploit genetic engineering for human welfare.	K6

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓	✓				
CO2	✓	✓	✓	✓				
CO3	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓				
CO5	✓	✓	✓	✓	✓	✓	✓	
Number of matches = 26			Mapping= 65%			Correlation =High		

SEMESTER IV				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
PBBIEP42	CORE BASED ELECTIVE 4	BIOSTATISTICS AND BIOINFORMATICS	5	4

Course Objectives

1. To properly collect and represent the data and applythe appropriate statistical tests
2. To Illustrate the concepts in bioinformatics and different types of tools used to search and analyze the DNA/protein database.

Unit-I	INTRODUCTION TO BIOSTATISTICS	15 Hours

Biostatistics –definition, scope, applications and limitations. Data- Collection, classification, and tabulation of statistical data. Organization of data - Individual series, discrete series, continuous series/Class interval. Diagrammatic and graphical representation of statistical data (bar diagram, line diagram, pictogram, histogram & horizontal and vertical bar diagram).

Unit-II	MEASURE OF CENTRAL TENDENCY, DISPERSION	15 Hours

Introduction to central tendency, Characteristics of a good average, Measure of central tendency, Mean, median, mode, range, standard deviation, variance.Percentile, dispersion: introduction, Range, interquartile range, mean deviation, Variance and Standard deviation, Coefficient of variation.

Unit-III	PROBABILITY & CORRELATION ANALYSIS	15 Hours

Probability - Introduction, application, Kinds of Probabilities. Binomial distribution, Poisson distribution, normal distribution. Sampling, types of populations, sampling variation and bias, nonprobability sampling technique, sample size, testing a hypothesis, test of significance, comparing a sample mean with population, student's t-test (paired, unpaired), Correlation Analysis - Introduction, Types of correlation - scatter diagram, correlation coefficient, Correlation and Regression: Types, Karl-Pearson's correlation, Spearman's Rank correlation, Regression equation and fitting, non-linear regression, multiple regression, chi-square test, analysis of variance, one way ANOVA

Introduction to Bioinformatics – applications and scope of bioinformatics, database concepts, database

Unit-IV	INTRODUCTION TOBIOINFORMATICS	15 Hours

management system, database security, biological databases – types.

Introduction to Sequences, alignments and Dynamic Programming, NCBI, Sequence database (EMBL, Genbank, DDBJ, UNIPROT, PIR, TrEMBL), Protein family/ Domain databases (PROSITE, PRINTS, Pfam,

BLOCK etc), Cluster Databases, Sequence alignment, similarity and difference of DNA, nomenclature, pairwise alignment, scoring function in sequence alignment, model of alignment, global alignment, end space free alignment

Unit-V	TOOLS USED IN BIOINFORMATICS	15 Hours

Database similarity search, blast search, FASTA, PAM unit and PAM metrics, multiple sequence alignment (MSA) and its applications, different methods, CLUSTALW, PILEUP, gene prediction methods, bioinformatics tools (GRAIL,FGENESH, Gene ID), gene annotation,
DNA marker Data analysis, types of DNA markers, computational analysis of molecular data, Data mining for DNA markers, and data mining for SSR markers. CRISPR (CAS). Primer designing.

Books for Study:

1. Genome analysis and bioinformatics – a practical approach, T.R. Sharma, IK International publishing house Pvt. Ltd 2013.
2. Essential bioinformatics, By JinXiong, Cambridge University Press 2006.
3. Biostatistical analysis - Jerrold H. Zar 5th edition Prentice Hall of India2010.
4. Statistical Methods, S.P.Gupta 28th edition Sultan Chand & Sons2009.
5. Introduction to Bioinformatics by T.K Atwood and D.J Parry- Smith Publisher: Pearson Education Pvt Ltd2002.
6. An Introduction to Biostatistics, 3rd Edition by Thomas Glover, KevinMitchell.
7. An Introduction for Biostatistics [5th edition] Rao P.S.S, Jesudian.G&Richard.J ,Prestographit, Vellore India Sundar 2012.
8. Biostatistics - P. Rama Krishna, Saras Publication2019.

Books for Reference:

1. IntroductionToBiostatisticsandResearchMethodsByP.S.S.SundarRao,J.Richard5th edition PHI learning Pvt Ltd 2012.
2. Bioinformatics A Practical Guide to the analysis of Genes and Proteins, Andreas D Baxevanis and BF Francis Oueliene A John Wiley& sons, INC, Pub2004.
3. Bioinformatics – Sequence and Genome Analysis David W Mount, CBS Publishers, Ian Korf, Mark Yandell& Joseph Bedell,2004.
4. Biostatistics: A Foundation for Analysis in the Health Sciences, 10th Edition Wayne W. Daniel, Chad L Cross Wiley Global Education,2013.
5. Bioinformatics: An introduction - Ramsden and Jeremy. 3rd Edition. Springer, 2015.

E-Resources:

https://international.neb.com/neb-primer-design-tools/neb-primer-design-tools
https://www.graphpad.com/scientific-software/prism/
https://pubmed.ncbi.nlm.nih.gov/
https://www.hsls.pitt.edu/obrc/
https://www.ebi.ac.uk/
https://www.expasy.org/
https://blast.ncbi.nlm.nih.gov/Blast.cgi
https://www.wwpdb.org/
https://www.simplilearn.com/what-is-statistical-analysis-article
https://datatab.net/tutorial/cross-table

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

Course Outcomes (COs) By the end of the course, the students will be able to:		**Knowledge level**
CO1	Identify different methods of data collection and graphically represent the data	K3
CO2	Calculate the Mean, Median,Mode, standard deviation, variance, percentile	K3
CO3	Compare the means with the student's t-test, chi-square test, and ANOVA.	K5
CO4	Describe the basic theory and application ofBioinformatics	K1
CO5	Apply the bioinformatics tool for analysis of Protein and Nucleic acidsequence.	K3

Course Outcomes (COs)	**Programme Specific Outcomes (PSOs)**							
	PSO 1	**PSO2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**
CO1				✓		✓	✓	✓
CO2				✓		✓	✓	✓
CO3				✓		✓	✓	✓
CO4				✓		✓	✓	✓
CO5				✓		✓	✓	✓
Number of matches = 20 Mapping= 50% Correlation =Moderate								

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBIDE43	**Discipline-Specific Elective Course**	**PHARMACOLOGY AND TOXICOLOGY**	**5**	**4**

Course Objectives

1. Have a fundamental understanding of pharmacology and the way that drugs work..
2. Awareness of fundamental scientific concepts associated with medication metabolism.
3. Process of action of drug and development of drug resistance.
4. Demonstrate screening of drug for pharmacological activity.
5. Educated about the danger of drugs.

Unit-I	**GENERAL PHARMACOLOGY**	**15 Hours**

Introduction to pharmacology, sources of drugs, Classification of drugs based on sources, dosage forms, route of administration, site of action of drugs. Mechanism of action, concept of receptors, combined effect of drugs, factors modifying drug action. Dose response curve- ED50 and LD50.

Unit-II	***PHARMACOKINETICS***	**15 Hours**

Absorption and distribution of drugs, importance of drug – protein interaction. Drug metabolism: chemical pathway of drug metabolism, phase I and phase II reactions, role of cytochrome P450, non- microsomal reactions of drug metabolism, drug metabolizing enzymes. Drug elimination of liver and kidney.

Unit-III	**THERAPEUTICS**	**15 Hours**

Biochemical mode of action of antibiotics- penicillin and chloramphenicol, actions ofalkaloids, antiviral and antimalarial substances. Biochemical mechanism of drug resistance -sulphonamides. Drug potency and drug efficacy. General principles ofchemotherapy: chemotherapy of parasitic infections, fungal infections, viral diseases.Introduction to immune modulators and chemotherapy of cancer.

Unit-IV	**SCREENING FOR PHARMACOLOGICAL ACTIVITY**	**15 Hours**

Analgesic, anti-inflammatory and antipyretic agents, gastrointestinal drugs, antiulcer and laxatives, antioxidants, anticancer and anti-fertility agents. Drugs for metabolic disorders like antidiabetic, anti-hyperlipidemic, anti-obesity and hepato protective agents..

Unit-V	**CLINICAL TOXICOLOGY**	**15 Hours**

Definition, classification of toxicity – occupational, environmental and pharmaceutical.Types of toxins and their mechanism of action. Factors affecting toxicity- Drug tolerance, intolerance, addiction, allergy, hypersensitivity, antagonism and synergism. Methods of detection. Drug abuses and their biological effects. Rational prescription of drugs. Toxicity of anticancer drugs. Clinical symptoms of toxicity and marker parameters.

Books for study:

1. Klaassen, Curtis D., ed. Casarett and Doull's toxicology: the basic science of poisons. McGraw-Hill, 2013.
2. Principles of pharmacology: the pathophysiologic basis of drug therapy Golan, David E., Armen H. Tashjian, and Ehrin J. Armstrong, eds Lippincott Williams &Wilkins, 1st edition.2011

Books for Reference:

1. The pharmacological basis of therapeutics Goodman & Gilman Pentagon press1st edition 2012
2. Basic and Clinical Pharmacology Bertram Katzung, Anthony Trevor McGraw HillProfessional 1st edition 2014

E-Resources:

1. https://www.youtube.com/watch?v=funYuQhPlmc
2. https://www.pharmanotes.org/2021/09/general-pharmacology.html
3. https://www.atsdr.cdc.gov/training/toxmanual/modules/1/lecturenotes.html
4. https://ocw.mit.edu/courses/hst-151-principles-of-pharmacology-spring-2005/pages/lecture-notes/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Discuss detailed study of drugs, particularly their actions on living system	K6
CO2	Compare the pharmacokinetics and pharmacodynamics of drugs	K5
CO3	Identify the chemotherapeutic value of drug	K4
CO4	Illustrate toxicity risk assessment and fate of toxicants in humans	K3
CO5	Demonstrate the basic principles of toxicology.	K2
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 = 26 Mapping= 65% Correlation =High								

DEPARTMENT OF BIOTECHNOLOGY

Programme Specific Outcomes for B.Sc Biotechnology:

Upon completion of the B.Sc Biotechnology programme, the students will be able to:

PSO 1: 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.

PSO 2: Apply biotechnology skills with global competencies in core and allied fields.

PSO 3: Integrate technologies through inter-disciplinary concepts and suggest better solution to solve issues of underprivileged.

PSO 4: Utilize ICT for learning and experimenting in pursuance of modern technology and concepts.

PSO 5: Develop a variety of communication skills such as reading, listening, speaking, etc. helps to express ideas clearly and effectively.

PSO 6: Conceive the concepts and research approaches to pursue higher studies/attain higher career in industry, medical and other relevant fields of biotechnology both locally and nationally and develop their scientific tempo.

PSO 7: Become entrepreneurs and technologists with strong ethics and technical skills.

PSO8: Find out the biosolutions for the cross cutting issues in a global, economic, environmental, and societal context.

MAPPING OF PROGRAMME SPECIFIC OUTCOMES (B.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 = 51, 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 III / IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBT3001	**Discipline Specific Core Course**	**IMMUNOLOGY**	**6**	**4**

Course Objectives

1.To obtain knowledge on immunity, lymphoid organs and immune cells.
2. To inculcate the knowledge on antigen, immunoglobulins and complement systems.
3. To make aware of antigen – antibody reaction, hypersensitivity and transplantation technique.

Unit I	**INTRODUCTION TO IMMUNOLOGY**	**18 Hours**

Introduction – History – Scope of Immunology – Immunity – types (Innate and Acquired) – Lymphoid organs: Primary and secondary – Immune cells and its functions: T cell, B cell, NK cells, T_H cells, Neutrophils, Eosinophils, Basophils and Macrophages. Humoral and Cell mediated immunity.

Unit II	**ANTIGENS AND ANTIBODIES**	**18 Hours**

Antigen – types and properties. Hapten, adjuvants, Immunoglobulins: properties, classes, and their function – Antibody diversity - Theory of antibody production.

Unit III	**COMPLEMENT SYSTEM**	**18 Hours**

Complement system – mode of activation - Classical, Alternate and Lectin pathways, biological functions. Vaccines – definition and types.

Unit IV	**IMMUNOLOGICAL REACTIONS**	**18 Hours**

Antigen – Antibody reactions – types and its mechanism. Monoclonal antibodies (MCAs) – Production of Hybridoma, Application of Monoclonal antibodies. Cytokines and lymphokines and its function.

Unit V	**HYPERSENSITIVITY & TRANSPLANTATION IMMUNOLOGY**	**18 Hours**

Hypersensitivity – types and mechanisms, Autoimmune diseases (Myasthenia gravis, Rheumatoid Arthiritis), Transplantation immunology – Types of graft, Graft acceptance and Graft rejection. Concepts of plastic surgery.

Books for study:

1. Dulsy Fatima and Arumugam. 5th Edition. Saras Publication. (2014).
2. Janis Kuby, Immunology, II edition. W. H. Freeman and Company, New York. (1993).
3. Ivan M. Roitt, J. Brostoff and D. K. Male, Immunology, Gower Medical Publishing, London. (1993).

Books for Reference:

1. Delves P, Martin S, Burton D, Roitt IM. Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford. (2006).
2. Goldsby RA, Kindt TJ, Osborne BA. Kuby's Immunology. 6th edition W.H. Freeman and Company, New York. (2007).
3. Helen chapel, Mansel Haeney, Siraj Misbah, Neil Snowden, Essentials of clinical Immunology (6thed).Wiley- Blackwell publications. (2014).
4. Leslie Hudson and Frank C. Hay. Practical Immunology. Blackwell Scientific Publication. 3rd

ed., (1989).
5. Clark WR, The experimental foundations of modern immunology. John Wiley and Sons Inc. New York. (1991).

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Grasp the fundamental concepts of immunity, lymphoid organs and immune cells.	**K1**
CO2	Gain insight into the types of antigen and immunoglobulins.	**K1**
CO3	Have clear concept complement systems.	**K2**
CO4	Identify and understand antigen – antibody reactions and production of hybridomas.	**K2**
CO5	Obtain a significant knowledge on transplantation and hypersensitivity.	**K2**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	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 = 30					**Correlations: 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

Prepared by: Dr. M.L. Mohammed Kaleem Arshan **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBTPR31	**Discipline Specific Core Course**	**PRACTICAL - IMMUNOLOGY**	**3**	**3**

Course Objectives

1. To perform immunological experiments
2. To get familiarize in blood grouping and enumeration of blood cells.
3. To gain knowledge on the use of Immuno diffusion assay.

Experiments

1. ABO Blood grouping
2. Enumeration of Red Blood Cells
3. Enumeration of White Blood Cells
4. Differential WBC count.
5. WIDAL Test
6. Radial Immuno Diffusion
7. Double Immuno Diffusion
8. Measurement of pulse and blood pressure.
9. Measurement of clotting and bleeding time.
10. Isolation of Immunoglobulin

Books for study:

1. Karthik Kaliaperumal und Senbagam Duraisamy Senthilkumar Balakrishnan. Practical Immunology A Laboratory Manual. LAP LAMBERT Academic Publishing; 1st edition. 2017.
2. Dulsy Fatima and Arumugam. 5th Edition. Saras Publication. 2014.
3. C P Talwar, S. K. Gupta. Hand Book Of Practical And Clinical Immunology. CBS Publishers & Distributors. 2017.

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Identify blood group and types.	**K3**
CO2	Enumerate the RBC an WBC	**K4**
CO3	Diagnose typhoid by performing WIDAL test	**K4**
CO4	Perform antigen – antibody reaction	**K4**
CO5	Identify the pulse rate and blood pressure of human.	**K4**

KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create

Course Outcomes (COs)	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 = 26					Correlations: 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

Prepared by: Dr. M.L. Mohammed Kaleem Arshan **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBTAL31	**Other Elective Course**	**ALLIED - PLANT TISSUE CULTURE**	**5**	**4**

Course Objectives

1. To understand fundamental principle and knowledge on PTC
2. To study of various culture techniques used in PTC
3. To learn principle and applications of Instruments of PTC

Unit-I	**BASIC PRINCIPLES AND TERMINOLOGY**	**Hours**

Definition – History and Scope – Totipotency – Plant cell – Tissue – Callus – Plant organ – Explant - Embryo– Tissue culture – micropropagation (Ex vitro and In vivo), Dedifferentiation, Redifferentiation - Steps of Tissue Culture - Advantages of Tissue Culture - Plant Tissue Culture: Current Status and Opportunities.

Unit-II	**LABORATORY ORGANIZATION AND INSTRUMENTATION**	**Hours**

Design and layout for wash area -room for media preparation, sterilization and storage - transfer area for aseptic manipulations - culture rooms - observation/data collection areas - Labwares - Working principle and Management: Laminar air flow, Autoclave, Distillation unit, pH meter, orbital shaker, Deep freezer and growth chamber.

Unit-III	**PTC MEDIA**	**Hours**

Tissue culture medium – compositions and purpose of Murashige and Skoog (MS) medium, Linsmaier and Skoog (LS) medium, Gamborg (B5) medium, Nitsch and Nitsch (NN) medium, White's Medium.

Unit-IV	**TYPES OF TISSUE CULTURE AND ITS TECHNIQUES**	**Hours**

Organized culture:Technique of Axillary bud culture, Seed culture, Shoot culture, Embryo culture and pollen culture. Unorganized culture*:* Callus culture, cell suspension culture, organogenesis, somatic embryogenesis, protoplast culture - Good laboratory practices - Good safety practices.

Unit-V	**FACTORS AFFECTING TISSUE CULTURE**	**Hours**

Tissue culture techniques – Mass production, Breeding of new varieties (virus free plants) – Environmental factors : light, temperature, pH, O_2 and CO_2. Growth medium (Artificial) – Nutrients, Plant Hormone, Vitamins. Applications of Micropropagation: Commercial aspects of Plant Tissue Culture – Green House, Germplasm Conservation, Nutritional improvement.

Books for study:

1. Verma, P.S. and V.K.Agarwal – Cytology – S.Chand& Co. New Delhi. 2012.
2. Reinert, J. Plant cell tissue and organs culture, Sathish Book Centre Press, Agra. 2015.
3. Dodas, J.H. and Roberts, L.W. – Experiments in Plant tissue culture – Cambridge University Press. 2010.
4. Johri, B.M. 1982 – Experimental Embryology of Vascular plants – Narosa Publishing House, New Delhi.

Books for Reference:

1. George E.F. Plant propagation by tissue culture: vol 1. The background. Springer, 2007.
2. Slater A and others, Plant Biotechnology: The genetic manipulation of plants. 1st edition., Oxford University press, NY, 2004.

3. BRC. Murthy & VST. Sai, Botany-Plant tissue culture and its biotechnological applications. Venkateswarea publications, Guntur, 2017.
4. Peter J. Lea and Richard C. Leegood, John, Plant Biochemistry and Molecular Biology Second Edition, Wiley & Sons Ltd, Chichester, United Kingdom, 2011.
5. Dodas, J.H. and Roberts, L.W. – Experiments in Plant tissue culture – Cambridge University Press. 2010.

E-Resources:

1. **https://www.plantcelltechnology.com/pct-blog/different-types-of-tissue-culture-processes/**
2. **https://www.youtube.com/watch?v=TORRxwbz7aY**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Demonstrate the knowledge base to plant tissue culture	**K1, K2**
CO2	Knowledge about laboratory organization for plant tissue culture	**K1, K2, K3**
CO3	Know technique of preparation of plant tissue culture media.	**K2, K4, K5**
CO4	Various domain in their plant tissue culture.	**K1,K2,K3,K6**
CO5	Learn techniques of acclimatization and applications of micropropagation.	**K2,K3,K4,K6**
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 = 32						**Correlation = Very 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

Prepared by: Dr. N.P.M. Mohamed Tariq **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBTAP31	**Other Elective Course**	**ALLIED PRACTICAL - PLANT TISSUE CULTURE**	**3**	**3**

Course Objectives

1. To prepare media for PTC.
2. To establish and maintain various cultures

Experiments

1. Preparation of M.S. stock solution –Macro salt, Micro salt, Vitamin, growth regulator
2. Surface sterilization of explants
3. Aseptic culture techniques for establishment and maintenance of cultures
4. Isolation of Explants, Establishment and Maintenance of Callus
5. Anthers Culture
6. Seed germination
7. Shoot culture
8. Somatic embryogenesis in carrot
9. Isolation of Protoplast

Books for Reference:

1. Ponmurugan. P, K.Suresh Kumar.2013. Application of Plant Tissue, New Age International (P) Ltd., Publisher.
2. George EF, Hall MA &De Klerk GJ. Plant Propagation by Tissue culture. 2008. Agritech Publ.
3. Herman EB. Media and techniques for growth, Regeneration and storage. 2005-08. Agritech Publ.

E-Resources:

https://youtu.be/eGLaLCBz2o0(Callus induction and tissue preparation – Carrot)
https://youtu.be/C9gfNY6F3SQ (Somatic embryogenesis)

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**P**repare PTC media.	**K1, K2, K3**
CO2	Sterile both living and nonliving things.	**K2, K3,K4**
CO3	Observe and Understand the aseptic culture techniques and maintenance instruments.	**K2,K4,K5,K6**
CO4	Culture and establish explants and callus.	**K4,K5,K6**
CO5	Isolate and culture seeds, embryo and protoplast.	**K3,K6**

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 = 35					Correlation = VERY 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

Prepared by: Dr. N.P.M. Mohamed Tariq **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBT4001	**Discipline Specific Core Course**	**BIOCHEMISTRY AND BIOPHYSICS**	**6**	**5**

Course Objectives

1. To get familiar with the classes and structure of biomolecules.
2. To build the knowledge on enzymes and its kinetics.
3. To learn the importance of thermodynamics in biological oxidation system.

Unit I	**CARBOHYDRATES**	**18 Hours**

Introduction –General characteristics of carbohydrates – classification: monosaccharide, oligosaccharides and polysaccharides; occurrence, structure and biological functions of monosaccharide (glucose) - disaccharides (sucrose) and Polysaccharides (starch) - Structural polysaccharides (cellulose), Heteropolyasaccharides (hyaluronic acid).

Unit II	**PROTEINS AND AMINO ACIDS**	**18 Hours**

General characteristics and biological functions of Proteins – structure of protein: primary, secondary, tertiary and quaternary structure. Amino acids – general structure, classification based on structure and chemical nature, nutritional requirement, metabolic fate.

Unit III	**LIPIDS & ENZYMES**	**18 Hours**

Lipids - Classification, structure and biological function – essential and non-essential fatty acids. Enzymes - classification, factors affecting enzyme activity, mechanism of enzyme action - Lock and key, Induced fit model. Michaelis-Menten Equation.

Unit IV	**THERMODYNAMICS IN BIOLOGICAL SYSTEM**	**18 Hours**

Thermodynamics – First, Second and Third law of thermodynamics as related to biology – three systems in thermodynamics in biology – Concept of free energy – Endothermic and Exothermic reaction – Entrophy – Enthalpy. Biological oxidation – Citric acid cycle, Electron transport chain, Oxidative phosphorylation.

Unit V	**FLUID DYNAMICS OF BLOOD FLOW**	**18 Hours**

Three types of blood flow – principles of Hemodynamics - mechanism of fluid movement in the cardiovascular system - the equation for blood flow - Poiseuille's law of fluid dynamics – blood flow in arteries and veins.

Books for Study:

1. Ambikashunmugam, "Fundamentals of Biochemistry" 8thEdn Wolters Kluwer India Pvt Ltd.
2. U. Sathayanarayana, Biochemistry. 3rd Edition by Books and Allied (P) Ltd., India. (2006).
3. Vasantha Pattabhi, N. Gautham. Biophysics. Alpha Science Intl Ltd, USA (2010).

Books for Reference:

1. Reginald H. Garrett, Charles M. Grisham. Biochemistry. Brooks Cole 5th Edition (2012).
2. Robert A. Horton, Principles of Biochemistry.5th Edition, Pearson Education (2011).
3. Jeremy M. Berg, John L. Tymoczko, LubertStryer. Biochemistry.7th Edition, Palgrave MacMillan (2011).
4. Donald Voet, Judith G. Voet. Biochemistry. 4th Edition, Wiley India Pvt Ltd (2011).
5. Andrey Rubin. Fundamentals of Biophysics (2014). Wiley Publications.

Methodology of Teaching:
Chalk and Talk, ICT Presentation.

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Gain knowledge on occurrence and classification of carbohydrates.	**K1**
CO2	Understand about the structure of protein and amino acid.	**K2**
CO3	Understand the role of lipids in biological systems, enzymes catalyses reactions & enzyme kinetics	**K2**
CO4	Identify and understand laws of thermodynamics	**K2**
CO5	Recall the fluid dynamics of blood flow.	**K1**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	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					**Correlations: 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**

Prepared by: Dr. M.L. Mohammed Kaleem Arshan **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBTPR41	**Discipline Specific Core Practical**	**PRACTICAL – BIOCHEMISTRY AND BIOPHYSICS**	**3**	**3**

Course Objectives

1. To obtain knowledge on wide range of practical's related to biochemistry and biophysics.
2. To learn about the qualitative analysis of carbohydrates, protein and lipids.
3. To get familiar on separation of amino acids.

Experiments

1. Measurement of pH of various biological samples using pH paper, pH meter and pH pen.
2. Preparation of phosphates buffers at different pH.
3. Qualitative analysis of carbohydrates.
4. Estimation of proteins.
5. Qualitative analysis of lipids.
6. Separation of amino acid by Thin Layer Chromatography (TLC).
7. Isolation of Casein Protein from Milk.
8. Food Calorimetry: Measuring the Energy in Food.

Books for study:

1. Dulsy Fatima and Arumugam. 5th Edition. Saras Publication. 2014.
2. GeethaDamodaran K. Practical Biochemistry. Jaypee Brothers Medical Publishers, 2013.
3. R. Singh, S. K. Sawhney. Introductory Practical Biochemistry. Narosa Publication. 2009.

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Identify the pH of given sample.	**K5**
CO2	Obtain skills on buffer preparation	**K5**
CO3	Acquire data about the qualitative analysis of carbohydrates, proteins and lipids.	**K5**
CO4	Acquire skills on isolation of protein from milk.	**K5**
CO5	Have the familiarity on colorimetric techniques.	**K5**
KI- 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

Course Outcomes (COs)	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 = 26					Correlations: 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

Prepared by: Dr. M.L. Mohammed Kaleem Arshan **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBTAL41	**Other Elective Course**	**ALLIED – PLANT BIOTECHNOLOGY**	**5**	**3**

Course Objectives

1. To know about the basics of plant breeding methods
2. To Study of various plant molecular markers.
3. To Learn about Instruments and its principles

Unit-I	**OUTLINES OF PLANT BREEDING**	**15 Hours**

Introduction and Objectives of plant breeding.Methods of crop improvement – procedure, advantages and limitations, selection and Hybridization. Role of mutations in crop improvement –Physical methods and Chemical methods.

Unit-II	**MOLECULAR MARKERS IN PLANTS**	**15 Hours**

DNA Markers –principle and their application of Randomly Amplified Polymorphic DNA (RAPD), Amplified Fragment Length polymorphism (AFLP), Microsatellites marker/ Simple Sequence Repeat maker (SSR) and Single nucleotide polymorphisms (SNPs).

Unit-III	**TRANSGENIC PLANTS**	**15 Hours**

Transgenesis – transgenic plants - Resistance to biotic and abiotic stress - herbicide resistant, insect resistant, virus resistant, drought resistant, heat resistant- salt tolerant - plants as bioreactors. Ethics in the production of transgenic plants.

Unit-IV	**APPLICATIONS OF PLANT BIOTECHNOLOGY**	**15 Hours**

Molecular biology of plant-pathogen interactions and application of gene transfer techniques in pest resistance –Bt. genes, edible vaccines and Delayed fruit ripening. IPR: Plant Variety protection.

Unit-V	**ORGANIC FOOD**	**15 Hours**

Organic foods – non organic foods - Production of organic food, types of organic food, identification of organic food, organic food and preservatives. Advantages and disadvantages of Organic foods - Labelling of GM foods.

Books for study:

1. Satyanarayana, U. (2017). Biotechnology, (2nd edition). Kolkata. Books & Allied (P) Ltd.
2. Arumugam (2015). Biotechnology. Saras publication.
3. Kumaresan V (2015). Applied Plant Biotechnology. Saras Publication, India.
4. Sree Krishna V (2007) Bioethics and Biosafety in Biotechnology, (1st ed.).New Age International Private Limited.

Books for Reference:

1. Bernard R. Glick and Jack J. Pasternak. (2001). Molecular Biotechnology- Principles and applications of recombinant DNA technology. ASM Press,Washington DC.
2. Bhojwani S.S. and Razdan M.K. (2004). Plant Tissue culture: theory and practice, Elsevier science.
3. Das, H.K. (2018).Text Book of Biotechnology, (5th edition).New Jersey. Wiley Dreamtech, India Pvt. Ltd.
4. Erbisch F.H and Maredia K.M. (2000). Intellectual property in agricultural Biotechnology, University Press.
5. Slater, (2008). Plant Biotechnology- The Genetic Manipulation of Plants, (2nd edition). New Jersey. Humana Press.

E-Resources: http://npmtariq.blogspot.com/ (Theory – notes) https://www.youtube.com/channel/UCAryeIwu3FrhwwcJk4F3-KQ

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Demonstrate the knowledge base to plant Breeding methods	**K1,K2**
CO2	Gain **k**nowledge about all kinds of molecular markers	**K2,K3,K5**
CO3	Recall and demonstrate the transgenic plants	**K1,K2,K3,K4**
CO4	Demonstrate the applications of plant biotechnology	**K4,K5,K6**
CO5	Differentiate organic and inorganic foods.	**K4,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 = 32						**Correlation = VERY 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

Prepared by: Dr. N.P.M. Mohamed Tariq **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBTAP31	**Other Elective Course**	**ALLIED PRACTICAL : PLANT BIOTECHNOLOGY**	**3**	**3**

Course Objectives

1. To enable the students to identify the different methods of safety practices
2. To acquire the knowledge of plant DNA.
3. To enable the students to identify the transformation, morphogenesis of plants.

Experiments

1. Protoplast culture.
2. Isolation of DNA from Plant Sample.
3. Extraction of Plant Protein.
4. Separation of Plant pigments in TLC.
5. Molecular identification by RFLP
6. Transformation of leaf discs with Agrobacterium – Demo
7. Morphogenesis in tobacco / leaf tissue – Demo

Books for Reference:

1. George E.F. Plant propagation by tissue culture: vol 1. The background. Springer, 2007
2. Pierik R.L.M. In vitro culture in higher plants, 1987. MartinusNijhoff Publishers, Boston.
3. Kalyanakumar. An Introduction to Plant Tissue Culture. 1997. NCB Agency, Calcutta.
4. ClarkM. S. Plant Molecular Biology: A Laboratory Manual. 1997. Springer-Verlag.
5. Chawla H.S. Introduction to Plant Biotechnology. 2002. Oxford and IBH Pub. Pvt. Ltd. New Delhi.

E-Resources:

https://www.youtube.com/watch?v=NXNFR4cj68U (Transformation of leaf with Agrobacterium)
https://www.youtube.com/watch?v=v6zMeWjZG50 (Morphogenesis in plant tissue)

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Know about PTC laboratory safety management.	**K1,K2**
CO2	Understand that all kinds of sterilization techniques.	**K2,K5**
CO3	Observe and Understand the aseptic culture techniques and maintenance instruments.	**K2,K3,K4**
CO4	Identify and preparation of DNA isolation methods.	**K4,K5**
CO5	Apply their knowledge of agarose electrophoresis techniques.	**K3,K5,K6**
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 = 35 Correlation = VERY 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

Prepared by: Dr. N.P.M. Mohamed Tariq **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	CATEGORY	COURSE TITLE	HRS/ WEEK	CREDIT
UBBIAL32/ UBCHAL32	Other Elective Course	ALLIED ZOOLOGY – I APPLIED ZOOLOGY - 1	5	4

Course Objectives

The objectives of the course are:

1. To understand the characteristics and classification of various Invertebrates and chordates.
2. To acquire knowledge about biofertilizer, to impart training on Earthworm culture technology and to create knowledge on Self - Employment opportunity.
3. To understand the poultry industry based on the emphasis of future growth and modern techniques of Animal culture.

Unit I	INVERTEBRATA	15 Hours

General characteristics and classification of Nine Major Phyla of Invertebrate. Few examples for each phylum.

Unit II	CHORDATA	15 Hours

General characteristics and classification of Chordates. Few examples for each phylum. Prochordata: General Characters and affinities of Hemichordata, Cephalochordata &Urochordata.

Unit III	VERMICULTURE	15 Hours

Eathworm types - Morphological and Anatomical characteristics. Biology of *Lampito mauritii*.

Vermicompost process - Types of Vermicomposting methods. Applications and Advantages of Vermicompost.		
Unit IV	**POULTRY FARMING**	**15 Hours**
Introduction - Poultry Farming, poultry production systems, housing, automation and equipments. Food And Feeding of Poultry Farming. Incubation and Hatchery Management.		
Unit V	**DAIRY FARM MANAGEMENT**	**15 Hours**
Live stock in India. Milch breeds, Draught breeds, Dual purpose breeds and New Cross breeds of Cows and Buffaloes in India. Sheep farming: Indigenous and Exotic breeds of Sheep.		

Books for study:

1. Ekambaranatha Ayyar and T.N. Ananatha Krishnan (1992). Manual of Zoology Vol. I and Vol.2 (Invertebrata), Part-I & II Vishwanathan Pvt. Ltd.
2. Keshav Singh (2014) A textbook on Vermicompost, Vermiwash and Biopesticide. Biotech Books, Astral International, New Delhi, India.
3. Sreenivasaiah, P. V. (2015). Textbook of Poultry Science. 1st Edition. Write & Print Publications, New Delhi.

Books for Reference:

1. Jordan, E.L. and P.S.Verma (1993). Invertebrate Zoology, 12th Edition. S. Chand and Co. Ltd., Delhi.
2. Jordan E.L. and P.S. Verma (1995). Chordata Zoology and elements of Animal Physiology.
3. Ismail, S.A. (1997) Vermitechnology – the Biology of Earthworms – Orient Longman Publ. – India.
4. Hurd M. Louis (2003). Modern Poultry Farming. 1st Edition. International Book Distributing Company, Lucknow.
5. Keith Wilson, N.D.P. (2005). A Handbook of Poultry Practice – Agrobios (India), Jodhpur – India.

E-Resources:

1. **https://www.uou.ac.in/sites/default/files/slm/MSCZO-501.pdf**
2. **https://egyankosh.ac.in/bitstream/123456789/16518/1/Unit-1.pdf**
3. **https://www.bbau.ac.in/dept/dz/TM/ZL(OE)-02%20Vermicomposting.pdf**
4. **https://ubblab.weebly.com/uploads/4/7/4/6/47469791/handbook_of_poultry_science_and_technology.pdf**
5. **https://ncert.nic.in/vocational/pdf/kedf101.pdf**

Methodology of Teaching: **Chalk and Talk and ICT Presentation**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Learn the general characters, classification of Invertebrates and its economic Importance.	**K2**
CO2	Describe the salient features of phylum Chordata.	**K2**
CO3	Learn about the characteristics and biology of earthworm and methods of composting.	**K3**
CO4	Have Knowledge about the poultry production systems, housing, automation, equipments, food and feeding of poultry farming.	**K3**

CO5	Learn the future strategies for Livestock Development for human welfare.	**K3**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

MAPPING WITH COURSE OUTCOME (COs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) {BIOCHEMISTRY}

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 WITH COURSE OUTCOME (COs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) {CHEMISTRY}

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**		

<u>Mapping Correlation Benchmark</u>

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**
UBBIAP32/ UBCHAP32	**Other Elective Course**	**PRACTICAL – ALLIED ZOOLOGY – 1 APPLIED ZOOLOGY – 1**	**3**	**3**

Course Objectives

The objectives of the course are:

1. To acquire skills of mounting of insect mouth parts.
2. To acquire knowledge about Anatomy of earthworm and its setae.
3. To test milk and identify poultry Ectoparasites.

Experiments		
1.	Mounting of Mouth parts of Cockroach	**6 Hours**
2.	Mounting of Mouth parts of Honey bee	**6 Hours**
3.	Mounting of Mouth parts of Mosquito	**6 Hours**
4.	Earthworm – Body setae	**6 Hours**
5.	Pure milk tests - Specific gravity and total solids	**6 Hours**
6.	Identification of Ectoparasites of poultry	**6 Hours**
7.	Visit to pasteurization Plant or Dairy Farm or Poultry farm	**6 Hours**

SPOTTERS

Invertebrates – Amoeba, Sponges, Obelia, Ascaris, Earthworm, Tapeworm, Prawn, Octopus, Star Fish.

Chordates – Ascidians, Rohu Fish, Frog, Cobra, Pigeon, Monkey.

Poultry Ectoparasites – Mites (*Dermanyssus gallinae*), Fowl tick (*Argas persicus*), Fleas (*Echidnophaga gallinacea*).

Books for study:

1. Ekambaranatha Ayyar and T.N. Ananatha Krishnan. (1992) Manual of Zoology Vol. I (Invertebrata), Part-I & II Vishwanathan Pvt. Ltd.
2. Ekambaranatha Ayyar and T.N. Ananatha Krishnan. (1992) Manual of Zoology Vol. II (Vertebrata), Part-I & II Vishwanathan Pvt. Ltd.
3. Jayanpa Sinha. (2010) Advanced Practical Zoology, Books & Allied (p) Ltd. No.1. Subham Plaza, I Floor, Calcutta.

Books for Reference:

1. Verma. P.S. (2011) A Manual of Practical Zoology INVERTEBRATES Chand & Co, Ltd, Ram Nagar - New Delhi.
2. Verma. P.S. (2011) A Manual of Practical Zoology CHORDATES, Chand & co, Ltd. Ram Nagar – New Delhi.
3. Prasab Sushil (2012) Handbook of Poultry Production. 1st Edition. Enkay Publishing House, New Delhi.

E-Resources:

1. **https://egyankosh.ac.in/bitstream/123456789/16622/1/Exercise-18.pdf**
2. **https://naldc.nal.usda.gov/download/CAT31027153/PDF**

3. https://www.fssai.gov.in/upload/uploadfiles/files/MILK_AND_MILK_PRODUCTS.pdf
4. https://egyankosh.ac.in/bitstream/123456789/33859/1/Practical-5.pdf
5. https://edis.ifas.ufl.edu/pdf/IG/IG14000.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Mount the mouth parts of Cockroach	**K3**
CO2	Mount the mouth parts of Honey bee	**K3**
CO3	Mount the mouth parts of Mosquito	**K3**
CO4	Test the physical parameters of milk	**K4**
CO5	Identify the ectoparasites from poultry	**K5**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

MAPPING WITH COURSE OUTCOME (COs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) {BIOCHEMISTRY}

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 WITH COURSE OUTCOME (COs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) {CHEMISTRY}

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	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

Prepared by: Dr. M. A. Farook **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBIAL42/ UBCHAL42	**Other Elective Course**	**ALLIED ZOOLOGY – II APPLIED ZOOLOGY – II**	**5**	**3**

Course Objectives

The objectives of the course are:

1. To infuse sound knowledge about the silkworm, their economic importance and diseases.
2. To acquire knowledge of honey bees and their social and Economic values and Motivate Entrepreneurship for practicing apiculture and fish culture.
3. To categorize the insects, to study about useful and harmful insects.

Unit I	**SERICULTURE**	**15 Hours**

History and Scope -Types of silkworms–*Bombyx mori* - life cycle - organization of larvae, pupae and moth - structure of the silk gland. Mulberry species: Classification, distribution and common varieties used in India - Sericulture in India - Silkworm Rearing and Silk Reeling.

Unit II	**APICULTURE**	**15 Hours**

History and Scope - Social organization of honey bees - Method of bee keeping - Care and management of honey bee hive - Bee products.

Unit III	**PISCICULTURE**	**15 Hours**

Scope of Aquaculture. Importance of cultivable fresh water, Marine and ornamental species. Fish farm Maintenance. Fish culture technique: Monoculture, Polyculture and Monosex culture.

Unit IV	**ECONOMIC ENTOMOLOGY – I**	**15 Hours**

Classification of insects [Major orders] – General account on Beneficial insects – Butterfly, Hoverfly, lac insect- Insects and their interrelations with environments. Insects as Pollinators, Parasitoids, Scavengers and Weed killers. Medicinal and Aesthetic value of insects.

Unit V	**ECONOMIC ENTOMOLOGY – II**	**15 Hours**

General account on harmful Insects – pest and diseases of cotton, rice and coconut - life cycle of pests of Rice (leaf folder, whorl maggot, and armyworms), Cotton (Pink bollworm, Tobacco Cutworm, Whitefly) and Coconut(Rhinoceros beetle, Red palm weevil, Bark weevil)

Books for study:

1. Tamilselvi M and Abdul Jaffar Ali (2019). A text book on apiculture.
2. Jhingran V.G. 1985. Fish & Fisheries of India, Hindustan Publishing Co. New Delhi. 666 pp.
3. Ganga, G. (2003) Comprehensive Sericulture Vol-II: Silkworm Rearing and Silk Reeling. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Nalina Sundari M.S. (2006) Entomology M.J.P Publications, Chennai.

Books for Reference:

1. Vasantharaj David and T. Kumaraswami, 1988. Elements of Economic. Entomology Popular Book Depot, Chennai.
2. Nayar, K.K., Ananthakrishnan, T.N. and B.V. David, V 1992 General and Applied Entomology Tata McGraw, New Delhi.
3. Fenemore P.G, AlkaPrakash, 1997 Allied Entomology. Wiley Eastern Ltd. New York.
4. Major Hall, C.B. (2005) Ponds and Fish culture – Agrobios (India), Jodhpur – India.

5. Ramnik Sood (2006) Medical Laboratory Technology — Jaypee Brother's Medical Publishers (P) Ltd., New Delhi.

E-Resources:

1. https://www.ignfa.gov.in/document/biodiversity-cell-ntfp-related-issues4.pdf
2. https://www.gdcboysang.ac.in/About/droid/uploads/Sericulture1stSem.pdf
3. https://www.kngac.ac.in/elearning-portal/ec/admin/contents/4_18KP2ELZ2_2021012803265445.pdf
4. https://nfdb.gov.in/PDF/Fish%20&%20Fisheries%20of%20India/1.Fish%20and%20Fisheries%20of%20India.pdf
5. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/animal-and-crops/plant-health/beneficial_insects.pdf
6. https://ntfb.org/wp-content/uploads/2020/09/Seasonal-Pest-Disease-Handout.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Value the economic importance of sericulture.	**K3**
CO2	Understand the Basics of beekeeping, role of Bee hive and Products of bee keeping.	**K3**
CO3	Gain basic knowledge on farm maintenance and fish culture technique.	**K3**
CO4	Classify Insects and value the ecological importance of insects.	**K2**
CO5	Understand significance of certain beneficial and harmful insects.	**K2**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

MAPPING WITH COURSE OUTCOME (COs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) {BIOCHEMISTRY}

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**		

MAPPING WITH COURSE OUTCOME (Cos) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) {CHEMISTRY}

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓		✓	✓	✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓	✓
CO3	✓	✓		✓	✓	✓	✓	✓
CO4	✓	✓		✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 36						Correlation = Very 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

Prepared by: Dr. M. A. Farook **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBIAP42/ UBCHAP42	**Other Elective Course**	**PRACTICAL – ALLIED ZOOLOGY – II APPLIED ZOOLOGY – 1I**	**3**	**3**

Course Objectives

The objectives of the course are:

1. To acquire practical skill on dissection of Silk gland.
2. To acquire practical skill on dissection of abdominal segments and Nervous system of cockroach.
3. To acquire practical skill on dissection of Nervous system of grasshopper.

Experiments

1.	Dissection of Silk gland	**6 Hours**
2.	Identification of Cycloid, Ctenoid scales and Placoid scale	**6 Hours**
3.	Mouth parts Housefly and Honey bee	**6 Hours**
4.	Dissection - Nervous system of cockroach	**6 Hours**
5.	Collection and preservation of beneficial insects	**6 Hours**
6.	Collection and preservation of harmful insects	**6 Hours**
7.	Visit to Apiary/Sericulture farm/Fish Farm	**6 Hours**

SPOTTERS – Silk rearing appliances, newton hive, freshwater fish, marine fish, ornamental fish, Beneficial insects , harmful Insects.

Books for study:

1. Mahadevappa, D., Halliyal, V.G., Shankar, D.G. and Bhandiwad, R. (2000) Mulberry Silk Reeling Technology Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. M.S. NalinaSundari (2006) Entomology M.J.P Publications, Chennai.
3. Dharm Singh and DevenderPratap Singh (2019) Hand Book of Bee Keeping.

Books for Reference:

1. Fenemore P.G, AlkaPrakash, 1997 Allied Entomology. Wiley Eastern Ltd. New York.
2. Major Hall, C.B. (2005) Ponds and Fish culture – Agrobios (India), Jodhpur – India.
3. AbhishekShkula, 2009. A Handbook on Economic Entomology, Daya Publishing House, India.
4. David, B.V. & Ramamurthy, V.V. 2016. Elements of Economic Entomology, 8th Edition, Brillion Publishing, India.

E-Resources:

1. **https://www.notesonzoology.com/sericulture/structure-of-silk-gland-of-silkworms/280**
2. **https://www.biologydiscussion.com/invertebrate-zoology/houseflies/head-and-mouth-parts-of-housefly-zoology/60388**
3. **https://egyankosh.ac.in/bitstream/123456789/16627/1/Exercise-20.pdf**

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Dissect the silk gland of silkworm.	**K3**
CO2	Identify the types of fish scales	**K4**
CO3	Mount the Mouth parts House fly and Honey bee	**K3**
CO4	Perform the dissection of Nervous system and Abdominal segments of cockroach.	**K3**
CO5	Collect and preserve the insect store box.	**K6**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

MAPPING WITH COURSE OUTCOME (COs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) {BIOCHEMISTRY}

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 = High**			

MAPPING WITH COURSE OUTCOME (COs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) {CHEMISTRY}

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 = 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

Prepared by: Dr. M. A. Farook **Verified by:** Dr. H. Abdul Jaffar Ali

PSOs for M.Sc Biotechnology programme

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 best scientific temperament, 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, environment, 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 team of students across disciplines.

PSO 7: Practice research & professional ethics as well as responsibility of SOPs.

PSO8: Evolve with recent innovations and scientific updates in the technological era in accordance with best scientific temperament, 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

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 III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
PBBT3001	**Discipline Specific Core Course**	**ANIMAL CELL CULTURE**	**6**	**4**

Course Objectives:

1. To make students understand about the basics of animal science and cell culture techniques.
2. To familiarize the Gene transfer methods.
3. To impart the knowledge in production of transgenic animals and applications of animal cell culture.

Unit I	**INTRODUCTION TO ANIMAL CELL CULTURE**	**18 Hours**

Animal tissue culture, history, requirements for animal cell culture. Substrate, liquids, culture mediums-Natural (Clots, Biological fluids, Tissue extracts), complex natural and chemically defined media. Cell culture technique- initiation, preparation and sterilization of media.

Unit II	**CELL LINES AND STEM CELLS**	**18 Hours**

Cell lines, evolution of cell lines, maintenance of cell lines, Large scale culture of cell lines-monolayer, suspension and immobilized cell culture, Development of primary culture and cell lines, subculture. Stem cells: Characteristic features, maintenance, culture and Applications of Embryonic and adult stem cells, Animal cloning- Nuclear transfer and embryonic stem cell method.

Unit III	**CELL CULTURE METHODS**	**18 Hours**

Cultured cells and evolution of continuous cell lines (established cell lines). Commonly used cell lines - their origin and characteristics. Cell line preservation and characterization.Biology and Characterization – Characterization of cultured cells- Measurement of growth parameters of cultured cells – Cell synchronization – Senescence and apoptosis.

Unit IV	**TRANSGENESIS IN ANIMAL CELL CULTURE**	**18 Hours**

High level expression of foreign gene in animal cells-expression vectors, enhancers, regulatory sequences. The need to express foreign genes in animal cells: advantage and disadvantages. Molecular pharming: Transgenic animals and their applications, methods used for transgenesis. Transfection methods of animal cells (Calcium phosphate, DEAE-dextran, Lipofection, Electroporation, Microinjection, Embryonic stem cell transfer) Selection of recombinant cells with various marker genes (XGPRT, HAT, Neomycin phosphotransferase).

Unit V	**APPLICATIONS OF ANIMAL CELL CULTURE**	**18 Hours**

Production of transgenic animals (Mice, Cattle, Sheep, pigs, Fish and Birds) Animal cells as bioreactors for the production of commercially important products. Applications, advantages and disadvantages of animal tissue culture and Ethical issues related to transgenic animals.

Books for study:

1. Satyanarayana U., Biotechnology, Books and Allied P. Ltd, Kolkata. (2017).
2. Ranga MM, Animal Biotechnology, 2007. 3rd Edition
3. Varun Mehta, Animal Biotechnology, 2009.
4. Ramadas P,Animal Biotechnology, 2002. 2nd Edition.
5.Sudha Gangal, Principles and Practice of Animal Tissue culture (Universities Press).

Books for References:

1. Freshney, R.I.2010, Animal cell culture, Fifth edition, Wiley Publishers
2. Masters J.R.W.2000, Animal cell culture, Oxford University Press.
3. Butler, M. (2004). Animal cell culture and technology: The basics II Edn. Bios scientific Pub.
4. AshishVerma, Anchal Singh (2020), Animal Biotechnology, Models in Discovery and

Translation, 2nd Edition, Elsevier Press.
5. Arumugam N, V. Kumaresan, Animal Biotechnology, Saras Publications.

E-Resources:
https://epgp.inflibnet.ac.in/Home/Download
Subject: Biotechnology , **Paper:** P09 - Animal Cell Biotechnology

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquire basic knowledge on animal tissue culture.	**K1**
CO2	Gain knowledge on animal tissue culture techniques	**K1**
CO3	Correlate biological samples and understand the importance of media in tissue culture	**K2**
CO4	Get knowledge about cell culture methods	**K1**
CO5	Comprehend the applications of animal cell culture in industry, healthcare and environment.	**K3**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	Programme learning 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 = 37, Correlations = Very High								

Mapping Correlation Benchmark

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

Prepared by: Dr. S.U.Mohammed Riyaz **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
PBBT3002	**Discipline Specific Core Course**	**PLANT MOLECULAR BIOLOGY**	**6**	**4**

Course Objectives:

1. To understanding the Principles and techniques involved in plant tissue culture.
2. To differentiate the methods of Micropropagation techniques & concepts.
3. To concepts of transformation and achievements of biotechnology in transgenic ideas.

Unit I	**INTRODUCTION TO PLANT TISSUE CULTURE**	**18 Hours**

History of plant cell and tissue culture; MS media - Composition and its elements function; various types of culture-callus, cell suspension, root, meristem, anther, pollen. *In vitro* differentiation; organogenesis and somatic embryogenesis. Micro propagation, Somaclonal variation; *In vitro* germplasm conservation - Production of Synthetic seeds.

Unit II	**CROP IMPROVEMENT & MARKER STUDIES**	**18 Hours**

Embryo culture and embryo rescue; Protoplast isolation, culture and fusion; selection of hybrid cells and regeneration of hybrid plants; symmetric and asymmetric hybrids, cybrids. Conventional versus non-conventional methods for crop improvement, transformation and genomic tools for crop improvements. Molecular marker-aided breeding, QTL, molecular marker assisted selection, Marker free plants.

Unit III	**PLANT GENETIC ENGINEERING**	**18 Hours**

DNA modifying enzymes and their uses in Molecular Biology; Host cells and Vectors, Host Cell Types (Prokaryotic and eukaryotic). Plasmid vectors, Bacteriophage - Lambda and M13 vectors, Cosmids, Phagemids. Artificial chromosomes (YACs and BACs). Expression vectors and gene fusion vectors PCR – basic process, types and applications. DNA sequencing- Principle of chemical and enzymatic methods. Automated DNA sequencing and high throughput sequencing, DNA foot printing, chromosome walking.

Unit IV	**PLANT GENETIC TRANSFORMATION**	**18 Hours**

Plant transformation technology: Agrobacterium mediated transformation, Particle bombardment, Electroporation; transgene stability and gene silencing. Chloroplast Transformation, Genetic engineering for resistance against abiotic (drought, salinity, cold) and biotic (insect pest, fungal, viral and bacterial diseases) stresses; Genetic engineering for increasing crop productivity, Genetic engineering for quality improvement.

Unit V	**TRANSGENIC PLANT PRODUCTION AND ITS APPLICATION**	**18 Hours**

DNA viruses as Expression vectors (CMV, Geminivirus, TMV, Potato X virus), Detection, characterization and expression of transformants-Genetic markers, reporter genes, transgene stability and gene silencing. Metabolic engineering and industrial products (plant secondary metabolites, industrial enzymes, therapeutic proteins, antibodies, edible vaccines), Aspects related to commercial release of transgenic crops - Environmental and Biosafety Issues and Regulatory considerations for Modern Biotechnology.

Books for study:

1. Buchanan, BB, W Gruissem, RL Jones. 2015. Biochemistry and Molecular Biology of Plants. 2nd Edition. John Wiley & Sons, Somerset NJ.
2. Kalyankumar De. An Introduction to Plant Tissue Culture Techniques. NCB Agency, Kolkata.
3. Ignacimuthu S. (1996) Applied Plant Biotechnology, McGraw Hill publ Co. Ltd., New Delhi.

Books for References:

1. Hammond, J., P.Mc Garvey and V.Yusibov (Eds). Plant Biotechnology – New products and Applications. By Springer Publication, (2012).
2. Glick and Paster mark Molecular Biotechnology by Panima. (2002).
3. Dixon, R.A And R.A. Gonzales. Plant cell culture, IRL press. (2012).
4. Bhojwani, S.S. and M.K. Razdan Plant Tissue culture: theory and practice a revised edition Elsevier science. (2014).
5. Bernard R.Glick and Jack J. Pasternak. Molecular Biotechnology, Principles and applications of recombinant DNA technology. ASM Press Washington DC. (2015).

E-Resources:

https://epgp.inflibnet.ac.in/Home/Download

Subject: Biotechnology , **Paper:** P 10 – Plant Biotechnology & Crop Improvement

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of tissue culture media and techniques	**K2**
CO2	Learn techniques for the maintenance of sterile condition and proper plant growth	**K1**
CO3	Remember the various types of culture methods	**K1**
CO4	Understand the basics of Molecular biology of plant genetic engineering	**K2**
CO5	Apply the methods of transgenic plant production techniques	**K3**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	Programme learning 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 = 37, Correlations : Very High								

Note:

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

Prepared by: Dr. S.U.Mohammed Riyaz **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
PBBTPR31	**Discipline Specific Core Practical**	**PRACTICAL – ANIMAL CELL CULTURE**	**5**	**4**

Course Objectives:

1. To develop skill in basic techniques involved in animal cell culture.
2. To provide knowledge about animal cell culture methods and media requirements.
3. To get trained in different culturing methods and techniques like cytotoxicity studies.

Experiments

1.	Sterilization Techniques	
2.	Preparation of Culture media & FBS	
3.	Establishment of Primary cell lines	
4.	Passaging of Monolayer cells	
5.	Trypsinization& Passaging of suspension cells	
6.	Determination of viable cells by Cell counting using Haemocytometer	
7.	Cytotoxicity assay by MTT Assay	
8.	Cell migration assay by Wound assay	

Books for study:

1. Freshney, R. I. (2010). Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications. Wiley-Blackwell, 2010. 6th Edition.
2. Davis, J. M. (2008). Basic Cell Culture. Oxford University Press. New Delhi.
3. Davis, J. M. (2011). Animal Cell Culture. John Willy and Sons Ltd. USA.
4. Verma, A. S. and Singh, A. (2014). Animal Biotechnology. Academic Press, Elsevier, USA.

Books for References:

1. Sambrook et al 2012. - Molecular Cloning‖ A Laboratory manual.
2 Cartwright, E. J. (2009). Transgenesis Techniques. Humana Press. London, UK.
3. McArthur, R. A. and Borsini, F. (2008). Animal and Translational Models for CNS Drug Discovery. Elsevier. London, UK.
4. Murray Moo-Young (2013) - Animal Biotechnology, Pergamon Press, Oxford.
5. Asok Mukhopadyay (2013), Animal Cell Technology, IK Intl. Ltd.

E Resources :

1. **https://www.youtube.com/watch?v=UV7T9JsxdXA – Animal cell culture**
2. **https://www.youtube.com/watch?v=Oo36pvP0TrI – Passaging of cells**
3. **https://www.youtube.com/watch?v=9BvTFowr0rI – Primary cell culture and cell line**
4. **https://www.youtube.com/watch?v=pP0xERLUhyc – Cell Viability assay**
5. **https://www.youtube.com/watch?v=6YQyq6rFxA4 - Cytotoxicity Assay**
6. **https://www.youtube.com/watch?v=PLZNStVA56Y - Cell migration assay**

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

SEMESTER III

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Use laboratory facilities and culture media for animal tissue culture.	**K3**
CO2	Prepare Culture Media for different animal cells and cancer cells.	**K4**
CO3	Do passaging for cancer cell lines.	**K3**
CO4	Perform cytotoxicity assay for cancer cell lines for determining the compound.	**K5**
CO5	Perform cell migration assay for cancer cell lines for characterizing the compounds.	**K6**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

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 = 37, Correlations : Very High								

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

Note:

Prepared by: Dr. S.U.Mohammed Riyaz **Verified by:** Dr. H. Abdul Jaffar Ali

COURSE CODE	CATEGORY	COURSE TITLE	HRS. / WEEK	CREDIT
PBBTPR32	**Discipline Specific Core Practical**	**PRACTICAL – PLANT MOLECULAR BIOLOGY**	**5**	**4**

Course Objectives:

The objectives of the course are:

1. To develop skill in basic techniques involved in plant tissue culture.
2. To provide knowledge about plant cell culture methods and media requirements.
3. To get trained in different culturing methods by *in vitro* gene transformation techniques.

1.	Preparation of Culture media & Reagents	
2.	Surface sterilization of plant materials	
3.	*In vitro* seed germination	
4.	Nodal culture, Meristem culture, Embryo culture	
5.	Callus initiation and maintenance from various explants	
6.	Regeneration of shoots and roots from callus cultures.	
7.	Preparation of synthetic seeds for germplasm conservation	
8.	Agrobacterium- mediated genetic transformation of plants through co-culture - Demo	
9.	Gene Interpretation Study using GUS markers - Demo	

Books for study:

1. Judith W. Zyskind and Sanford I. Bernstein, Recombinant DNA Laboratory Manual. Academic Press, 1989.
1. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
3. Sambrook J, Fritsch EF and Maniatis T. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press.
4. Plant Tissue Culture by MK Razdan& SS Bhojwani (1996) Elsevier.
5. Plant Tissue Culture Concepts and Laboratory Exercises, Second Edition, Robert N.
6. Ignacimuthu, S. (1996). Applied Plant Biotechnology. - McGraw Hill publications Co. Ltd., New Delhi

Books for References:

1. Sambrook et al 2012. - Molecular Cloning. A Laboratory manual.
2. Brown TA. (2006). Gene Cloning and DNA Analysis. 5th edition. Blackwell Publishing, Oxford, U.K.
3. Gene Cloning and DNA Analysis. An Introduction 2006 by T. A. Brown, Blackwell Scientific Publications.
4. Gene Cloning 2007 by Julia Lodge, Pete Lund and Steve Minchin, Taylor and Francis.
5. Plant Physiology by L Taiz& E Zeiger 4th Edition (2006) Sinauer, Associates Inc, Publishers.

E Resources :

1. **https://www.youtube.com/watch?v=dFrx-t5J0PA - Plant tissue culture overview**
2. **https://www.youtube.com/watch?v=TORRxwbz7aY–Introduction to PTC**
3. **https://www.youtube.com/watch?v=ltbdM3boWmU – MS Media Preparation**
4. **https://www.youtube.com/watch?v=n9RGZ1jJt6s - Basic techniques in PTC**
5. **https://www.youtube.com/watch?v=cD9CFtpLL2s - Shoot tip culture**
6. **https://www.youtube.com/watch?v=NXNFR4cj68U– Agrobacterium transformation**
7. **https://www.youtube.com/watch?v=mS6OjCekrNo– Agrobacterium transformation**

8. https://www.youtube.com/watch?v=hrmr8ftGkLo– **GUS Assay**

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

COs	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Prepare MS Medium in plant tissue culture experiments	**K4**
CO2	Perform in culturing various explants for *in vitro* studies.	**K5**
CO3	Perform the synthetic seed preparation.	**K6**
CO4	Regenerate the shoot and root from callus culture..	**K6**
CO5	Apply and procure employment in plant tissue culture industry in transgenic plant production	**K3 &K5**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	Programme learning 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 = 37, Correlations : Very High								

Note:

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

Prepared by: Dr. S.U.Mohammed Riyaz **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBTDE31	**Discipline Specific Elective Course**	**ECOLOGY, EVOLUTION AND BIODIVERSITY**	**5**	**3**

Course Objectives

5. To study about the fundamental processes that cause or prevent adaptive evolution, speciation and extinction.
6. Classify the concepts of species, populations, communities, ecosystems and biomes
7. To study about the ecosystem and roles in an ecosystem
8. To study about environmental issues, ecological basis, ecological evolutionary & biodiversity consequences.

Unit-I	**ECOLOGY & ECOSYSTEM**	**15 Hours**

Ecology – Environment - atmosphere, hydrosphere, lithosphere, concept of ecosystem, biotic and abiotic components and function habitat, energy flow, food chain, food web, ecological pyramids. Biogeochemical cycle Carbon, Nitrogen, Phosphorus.
Structure and function of terrestrial - forest, grassland and aquatic ecosystem.
Ecological succession: Types; mechanisms; changes involved in succession.

Unit-II	**EVOLUTION & TIME SCALE**	**15 Hours**

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.

Unit-III	**EVOLUTION OF PROKARYOTES AND EUKARYOTES**	**15 Hours**

Concept of Oparin and Haldane. Evolution of prokaryotes – origin of prokaryotes, unicellular bacterial evolution, origin of Eukaryotes, endosymbiosis, Margulis endosymbiont theory of evolution, evolution of mitosis, evolution of meiosis, evolution of sex and fertilization.

Unit-IV	**POPULATION GENETICS**	**15 Hours**

Population genetics – Population characteristics, population density, Natality, Mortality, dispersion, Gene pool, Gene frequency, migration and random genetic drift. Species interactions – Mutualism, Commensalism, Amensalism, Predator /Parasite host interaction, competition.

Unit-V	BIODIVERSITY	15 Hours

Biodiversity – definition, levels and threats. Endemic and endangered species of India. Methods of taxonomy - Concepts of species and hierarchical taxa, biological nomenclature, classical & quantitative methods of taxonomy of plants, animals and microorganisms. Outline classification of plants, animals & microorganisms- Important criteria used for classification in each taxon.

Books for study:

6. The Ecology Book: Big Ideas Simply Explained, Tony Juniper 2019.
7. An introduction of Biodiversity Prithipalsingh, Ane's Student edition, 2007.
8. Essential environmental studies by S.P. Mishra S.N. PanueyAne books Pvt Ltd 2011.
9. Fundamentals of Ecology by Eugene Odum, Gary Barrett, 5th Edition, Brooks/Cole.2004
10. Cell biology, genetics, ecology, evolution – P.S. Verma& V.K. Agarwal – S. Chand Publication. Edition: 2021, 2021

Books for Reference:

5. Wildlife Biodiversity Conservation: Multidisciplinary and Forensic Approaches, Susan C. Underkoffler, 2021
6. Biodiversity of Microbial Life – Staley Reysenbach.
7. Evolution, adaption and Ethology, Sanjibchattopadhyay, Books and Allied Pvt Ltd.
8. Text book of Environmental Studies A. Joseph Thatheyus, Norasa publications, 2011.

E-Resources:

6. https://sangu.ge/images/EssentialsofEcology.pdf
7. https://ncert.nic.in/textbook/pdf/lebo115.pdf
8. https://ncert.nic.in/textbook/pdf/lebo107.pdf
9. https://www.austincc.edu/sziser/Biol%201413/LectureNotes/lnexamI/taxonomyClassification.pdf
10. https://uomustansiriyah.edu.iq/media/lectures/6/6_2021_04_03!09_45_19_PM.pdf

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Able to explain the ecosystem and their roles	**K1**
CO2	Determine the evolutionary time scale theories	**K5**
CO3	Discuss the significance of evolution in prokaryotes and eukaryotes organisms.	**K6**
CO4	Demonstrate ecosystems and environmental issues and biodiversity consequences.	**K2**
CO5	Organize the taxonomical classification.	**K3**

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)							
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	✓	✓	✓			✓	✓	✓
CO2		✓	✓			✓		✓
CO3		✓	✓			✓		✓
CO4	✓	✓	✓			✓		✓
CO5		✓	✓		✓	✓		✓
Number of matches = 24					Correlation = Moderate			

Note:

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

Prepared by : S. Zakirullah and Dr. N. Shabeer Ahmed

Verified by : Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBTDE32	**Discipline Specific Elective Course**	**PLANT BIOCHEMISTRY**	**5**	**3**

Course Objectives

4. To develop basic knowledge on plant cell and its physiological functions.
5. Compare Plant defense mechanism against pathogens.
6. Outline the role of different biosynthetic pathways in plant growth and development.

Unit-I	**PLANT PHYSIOLOGY**	**15 Hours**

Plant cell-Structure and Functions, Plant cell wall, Plant-Water Relations- Water Transport Processes-Diffusion, Osmosis, Transpiration-Types, Mechanism and Factors affecting transpiration, Mechanism of Water Absorption - Passive and Active.

Unit-II	**PLANT METABOLISM**	**15 Hours**

Photosynthesis–photosynthetic pigments and chloroplast. Light reaction - Photosystems, Cyclic and non-cyclic photophosphorylation, Calvin cycle, Hatch-Slack cycle.

Unit-III	**PLANT RESPIRATION**	**15 Hours**

Respiration: ATP -the biological energy currency, aerobic and anaerobic Electron transport mechanism (chemiosmotic theory), pentose phosphate pathway Cycles of Elements-N2 cycle, Biochemistry of symbiotic and non-symbiotic N2 fixation.

Unit-IV	**PLANT NUTRIENTS**	**15 Hours**

Defense mechanism in plants against pathogens – Structural and Biochemical defence. Production of biotechnological products – SCP (Algae, Yeast, Mushroom). Biofertilizers, Biopesticides. Biochemistry of seed dormancy, seed germination, fruit ripening and Senescence, Primary and Secondary metabolites in Plants - Definition and Function.

Unit-V	**PLANT HORMONES**	**15 Hours**

Plant growth regulators-Physiological effects of Auxins, Gibberellins, Cytokinins, ABA and Ethylene.

Books for study:

1. Plant Biology, Taylor & Francis, New York. Andrew Lack (2001)
2. P.J.Lea and R.C. Leegood (1999), 2nd Edition, Plant Biochemistry and Molecular Biology, Wiley and Sons, New York.

Books for Reference:

1. N.C. Gautam (2006), Plant Biotechnology, Shree Publishers.
2. Heldt HW (2005), 3rd Edition, Plant Biochemistry, Elsevier Academic Press Publication, USA.
3. H.S. Srivastava (2006), Plant Physiology, Biochemistry and Biotechnology, Rastogi
4. Publications,Merut.
5. A.J. Lack (2001).Plant Biology. Viva Books, New Delhi.
6. V. Verma, Plant Physiology, (2001) 7th revised edition. Emkay publications,
7. V.K. Jain, (2000) Fundamentals of Plant Physiology, S.Chand Publishing, New Delhi.

E-Resources:

6. https://www.pdfdrive.com/plant-biochemistry-d165189725.html
7. https://www.pdfdrive.com/plant-biochemistry-4pdf-e39618886.html
8. http://site.iugaza.edu.ps/wp-content/uploads/Heldt%20-%20Plant%20Biochemistry%203e.pdf
9. https://agrigyan.in/bioch-311fundamentals-of-plant-biochemistry-sknau-notes/
10. https://www.helpforag.app/2018/02/plant-biochemistry.html

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Illustrate plant cell structure and biochemistry; plant water relations; plant mineral nutrition	**K3**
CO2	Demonstrate of the transport processes, light and dark reactions in photosynthesis.	**K2**
CO3	Relate the respiration of plant in aerobic and anaerobic.	**K3**
CO4	Summarize the concept of plant defense mechanism.	**K2**
CO5	Compare the basic knowledge about plant physiology and plant hormones.	**K2**

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								

Note:

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

Prepared by : S. Zakirullah and Dr. N. Shabeer Ahmed

Verified by : Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBTDE33	**Discipline Specific Elective Course**	**BIOFERTILIZER TECHNOLOGY**	**5**	**3**

Course Objectives

1. To understand the importance of biofertilizers in agriculture field.
2. To get insight into the various types of microbial inoculants used as biofertilizers
3. To acquire the methodology and applications of biofertiliers.

Unit-I	**Introduction to Biofertilizers**	**15 Hours**

General account of the microbes used as biofertilizers for crop plant and their advantages. Symbiotic N2 fixers: *Rhizobium* – Isolation, Characterization, identification classication, inoculum production and field application–Nitrogen fixation – Nif genes – Bradyrhiobium and Aorhizobium. Frankia – Isolation, actinorrrhial nodules, non – leguminous crop symbiosis.

Unit-II	**Non Symbiotic Biofertilizers**	**15 Hours**

Free living - associative – Non-symbiotic N2 fixers: Azospirillum - Isolation Characterization. Mass inoculum production and field application. Azotobacter – isolation characterization, mass inoculums production and field application. Seaweed as Biofertilizers. Bio-stimulants.

Unit-III	**Symbiotic Biofertilizers**	**15 Hours**

Free living nitrogen fixers – Cyanobacteria BGA, Azolla – Isolation, characterization, mass multiplication- industrial application of bioreactors, Role of biofertilizers in rice cultivation-crop response – field application – Immobilization of Cyanobacteria.

Unit-IV	**Phosphate Bacteria Biofertilizers**	**15 Hours**

Phosphate solubilizers; Phosphate Solubilizing Microbes (PSM): Bacillus megaterium – Phosphobacteria – Isolation, characteristics – mass inoculum production and mechanism of Phosphate solubilisation – field application.

Unit-V	**Fungal Biofertilizers**	**15 Hours**

Mycrorrhizal bioinoculants – Types, classification and their importance –Ectomycorrhizae, Endomycorrhizae, Ectendomycorrhizae – Isolations of Arbuscular Mycorrhizae spore and assessment of AM infection in roots. – Mass inoculum production and Field applicationsof Ecto and Vesicular Arbuscular Mycorrhizae. Potash mobilizers (*Fraturia aurantia)* – role of bioinputs in organic farming – co-inoculation studies – Microbial consortium – biofertilizer with biocontrol agent – response of biofertilizers in stress – pH and saline

Books for study:

1. Subbarao, N.S., (1982). Biofertilizers in agriculture and forestry.
2. Bagyaraj, D.J. and Rangaswamy, (2005). Agricultural Microbiology – Tata McGraw Hill., New Delhi

Books for Reference:

1. Subbarao, N.S., Soil Microorganisms and Plant Growth.

E-Resources:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Acquired knowledge regarding biofertilizers and its consequences in the environment.	**K1**
CO2	Develop skill regarding isolation, identification and mass production of bacterial bio fertilizers, on blue green algal biofertilizer production and its application	**K2**
CO3	Get familiar with the commonly used bacteria, fungal ad cyanobacterial fertilizers for crops	**K3**
CO4	Gain knowledge on difference between biofertilizers and chemical fertilizers to increasing crops production	**K1**
CO5	Get awareness to mitigate the usage of synthetic fertilizers.	**K4 and K6**
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 = 31 Correlation =Very 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

Prepared by : S. Zakirullah and Dr. N.P.M. Mohamed Tariq

Verified by : Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBT4001	**Discipline Specific Core Course**	**INDUSTRIAL BIOTECHNOLOGY**	**6**	**5**

Course Objectives

1.To obtain knowledge on upstream and downstream process.
2. To build the knowledge on bioreactors and fermentation process.
3. To get familiar with enzymes and microbes used for production of primary metabolites and recombinant proteins.

Unit I	**INTRODUCTION TO INDUSTRIAL BIOTECHNOLOGY**	**18 Hours**

Introduction to industrial Biotechnology – History, Scope - basic principles of fermentation Technology, Screening and Isolation of Microorganisms, maintenance & preservation of strain, strain improvement (Mutant selection, Recombinant DNA methods). Fermentation Media, Natural and synthetic Media.

Unit II	**UPSTREAM PROCESSING**	**18 Hours**

Commercially essential organic acids (e.g. citric acid, acetic acid, glucanoic acid). Aminoacids (glutamic acid, lysine, aspartic acid). antibiotics (penicillin, streptomycin, chloramphenicol), Alcohols (ethanol). Fermentor/Bioreactors – design and types - Type of Fermentation - Solid State, submerged fermentation and continuous fermentation. Plant and animal cell bioreactors.

Unit III	**DOWN STREAM PROCESSING**	**18 Hours**

Process Development – Solid – Liquid Separation (Flotation, Flocculation, Filtration, Centrifugation) – Release of intracellular products – Cell disruption (Physical, Chemical, Enzymatic) – Concentration (Evaporation, liquid-liquid extraction, membrane filtration, precipitation, Adsorption) – Purification by chromatography (gel-filtration, affinity, ion-exchange, hydrophobic interaction) – Formulation (drying, freeze-drying, crystallization).

Unit IV	**INDUSTRIAL APPLICATION OF ENZYMES**	**18 Hours**

Immobilization principles & Types - commercial production of enzymes; amylases, proteases, cellulase, artificial enzymes, industrial applications, enzymes modification, site directed mutagenesis; Structure and function of coenzyme. Biosensors – Types.

Unit V	**PRODUCTION OF COMMERCIALLY IMPORTANT RECOMBINANT PROTEINS**	**18 Hours**

Production of recombinant proteins having therapeutic and diagnostic applications: production of vaccines. bio-products for agricultural, food and pharmaceutical industries - biopesticides, biofertilizers and plant growth factors: natural bio-preservatives (nisin), biopolymers (xanthan gum and PHB) - single-cell protein. Good manufacturing practice bio safety issues, bioethics.

Books for study:

1. Satyanarayana, U. “Biotechnology” Books & Allied (P) Ltd., (2005).
2. Dubey, R.C. “A Textbook of Biotechnology” S. Chand & Co. Ltd., (2006).
3. Thangadurai D and Sangeetha J. Industrial Biotechnology: Sustainable production and Bioresource Utilization. CRC press (2017).

Books for Reference:

1. Prescott & Dunn. Industrial Microbiology, Agrobios (India) Publishers. (2002).
2. Bioprocess technology by P.T. Kalaichelvan and Arulpandi-; MJP Publishers. (2007)
3. Wolf. Cruzer and AnnaliseCruzer. Biotechnology Text Book of Industrial Microbiology.

Panima Publishing House, New Delhi.(2000)
4. Patel, A.H. Industrial Microbiology, Mac-Millan India Ltd. (2001).
5. Colin Ratledge, Bjorn Kristiansen. "Basic Biotechnology" Cambridge University Press, Third Edition. (2006).

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Gain knowledge on principles of fermentation, strain improvement and media formulation.	**K1**
CO2	Have clear concept of upstream and fermentation.	**K1**
CO3	Identify and understand industrial importance of downstream processing	**K 2**
CO4	Understand techniques like enzyme immobilization, commercial production of enzymes.	**K2**
CO5	Understand the production of commercially recombinant proteins	**K2**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	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 = 31						**Correlations: Very High**		

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	**1-12**	**13-24**	**25-28**	**29-40**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

Prepared by : Dr. ML. Mohammed Kaleem Arshan **Verified by :** Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS. / WEEK**	**CREDIT**
PBBT4002	**Discipline Specific Core Course**	**MEDICAL BIOTECHNOLOGY**	**6**	**4**

Course Objectives:

The objectives of the course are:

1. To describe the procedure of diagnosis in infectious and genetic diseases.
2. To explicate the different diagnostic and treatment approaches.
3. To get insight into the Monoclonal antibody and Vaccine production.

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

Methodology of Teaching:
Chalk and Talk, ICT Presentation and Video lectures

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Differentiate the state of a healthy human from diseased conditions	**K4**
CO2	Apply molecular concepts to investigate biological samples through different diagnostic approaches	**K3**
CO3	Describe the various approaches for gene therapy	**K1**
CO4	Illustrate the methods involved in vaccine production	**K4**
CO5	Describe the technology assisted in treating reproductive related problems in animals and humans	**K1**
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)							
	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

Prepared by: Dr. N. Shabeer Ahmed **Verified by:** Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBTPR41	**Discipline Specific Core Practical**	**PRACTICAL – INDUSTRIAL BIOTECHNOLOGY AND MEDICAL BIOTECHNOLOGY**	**5**	**4**

Course Objectives

1. To gain knowledge on the use of microorganism and its applications in industries
2. To train them in preparing and analyzing blood samples.
3. To impart skills in performing immunological assays.

Experiments

1. Screening of Extra Cellular Enzyme producing microbes.
2. Production and Estimation of Lactic acid using Bioreactor.
3. Mass Production of *E. coli* in Fermentor.
4. ELISA
5. Examination of normal flora from oral cavity.
6. Indirect Haemagglutination test.
7. Disease Diagnosis by PCR.
8. Western Blotting
9. Visit to Molecular Diagnostic Lab.

Books for study:

1. Arnold L. Demain& Julian E. Davies. (1999). Manual of Industrial Microbiology and Biotechnology. 2nd Edition. ASM press.
2. Textbook of Medical Laboratory Technology by P. B. Godkar and D. P. Godkar Vol 1 and 2 Bhalani Publishing, 2005.
3. Medical Bacteriology, N.C. Dey and T. K. Dey. Allied Agency, Calcutta, 17th Edition, 1988.

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Screen enzymes producing microorganisms	**K3**
CO2	Estimate lactic acid using Bioreactor.	**K4**
CO3	Perform ELISA	**K4**
CO4	To examine normal flora from oral cavity	**K4**
CO5	Test Haemagglutination Indirectly	**K4**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

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 = 31 Relationship:= Very 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

Prepared by: Dr. N. Shabeer Ahmed and Dr. ML. Mohameed Kaleem Arshan

Verified by : Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	COURSE	COURSE TITLE	HRS. / WEEK	CREDIT
PBBTPJ41	PROJECT	PROJECT WITH VIVA-VOCE	4	2

COURSE WORK

1. Projects would be allotted to III Semester students which have to be carried out and completed in Semester IV.

2. A list of projects will be finalized and announced by the Department. The students will have an option to select the project in their field of interest.

5. The project will comprise of the following:

e. Study of background material
f. Collection of data, procurement, samples and Analysis
g. Experimental analysis of samples.
h. Giving a preliminary seminar in the III semester for the purpose of internal assessment.

d. Writing a dissertation or project report. This will be submitted by the students at the end of IV semester.

VIVA-VOCE

The Final evaluation of the project work completed will be done by external and internal examiners appointed by the Board on the basis of an oral presentation and the submitted Project-Report.

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBTNM41	**Other Elective Course**	**CELL SIGNALING & COMMUNICATION**	**3**	**2**

Course Objectives

1. .To acquire knowledge about various aspects of signal transduction pathways.
2. In order to comprehend the function of signaling molecules in cell-cell communication.
3. To become familiar with the molecular processes that underlie carcinogenesis..
4. Read up on the interactions between the pathogen and the host.

Unit-I	**SIGNALING COMPONENTS**	**9 Hours**

Fundamental concepts and definitions of signal, ligands, and receptors, Endocrine, paracrine and autocrine signaling. Receptors and signaling pathways – cell surface receptors, ion channels, G – protein coupled receptors, receptor kinases (tyr, ser/thr). Signal transduction through cytoplasmic and nuclear receptors. The Ras – raf – MAP kinase cascade. Second messengers – cyclic nucleotides, lipids and calcium ions. Crosstalk in signaling pathways.

Unit-II	***CELL SIGNALING***	**9 Hours**

Hormones and their receptors, regulation of signaling pathways, bacterial and plant two-component systems, light signaling in plants, bacterial chemotaxis and quorum sensing. Signal cascade, inhibitors of signal cascade.

Unit-III	**HOST PATHOGEN INTERACTION**	**9 Hours**

Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen- induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.

Unit-IV	**CELLULAR COMMUNICATION**	**9 Hours**

Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation.

Unit-V	**CANCER**	**9 Hours**

Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.

Books for study:

4. Signal Transduction: Principles, Pathways, and Processes Hardcover (2014) by Lewis Cantley
5. Hormone Receptors (Advances in Experimental Medicine and Biology) Paperback (2014) by
   David Klachko
6. The biochemistry of cell signaling, Helmreich JM, Oxford press 2005

Books for Reference:

3. Introduction to Biological Membranes; William Stillwell, Elsevier (2013).
4. Molecular Biology of the Cell; 6th Edn. Bruce Alberts, Alexander Johnson, Julian Lewis, David

E-Resources:

5. https://www.khanacademy.org/science/ap-biology/cell-communication-and-cell-cycle/cell-communication/a/introduction-to-cell-signaling
6. https://biosignaling.biomedcentral.com/about
7. https://dosequis.colorado.edu/Courses/MCDB3145/Docs/Karp-617-660.pdf
8. http://medcell.med.yale.edu/lectures/files/cell_communication.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Describe the process of cell signaling and its role in cellular functions	**K1**
CO2	Explain the signaling components and pathways involved in cell signaling	**K2**
CO3	Distinguish with host pathogen interaction.	**K3**
CO4	Explain knowledge about carcinogenesis.	**K4**
CO5	Select knowledge in cell-cell communication and regulations.	**K3**

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**			

Note:

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

Prepared by : S. Zakirullah and Dr. M.A. Farook

Verified by : Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBTDE41	**DSE4**	**Nano Biotechnology**	**5**	**4**

Course Objectives

1. To Understand the principles of basic science in understanding, analysis of matter at Nano scale.
2. To know the advanced ideas and techniques required in emergent area of nanotechnology.
3. Understand the synthesis of nanomaterials and their application and the impact of nanomaterials on environment.

Unit-I	**INTRODUCTION TO NANOTECHNOLOGY**	**15 Hours**

Introduction: History & Scope of nanotechnology, background & definition of nanotechnology, Introduction & properties of Nanomaterials – size of nanomaterials. Chemical bonds in nanotechnology. Scales at the bio-nano interface - basic capabilities of Nanobiotechnology and Nano medicine.

Unit-II	***FUNCTIONAL PRINCIPLES OF NANO-BIOTECHNOLOGY***	**15 Hours**

Biomolecular structure and stability - Protein folding, Self-assembly, Self-organization, Molecular recognition – Flexibility – Information. Driven Nano assembly – Energetics, Chemical transformation. Biomaterials-Biomolecular motors-Traffic across membranes-Biomolecular sensing-Self replication, Phase nano-biotechnology

Unit-III	**NANO BIOMATERIALS & NANOSTRUCTURES**	**15 Hours**

Surface and Bulk Properties of Bio materials – Nano biomaterials –Nano Ceramics – Nano polymers. Carbon Based nanomaterial's. Nanostructures: Zero-, One-, Two- and Three-dimensional structure, DNA based Nano structures. Size control of metal Nanoparticles and their properties

Unit-IV	**NANOMATERIALS AND DIAGNOSTICS/DRUG DELIVERY**	**15 Hours**

Surface Modified Nanoparticles - MEMS/NEMS based on Nanomaterials. Peptide/DNA Coupled Nanoparticles. Lipid Nanoparticles For Drug Delivery. Inorganic Nanoparticles For Drug Delivery. Metal/Metal Oxide Nanoparticles (antibacterial/anti-fungal/anti-viral). Anisotropic and Magnetic Particles (Hyperthermia).

Unit-V	**APPLICATION OF NANOTECHNOLOGY IN FOOD & AGRICULTURE INDUSTRY**	**15 Hours**

Application - fisheries and livestock sectors, Nanotechnology for environmental safety: Pollution control, gas sensing. Social and ethical impacts. Nanomaterial based adsorbents for water and wastewater treatment. Impact of nanotechnology on the environment: Health, safety and environmental risks. Ethical Issues of Nanomaterials on agriculture & Aquaculture.

Books for study:

1. D S. Goodsell, by John Wiley & Sons, Bio nanotechnology: Lessons from Nature, Inc. 2008.
2. Saura C Sahu, Daniel A Casciano. Edition - 2015 .Handbook of Nano toxicology, Nano medicine and Stem Cell Use in Toxicology.
3. Qingrong Huang - Nanotechnology in the Food, Beverage and Nutraceutical Industries, Ed:, 2012, Elsevier.

Books for Reference: 1.Jain K.K, **Nanobiotechnology in Molecular Diagnostics** – Current Techniques andApplications, Taylor and Francis Publications 2006. 2. ChristofM.Niemeyer - **Nanobiotechnology**: Concepts, Applications and Perspectives (2004), (Editor), Chad A. Mirkin (Editor), Wiley VCH. 3. Chad A Mirkin and Christof M. Niemeyer (Eds),**Nanobiotechnology - II more concepts and applications. (2007)** - Wiley VCH.
E-Resources:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basic properties of nanoparticles.	**K2**
CO2	Know the use of basic concepts for describing nano systems and processes.	**K5**
CO3	Analyze different types of DNA based Nanostructures.	**K4**
CO4	Understand various forms of nanomaterials and polymers for special applications.	**K2**
CO5	Understand various concepts and protocols in the application of Nanotechnology.	**K2**
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 = 31						**Correlation = Very 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

Prepared by : Mr. M. Mohammed Zeeshan and Dr. S.U. Mohamed Riyaz

Verified By : Dr. H. Abdul Jaffar Ali

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBTDE42	**Discipline Specific Elective Course**	**IPR, BIOSAFETY AND ETHICS IN LIFE SCIENCE**	**5**	**3**

Course Objectives

1.To recognize the importance and basic concepts of Intellectual Property Rights.

2.To learn the procedure of obtaining Patents, Copyrights, Trade Marks.

3.To know the current and emerging issues relating to the intellectual property protection, including those relating to indigenous knowledge or culture and biotechnology Issues.

Unit-I	**INTRODUCTION TO INTELLECTUAL PROPERTY (IPR)**	**15 Hours**

Introduction -Types of intellectual property, international organizations, agencies and treaties, Theories of Intellectual Property Rights. Importance of intellectual property rights. Economic importance of IPR in India and world. IPR and WTO (TRIPS, WIPO).

Unit-II	***PATENTS, COPYRIGHTS & TRADEMARKS***	**15 Hours**

Objectives, Rights, Patent Claims - Procedure of obtaining patents, Working of patents. The Patents Act, 1970.Copyright and Neighboring Rights - Concept and Principles - Historical background and Development of Copyright Law. Introduction to Trademarks- concept of Trademarks, Trademarks Act, 1999

Unit-III	**PROTECTION OF TRADITIONAL KNOWLEDGE**	**15 Hours**

Introduction, Objective, Concept of Traditional Knowledge. Historical impact of Social change of traditional knowledge system. Significance of TK protection – Value of TK in global economy. Traditional medicine System – TK in agriculture. Food security of the country and Protection of TK. Bio-Prospecting and Bio-Piracy.

Unit-IV	**PROTECTION OF PLANT VARIETIES**	**15 Hours**

History of Protection of Plant Varieties and Farmers' Rights Act. Introduction to Plant Varieties – Law & Science. Evolution of Plant Patents & Plant Varieties Protection. Rights of farmers, Rights under the Plant varieties and Farmers right Act 2001. Breeders and Researchers. National gene bank.

Unit-V	**BIOTECHNOLOGY AND INTELLECTUAL PROPERTY RIGHTS.**	**15 Hours**

IPR of Living species, Protecting inventions in biotechnology. Patenting Biotech Inventions - Concept of inventive step, Microorganisms. Moral Issues in Patenting Biotechnological inventions. Biosafety guidelines in India – biosafety levels for plants, animals and microbes.

Books for study:

1. N.S. Gopalakrishnan& T.G. Agitha, (2009) **Principles of Intellectual Property** Eastern Book Company, Lucknow.
2. Ajit Parulekar and Sarita D' Souza, (2006) **Indian Patents Law – Legal & Business Implications**; Macmillan India Ltd.
3. GraghamDutfeild "**Intellectual Property, Biogenetic Resources and Traditional**

Knowledge", EarthScan (2004).
Books for Reference: 1. P. Narayanan (2010**) Law of Copyright and Industrial Designs**; Eastern law House, Delhi. 2. M.M.S. Karki 2009, **Intellectual Property Rights: Basic Concepts**, Atlantic Publication. 3. Susan K Sell, Private Power, Public Law: **The Globalization of Intellectual Property Rights**, Cambridge University Press, 2003. 4. N.S. Gopalakrishnan & T.G. Ajitha, **Principles of Intellectual Property**, Eastern Book Company,2nd Edition, 2014.
E-Resources:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Know the concepts and importance of Intellectual Property Rights.	**K1**
CO2	have an understanding of the fundamental legal principles of copyright, patents, and trademarks.	**K2**
CO3	Understand the Concept and Protection of Traditional Knowledge and its importance.	**K2**
CO4	Have knowledge about the protection of Plant varieties and Farmers Act.	**K1**
CO5	Understand the various issues on patenting of Inventions& Biosafety guidelines**.**	**K2**
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								

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
PBBTDE43	**Discipline Specific Elective Course**	**BIOENTREPRENEURSHIP**	**5**	**4**

Course Objectives

1. To create entrepreneurial opportunities through the invention, development and exploitation of entirely new ideas, products and services.
2. To improve lifestyle, generous thinking, better morals, and greater economic choice.

Unit-I	**BIOENTREPRENEURSHIP**	**15 Hours**

Entrepreneur – Bio-entrepreneur - Evolution of the Concept - Scope in Bio-entrepreneurship - Functions and importance of bioentrepreneurs, Competencies of an Bio-Entrepreneur - Types of Bio-Entrepreneur - Role of Bio-entrepreneurs in Economic Development - Entrepreneurship development programs of public and private agencies (MSME, DBT, BIRAC, Make In India) - Profiling the Bioentrepreneur - Education Qualifications, Technical Skills, Experiential Learning).

Unit-II	**BIO MARKETS -BUSINESS STRATEGY AND MARKETING**	**15 Hours**

Small Business Negotiation Strategies and Tips for Business Owners - strategic negotiation with financiers, government and regulatory authorities - Pricing strategies, Challenges in marketing in bio business - Basic contract principles, different types of agreement and contract terms typically found in joint venture and development agreements - Dispute resolution skills.

Unit-III	**FUNDING AGENCIES FOR BIOTECH IN INDIA**	**15 Hours**

Funding of biotech business (Financing alternatives, Venture Capital funding, funding for biotech in India, Exit strategy, licensing strategies, valuation), support mechanisms for entrepreneurship (Bio- entrepreneurship efforts in India, difficulties in India experienced, organizations supporting biotech growth, areas of scope, funding agencies in India, biotech policy initiatives). Schemes and Subsidies from government and NGOs.

Unit-IV	**BIOTECHNOLOGY ENTERPRISES**	**15 Hours**

Definition of MSME Enterprises - Types of Enterprises (Private sector enterprises, Public sector enterprises, Joint sector) - Desirables in start-up, setting up Small, Medium & Large scale industry, Quality control in Biotech industries, Location of an enterprise, steps for starting a small industry, incentives and subsidies, exploring export possibilities.

Unit-V	**COMMERCIALIZATION**	**15 Hours**

Process of Commercialization - Strategy for Commercialization - Market for Ideas v/s Market for Products - Pathways & Strategies to Market (Traditional out-licensing of technology or intellectual property, Trade sale, Incubation, Collaboration/Partnership/Joint venture, Stepping-stone approach, Simple contract - Business Models in Biotechnology

Commercialization - Avoid 'Valley of Death'.
Books for study: 1. ShreyaSanghvi Malik, and Dr. Shiv Kant Shukla, Bioentrepreneurship Development: A Resource Book, Biotech Consortium India Limited (BCIL), New Delhi , 2018 2. Adams, D.J., & Sparrow, J.C. (2008). Enterprise for Life scientists: Developing Innovation and Entrepreneurship in the Biosciences. Bloxham: Section. 3. Shimasaki, C. D. (2014). Biotechnology Entrepreneurship: Managing, and Leading Biotech Companies. Amsterdam: Elsevier. Academic Press is an imprint of Elsevier.
Books for Reference: 1. Onetti, A., &ucchella, A. Business Modeling for Life Science and Biotech Companies: Creating value and Competitive Advantage with the Milestone Bridge. Routlede. 2. Jordan, J. F. (2014). Innovation, commercialization and Strat-Ups in Life Sciences. London: CRC Press. 3. Desai, V. (200). The dynamics of Entrepreneurship Development and Management. New Delhi: Himalaya Pub. House
E-Resources:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Know the concept ,types, economic development in Bio-entrepreneurship	**K1**
CO2	Understand the business strategy, facing challenges in marketing	**K2**
CO3	Know the supportive funding agencies for biotech business	**K2 and K4**
CO4	Know Enterprises and startup in Biotechnology sector	**K3**
CO5	Know the exact way of commercializing the product to the market	**K5 and K6**
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 = 32					**Correlation = Very 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

Prepared by : Mr. S. Zakirullah and Dr. ML. Mohammed Kaleem Arshan

Verified By : Dr. H. Abdul Jaffar Ali

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCC3001	**DSC4**	**C++ & DATA STRUCTURES**	**6**	**4**

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-Design member's functions-Nesting of member functions-Array of class object-Friend function-Static and Data member 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-Working with files-Templates-Class and Function template-Exception Handling.

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 and 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, VI & 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	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCPR31	**DSC6**	**C++ & Data Structures Lab**	**3**	**3**

Course Objectives

1. To learn about abstract data types
2. Prepare the student for composite data structures
3. 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, DFS and Shortest (Dijkstra's).
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%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAL31	**OEC5**	**COMPUTER ORIENTED FINANCIAL ACCOUNTING – I**	**5**	**4**

Course Objectives

1. To enlighten the students with various Principles, Concepts and Conventions in Accounting.
2. To impart practical knowledge in the Preparation of Final Accounts and Depreciation Accounts.
3. To provide insights to the students about Single Entry and Computerized Accounting Systems.

Unit-I	**Introduction to Accounting**	**15Hours**

Conceptual Framework: Accounting Principles - Accounting Concepts - Accounting Conventions – Introduction to Accounting Standards and Indian Accounting Standards - Accounting Process: Journal – Ledger – Trial Balance.

Unit-II	***Final Accounts***	**15 Hours**

Preparation of Final Accounts – Trading Account – Profit & Loss Account – Balance Sheet – Adjustments in Final Accounts: Outstanding Expenses – Prepaid Expenses – Accrued Income - Income Received in Advance - Depreciation and Appreciation of Fixed Assets – Interest on Capital – Interest on Drawings.

Unit-III	**Depreciation Accounting**	**15 Hours**

Meaning of Depreciation – Causes of Depreciation – Methods of providing Depreciation – Straight Line Method – Diminishing Balance Method – Annuity Method – Sinking Fund Method (Simple Problems only)

Unit-IV	**Single Entry System**	**15 Hours**

Meaning – Objectives – Features – Limitations – Differences between Single Entry and Double Entry System – Ascertainment of Profit through Networth Method (Statement of Affairs) and Conversion Method.

Unit-V	**Computerized Accounting System**	**15 Hours**

Meaning – Role of Computer in Accounting – Need for Computerised Accounting – Salient Feature of Computerised Accounting –Fundamentals of Accounting System – Comparison between Manual and Computerised –Advantages of Computerised Accounting System – Limitations of Computerised Accounting System.

Books for Study

1. **Neeraj Goyal & Rohit Sachdeva**, Computerised Accounting, Kalyani Publishers, New Delhi.
2. **S.M.Shukla**, Financial Accounting &Computerised Accounting, Sahitya Bhawan Publications, New Delhi.
3. **R.L.Gupta& M. Radhaswamy,** Financial Accounting, Sultan Chand & Sons., New Delhi.
4. **S. Thothadri& S. Nafeesa,** Financial Accounting, McGraw Hill Education, Chennai.

5. **T.S. Reddy & Murthy,** Financial Accounting, Margham Publications, 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 &K.L.Narang,** Financial Accounting, Kalyani Publishers, Ludhiana.
3. **Mukherji & M. Hanif,** Financial Accounting, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
4. **DhaneshKhatri**, Financial Accounting, McGraw Hill Education, Chennai.
5. **K Murugadoss & M Ja**ya, Financial Accounting, Vijay Nicole Imprints Private Ltd., Chennai.

E-Resources: https://www.udemy.com/course/fundamentals-of-computer-based-financial-accounting/

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts of Accounting and Pass Journal Entries and Prepare Ledgers.	**K2,K3**
CO2	Prepare Final Accounts.	**K2,K3**
CO3	Calculate Depreciation and Prepare Depreciation Account.	**K2,K3**
CO4	Prepare Statement of Affairs and Statement of Profit or Loss in Single Entry System.	**K2,K3**
CO5	Understand the basics of Computerised Accounting Systems.	**K2,K3**

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 = 25 , Correlation: Hogh								

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	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAP31	**OEC6**	**COMPUTER ORIENTED FINANCIAL ACCOUNTING LAB - I**	**3**	**3**

Course Objectives

1. To acquaint students to Computerised Accounting System.
2. To impart skills related to recording of Business Transactions in a Computerized Accounting System.
3. To enable students to generate Financial Statements electronically.

Unit-I	**Introduction to Computerised Accounting**	**12 Hours**

Computerised Accounting – Different Application Software used for Computerized Accounting - Function Keys in Tally with its purpose - Preparation of Journal - Ledger - Trial Balance.

Unit-II	***Creation of Company & Enabling Features in Tally ERP 9***	**12 Hours**

Basics of Tally – Installing - Configuring Tally ERP9 - Creating Company – Data Path for Storing and Retrieving Tally Data – Altering Company Information and Deleting Company – Selecting Company from the List of Companies - Shutting a Company.

Unit-III	**Creating Accounting Ledgers and Groups**	**12 Hours**

Creating Accounting Ledgers - Predefined Ledgers in Tally - Creating Accounting Masters in Tally ERP 9 - Creating Ledgers – Single Ledger – Multiple Ledger – Altering and Deleting Ledgers. Creating Accounting Groups - Predefined Accounting Groups in Tally – Creating Groups – Altering and Deleting Groups.

Unit-IV	**Creating Inventory Items and Stock Groups Creation**	**12 Hours**

Creating Inventory Items - Creating different stock items for business– Selecting proper group for each stock item – Creating unit of measurement – Altering and Deleting Stock Item -Entering opening stock items – Fixing unit price of items.

Unit-V	**Voucher Entry& Report Generation**	**12 Hours**

Introduction to Vouchers - Accounting Vouchers - Predefined Accounting Vouchers – Creation and Alteration of Vouchers – Cancellation and Deletion of Vouchers - Recording of Business transactions using appropriate Accounting Vouchers. Generating Reports.

Books for Study

1. **Dr. P. Rizwan,** Tally ERP 9, Margham Publications, Chennai.
2. **Asok K Nadhani,** Tally ERP 9 Made Simple: Basic Financial Accounting, BPB Publications, New Delhi.
3. **Vishnu P.Singh, —**Tally-ERP 9 -Computer, Publications Ltd, New Delhi.
4. **Soumya Ranjan Behera,** Learn Tally.ERP 9, BK Publications Pvt. Ltd, New Delhi.
5. **S. Palanivel,** Tally - Accounting Software, Margham Publications, Chennai.

Books for Reference:

1. Kogent Learning Solutions Inc., Tally ERP 9 in Simple Steps, DreamTech Press Inc. New Delhi.
2. **Shraddha Singh,** Navneet Mehra, Tally ERP 9 – Power of Simplicity, V & S Publishers, New Delhi.
3. DT Editorial ServicesTally.ERP 9 with GST in Simple Steps — Dream Tech Press – New Delhi.
4. **Shraddha Singh,** Tally ERP 9 (Power of Simplicity), V & S Publishers – New Delhi.

5. **A.K. Nadhani& K.K. Nadhani,** Tally 9, BPB Publications, New Delhi.
E-Resources: https://www.udemy.com/course/fundamentals-of-computer-based-financial-accounting/

Methodology of Teaching:

ICT Presentation, Video lectures, Assignments on problems

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of Computerized Accounting and various computerized accounting softwares used in business.	**K1, K2**
CO2	Create company, ledgers and alter company details.	**K2, K3**
CO3	Create inventory items and stock groups.	**K2, K3**
CO4	Pass Voucher Entries of daily transactions in Business.	**K3, K4**
CO5	Generate Invoices and other Financial Statements.	**K3, K4**
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 = 25 , Correlation: High								

<u>Mapping Correlation Benchmark</u>

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**
UBCCAL32	**OEC5**	**Discrete Mathematics**	**5**	**4**

Course Objectives

1. Able to understand the concepts of Logics and Proofs
2. Understand the basic concepts of Combinatorics and set functions
3. Understand the concepts of algebraic systems and graphs

Unit-I	LOGICS AND PROOFS	**12 Hours**

Propositions – Logical connectives – Compound propositions – Conditional and bi-conditional propositions – Truth tables – Tautologies and contradictions – Contra positive – Logic equivalences and implications. Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements. *Suggested Reading:* Basics of logical operators

Unit-II	COMBINATORICS	**12 Hours**

Mathematical Induction-Strong induction and well ordering – the basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – inclusion and exclusion and applications. *Suggested Reading:* Basics of probability

Unit-III	SETS AND FUNCTIONS	**12 Hours**

Sets: Relations on sets – Types of relations and their properties – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram. Functions: Characteristic function of a set – Hashing functions – Recursive functions – Permutation functions. *Suggested Reading:* Basic concepts of sets and Functions

Unit-IV	ALGEBRAIC SYSTEMS	**12 Hours**

Groups, Cyclic Groups, Subgroups, Cosets, Lagrange's theorem, Normal subgroups – Codes and group codes – Decodes. *Suggested Reading:* Basics of Groups

Unit-V	GRAPHS	**12 Hours**

Graphs and graphs models – Graph terminology and special types of graphs – Representing raphs and graph isomorphism – connectivity – Euler and Hamilton paths. *Suggested Reading:* Basics of Graphs

Books for study:

1. **Singaravelu, M. P. Jeyaraman, "Discrete Mathematics", Meenakshi Agency, 2013.**
2. **Kenneth H. Roshan, "Discrete Mathematics and its Applications", Tata McGraw Hill, 2011**

Books for Reference:

1. **Trembly J.P and Monohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, 2003.**
2. **Trivedi.K.S., "Probability and Statistics with Reliability, Queueing and Computer Science**

Applications", John Wiley and Sons, 2nd Edition, 2002 3. **J. A. Bondy and U.S.R Murty, "Graph Theory", Springer, 2008.**
E-Resources: http://nptel.ac.in/courses/106106094/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**Write an argument using logical notation and determine if the argument is valid or not valid.**	K1
CO2	**Understand the ideas of permutations and combinations.**	K1,K2
CO3	**Demonstrate an understanding of relations and functions**	K4
CO4	**Recognize the principles of the group theory.**	K3
CO5	**Design model problems in computer science using Graphs.**	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%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

SEMESTER III				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAP32	**OEC6**	**Discrete Mathematics Lab**	**3**	**3**

Course Objectives

1. Able to understand the concepts of Logics and Proofs
2. Understand the basic concepts of Combinatorics and set functions
3. Understand the concepts of algebraic systems and graphs

Lab Experiments using C

1. Write a program to find intersection set of two sets
2. Write a program to find union set of two sets.
3. Write a program to find Compliment set of the given set
4. Write a program to find difference set of two sets
5. Write a program to find symmetric difference set of two sets
6. Write a program to prove the D'Morgan's Laws of set theory
7. Write a program to find the power set of the given set
8. Write a program to find permutation of the set
9. Find the cardinality of the set and prove

   $|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$

Books for study: Department Lab Manual

Books for Reference: Lab manual

E-Resources:http://nptel.ac.in/courses/106106094/

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**Write an argument using logical notation and determine if the argument is valid or not valid.**	K1
CO2	**Understand the ideas of permutations and combinations.**	K1,K2
CO3	**Demonstrate an understanding of relations and functions**	K4
CO4	**Recognize the principles of the group theory.**	K3
CO5	**Design model problems in computer science using Graphs.**	K6,K2
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	ProgrammeSpecific 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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCC4001	**DSC7**	**Programming in Java**	**6**	**4**

Course Objectives

1. To impart knowledge of Object Orientation.
2. To impart knowledge of Remote Access.
3. To impart knowledge of Data Security.
4. To impart knowledge of Networking.
5. To impart knowledge of concurrent processing.

Unit-I	**Object Orientation with Java**	**15 Hours**

OOP and Java - The Primaries – Control Statements – Arrays and Methods.*(Chapter: 1, 2, 3, 4)*

Unit-II	**Classes and Objects**	**15 Hours**

Classes and Objects – Inheritance and Polymorphism – Abstract Class-Interfaces and Packages-Applets.*(Chapter: 5, 6, 7, 8)*

Unit-III	**Abstract Windowing Toolkit**	**15 Hours**

Abstract Windowing Toolkit-I – Abstract Windowing Toolkit-II-Swing-Exception Handling-Multi Threading.*(Chapter: 9, 10, 11, 12, 13)*

Unit-IV	**Java packages, Streams**	**15 Hours**

I/O Streams-Networking-java.lang.package(The String class and StringBuffer class)*(Chapter: 14, 15, 16)*

Unit-V	**JDBC and RMI**	**15 Hours**

Java Database Connectivity-Servlets-Remote Method Invocation-Java Beans(MathsBean).*(Chapter: 18, 19, 20, 21)*

Books for study: Programming with JAVA, Muthu, Tata McGraw Hill, 2nd Edition, 2011.

Books for Reference:

1. The Complete Reference Java 2, Patrick Naughton, Herbert Schildt, Tata McGraw Hill, 5th Edition, 2006.
2. Java Programming, E. Balagurusamy, Tata McGraw Hill, 4th Edition, 2011.
3. Programming with Java, John R. Hubbard, Schaum Series, 2011

E-Resources:

https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/download/java/LearnJava.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Apply Java based code for solving low complexity problems	**K1**
CO2	Utilize Object Oriented Features in Java for solving medium complexity problems	**K1,K2**
CO3	Exploit Exception Handling Feature in Java	**K4**
CO4	Develop Multi-Threaded Java Applications	**K3**
CO5	Utilize appropriate Java Stream Classes to Solve IO Related Problems.	**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										

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCPR41	**DSC9**	**Programming in Java - Lab**	**3**	**3**

Course Objectives

1. To impart knowledge of Object Orientation
2. To impart knowledge of remote access
3. To impart knowledge of data security
4. To impart knowledge of networking
5. To impart knowledge of concurrent processing

Lab Experiments:

Module 1:

1. Write a java program to multiply two given matrices
2. Write a java program to implement method overloading and constructors overloading
3. Write a java program to implement method overriding

Module 2:

1. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
2. Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Module 3:

1. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
2. Write a java program that correct implements of producer consumer program.

Module 4:

1. Write a java program that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with “STOP” or “READY” or ”GO” should appear above the buttons in selected color. Initially, there is no message shown.
2. Write a java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*, % operations. Add a text field to display the result. Handle any possible exception like divided by zero.

Module 5:

1. Implementation of Using TCP,Using UDP
2. Implementation of RMI(Addition of two numbers)

3. Implementation of Java Beans(MathsBean)
Books for study: Department Lab Manual
Books for Reference: Programming with JAVA, Muthu, Tata McGraw Hill, 2nd Edition, 2011.
E-Resources: https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/download/java/LearnJava.pdf

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Able to create classes and object	**K1**
CO2	**Utilize Object Oriented Features in Java for solving medium complexity problems**	**K1,K2**
CO3	**Exploit Exception Handling Feature in Java**	**K4**
CO4	**Develop Multi-Threaded Java Applications**	**K3**
CO5	**Utilize appropriate Java Stream Classes to Solve IO Related Problems.**	**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%
Matches	**1-12**	**13-24**	**25-28**	**29-40**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAL41	**OEC8**	**COMPUTER ORIENTED FINANCIAL ACCOUNTING – II**	**5**	**4**

Course Objectives

1. To enlighten the students about Computation of Average Due Date and Insurance Claims.
2. To make the students to prepare Branch Accounts and Departmental Accounts.
3. To impart practical knowledge on Accounting for Non-Profit Organization and Accounting Software.

Unit-I	**Average Due Date and Fire Insurance Claims**	**15 Hours**

Meaning of Average Due Date – Determination of Due Date – Calculation of Interest.Meaning of Fire Insurance – Need for Fire Insurance – Computation of Claims to be lodged for loss of stock – Average Clause.

Unit-II	***Branch Accounting***	**15 Hours**

Meaning and Types of Branches – Branch Accounting – Objectives of Branch Accounting - Accounting for Dependent Branches – Debtors System – Stock and Debtors System – Final Account System.

Unit-III	**Departmental Accounting**	**15 Hours**

Distinction between Departments and Branches – Allocation of Common Expenses – Expenses which cannot be allocated – Preparation of Departmental Accounts – Inter Departmental Transfers at cost price. (Simple Problems only).

Unit-IV	**Accounting for Non-Profit Organizations**	**15 Hours**

Preparation of Receipts and Payments Account – Preparation of Income and Expenditure Account. (Simple Problems only).

Unit-V	**Accounting Software**	**15 Hours**

Accounting Software – Features of Accounting Software – Types of Accounting Software – Readymade Software – Customized Software – Tailored-made Software - Tally ERP 9 –Quick Book –Clean Book.

Books for Study

1. **Neeraj Goyal & Rohit Sachdeva**, Computerised Accounting, Kalyani Publishers, New Delhi.
2. **S.M.Shukla**, Financial Accounting &Computerised Accounting, SahityaBhawanPublications , New Delhi.
3. **R.L.Gupta& M. Radhaswamy,** Financial Accounting, Sultan Chand & Sons., New Delhi.
4. **S. Thothadri& S. Nafeesa,** Financial Accounting, McGraw Hill Education, Chennai.
5. **T.S. Reddy & Murthy,** Financial Accounting, Margham Publications, 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 &K.L.Narang,** Financial Accounting, Kalyani Publishers, Ludhiana.
3. **Mukherji& M. Hanif,** Financial Accounting, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
4. **DhaneshKhatri**, Financial Accounting, McGraw Hill Education, Chennai.
5. **K Murugadoss & M Ja**ya, Financial Accounting, Vijay Nicole Imprints Private Ltd., Chennai.

E-Resources: https://www.udemy.com/course/fundamentals-of-computer-based-financial-accounting/

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Calculate Average Due Date and Fire Insurance Claims.	**K2, K3**
CO2	Prepare Accounts for different Branches.	**K2, K3**
CO3	Prepare Departmental Trading and Profit & Loss Accounts.	**K2, K3**
CO4	Prepare Receipts and Payment Account and Income and Expenditure Account.	**K2, K3**
CO5	Understand various computersied accounting software.	**K2, K3**
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 = 26 , 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 IV				
COURSE CODE	**COURSE**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAP41	**OEC9**	**COMPUTER ORIENTEDFINANCIAL ACCOUNTING LAB– II**	**3**	**3**

Course Objectives

1. To enable students in preparing and maintaining Suppliers' and Customers' transactions in computerized accounting.
2. To assist students in preparing and generating GST Invoices using Tally ERP 9 Software.
3. To help students in preparing Payroll of Employees.

Unit-I	**Receivable and Payment Management**	**12 Hours**

Receivables and Payables Management – Activating Bill Wise Details – Sales Entries - Purchase Entries - Activating Debit Note and Credit Note for passing entries - Entries for Discount Allowed and Discount Received - Purchase Returns and Sales Returns - Entries for Receipt of Money from Credit Customers and Payment to Suppliers.

Unit-II	***Payroll Management***	**12 Hours**

Introduction – Salient features of Tally ERP 9's Payroll – Enabling Payroll in Tally – Payroll Configuration - Create Pay Heads – Create Employee Masters – Employee Group Creation.

Unit-III	**Creating GST Ledgers**	**12 Hours**

Goods and Services Tax (GST) – Features - Creating GST Ledgers – Creating of CGST Account - SGST Account - IGST Account and UTGST Account under Duties & Taxes.

Unit-IV	**Passing of GST Voucher Entries**	**12 Hours**

Passing GST Voucher Entries for Purchases and Sales. Entries for Local Purchase and Inter State Purchase – Entries for Local Sales and Inter State Sales - Entries for Return Inwards and Outwards

Unit-V	**Generating Invoice & Statutory Reports**	**12 Hours**

Display and Generate GST Bill/Invoice for Purchases and Sales – Displaying and Generating Reports – GSTR 1 – Generating Inter State Sales and Purchase Reports – Generating Intra State Sales and Purchase Reports

Books for study:

1. **Dr. P. Rizwan,** Tally ERP 9, Margham Publications, Chennai
2. **Asok K Nadhani**, Tally ERP 9 Made Simple: Basic Financial Accounting, BPB Publications, New Delhi.
3. **Vishnu P.Singh**, **—**Tally-ERP9‖-Computer, Publications Ltd, New Delhi.
4. **Soumya Ranjan Behera**, Learn Tally.ERP 9, BK Publications Pvt. Ltd, New Delhi.
5. **S. Palanivel**, Tally - Accounting Software, Margham Publications, Chennai.

Books for Reference:

1. **Kogent LearningSolutions Inc.**, Tally ERP 9 in Simple Steps, DreamTech Press Inc. New Delhi.
2. **Shraddha Singh, Navneet Mehra,** Tally ERP 9 – Power of Simplicity, V & S Publishers, New Delhi. 36
3. **DT Editorial** Services Tally. ERP 9 with GST in Simple Steps — Dream Tech Press – New Delhi
4. **Shraddha Singh**, Tally ERP 9 (Power of Simplicity), V & S Publishers – New Delhi.
5. **A.K. Nadhani& K.K. Nadhani**, Tally 9, BPB Publications, New Delhi

E-Resources: https://www.udemy.com/course/fundamentals-of-computer-based-financial-accounting/

Methodology of Teaching:

ICT Presentation, Video lectures, Assignments on problems

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Prepare and maintain Bills Receivables and Payables in Tally ERP 9.	**K2, K3**
CO2	Create GST Ledgers for Purchases and Sales (Local and Inter-State)	**K2, K3**
CO3	Create and Maintain Payroll of Employees in Tally ERP 9	**K2, K3**
CO4	Pass entries for GST Local and Inter-State Purchases and Sales	**K2, K3**
CO5	Generate Reports: Invoices, Final Accounts and GSTR 1	**K2, K3**
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
CO1	✓	✓	✓	✓		✓	✓	✓
CO2		✓			✓			
CO3		✓	✓	✓	✓	✓		
CO4	✓		✓			✓		✓
CO5	✓		✓	✓	✓		✓	✓
Number of matches = 24 , Correlation: Moderate								

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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAL42	**OEC8**	**Operation Research**	**5**	**4**

Course Objectives

1. To introduce the concepts, models and problem solving techniques in optimization problems.
2. To solve the linear programming problems using various methods.
3. To implement operation research models for solving transportation and assignment problems.
4. To learn and understand sequencing problems with n-jobs and m-machines.
5. To acquire knowledge in application of queuing models in business for making decisions

Unit-I	**Introduction of OR and LPP**	**12 Hours**

Origin – Nature of OR – Characteristics of OR – Models in OR – Phases of OR – Uses and Limitations of OR – Mathematical Formulation of LPP – Solution of LPP by Graphical Method.

Unit-II	**Linear Programming Problem**	**12 Hours**

Solution of LPP by Simplex Method – Big-M method – Duality in LPP – Dual Simplex Method -Simple Problems.

Unit-III	**Transportation Problem**	**12 Hours**

Transportation Problem – Formulation – Balanced, Unbalanced Transportation Problem – Initial Basic Feasible Solution – North West Corner Rule – Least Cost Method – Vogel's Approximation Method – Optimum solution – MODI method.

Unit-IV	**Assignment Problem and Sequencing Problem**	**12 Hours**

Solution of Balanced and Unbalanced Assignment Problems – Sequencing Problem – Problems with n - jobs through two machines – n-jobs through three machines – Problems with n-jobs and m-machines.

Unit-V	**Queuing Theory**	**12 Hours**

Basic concepts of queueing theory - Characteristics of a queueing model – classification of queueing models- Average waiting time, expected queue length - variance of queue length - Expression for probability of n customers in the system p(n) for the queueing models (M/M/1: ∞/FIFO) and (M/M/1: N/FIFO) - Simple problems.

Books for study:

1. Kanti Swarup, Gupta P. K, Man Mohan (1980), Operations Research, Sultan Chand and sons, New Delhi.
2. Gupta, P.K., and Man Mohan. (1979). Operations Research: Linear Programming and Theory of Games, Third Edition, Sultan Chand and Sons, New Delhi.

Books for Reference:

1. Taha, H.A (2011). Operations Research: An Introduction, Ninth Edition, Prentice Hall Publishing Company.
2. Sharma J.K. (2013), Operations Research: Problems and Solutions, (Fifth Edition) Macmillan India Limited.
3. Gupta R. K (1985), Operations Research, Krishna Prakashan, Mandir Meerut.

E-Resources:
http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdfhttp://www.uky.edu/~dsianita/300/online/LP.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Gain knowledge about various optimization techniques.	**K1**
CO2	Solve the problems related to business and industries by using linear programming techniques.	**K1,K2**
CO3	Execute operations research techniques for finding the optimum solution in real life situations.	**K4**
CO4	Solve the sequencing , transportation and assignment problems	**K3**
CO5	Understand the characteristics of a queuing system.	**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%
Matches	**1-12**	**13-24**	**25-28**	**29-40**
Correlation	**Poor**	**Moderate**	**High**	**Very High**

SEMESTER IV				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAP42	**OEC9**	**Operation Research Lab**	**3**	**3**

Course Objectives

1. Introduction to optimization techniques using both linear and non-linear programming.
2. The focus of the course is on convex optimization though some techniques will be covered for non-convex function optimization too.
3. After an adequate introduction to linear algebra and probability theory, students will learn to frame engineering minima maxima problems in the framework of optimization problems.

Lab Experiments using Python

1. Transportation Problem I
2. Transportation Problem II
3. Linear Programming I
4. Linear Programming II
5. Assignment Problem I
6. Assignment Problem II
7. Queuing Problem
8. Sequencing Problem
9. Game Theory

Books for study: Department Lab Manual

Books for Reference:

1. Taha, H.A (2011). Operations Research: An Introduction, Ninth Edition, Prentice Hall Publishing Company.
2. Sharma J.K. (2013), Operations Research: Problems and Solutions, (Fifth Edition) Macmillan India Limited.
3. Gupta R. K (1985), Operations Research, Krishna Prakashan, Mandir Meerut.

E-Resources:
http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdfhttp://www.uky.edu/~dsianita/300/online/LP.pdf

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basic principles and concepts of Operation Research	**K1**
CO2	Explore the applicability of programming skills in MODI Methods.	**K1,K2**
CO3	Summarize various optimization techniques like LPP models.	**K4**
CO4	Analyze the transportation, inventory and assignment problems.	**K3**
CO5	Explain the concepts of sequencing, game theory.	**K6,K2**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	ProgrammeSpecific 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**
UBDS3001	**DSC4**	**Programming in Python**	**6**	**4**

Course Objectives

1. To impart knowledge of Object oriented programming
2. To impart knowledge of multiple data structures
3. To impart knowledge of hierarchical coding
4. Prepare the learner for data mining
5. Prepare the learner for Python libraries

Unit-I	**PYTHON BASICS&CONTROL CONSTRUCTS**	**15 Hours**

Why Python? –Python Fundamentals - Essential Python libraries - Features, Identifiers, Reserved words, Indentation, Comments, Operators- Decision Making- Looping- Loop Control statement

Unit-II	**FUNCTIONS&BUILT-IN TYPES**	**15 Hours**

Math and Random number functions. User defined functions - function arguments & its types - Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion

Unit-III	**OOPS**	**15 Hours**

OOPs: Classes and Objects, Constructor, Data Abstraction, Inheritance, User defined Modules and Packages in Python

Unit-IV	**EXCEPTION HANDLING & FILES**	**15 Hours**

Files: File manipulations, File and Directory related methods -Generators and Iterators - Python Exception Handling.

Unit-V	**PYTHON LIBRARIES: NUMPY & PANDAS**	**15 Hours**

NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing- Transposing Arrays and Swapping Axes. Introduction to pandas Data Structures: Series, DataFrame, Essential Functionality: Dropping EntriesIndexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking.

Books for study:

1. Reema Thareja, “Python Programming using Problem Solving Approach”, Oxford University Press, First Edition,2017.
2. Allen B. Downey , “Think Python: How to think like a Computer Scientist” , Second Edition, Shroff, O ‘Reilly Publishers, 2016
3. Wes McKinney, “Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython”, O’Reilly, 2nd Edition,2018

Books for Reference:

1.Wesley J. Chun, “Core Python Programming”, Prentice Hall,2006.
2.Mark Lutz, “Learning Python”, O’Reilly, 4th Edition, 2009.

E-Resources: *https://docs.python.org/3/tutorial/*

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Ability to code for hierarchical programming	**K1, K2**
CO2	Protect data for unauthorized usage	**K3, K2**
CO3	Design user defined exception mechanisms	**K6, K2**
CO4	Perform mining of data	**K3, K4**
CO5	Create a file for permanent storage	**K6**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO1	✓		✓		✓		✓		✓	
CO2		✓		✓		✓		✓		✓
CO3	✓		✓		✓		✓		✓	
CO4		✓	✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 28, Correlation: High										

<u>Mapping Correlation Benchmark</u>

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	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBDSPR31	**DSC5**	**Python Lab**	**3**	**3**

Course Objectives

1. To impart knowledge of Object oriented programming
2. To impart knowledge of multiple data structures
3. To impart knowledge of hierarchical coding
4. Prepare the learner for data mining
5. Prepare the learner for Python libraries

Lab Experiments:

1. Linear search and Binary search
2. Selection sort, Insertion sort, Merge sort
3. Find the most frequent words in a text read from a file.
4. Inserting a record in a CSV file using function.
5. Selecting a record from a CSV file.
6. Simulate bouncing ball using Pygame
7. Write a Python script to read each row from a given csv file and print a list of strings.
8. Write a Python program to read a given CSV file as a dictionary.
9. Write the python script to Read the XML file.
10. Write a Pandas program to import excel data (child labour and child marriage data.xlsx) into a Pandas data frame and process the following
    a. Get the data types of the given excel data
    b. Display the last ten rows.
    c. Insert a column in the sixth position of the said excel sheet and fill it with NaN values

Books for study: Department Lab Manual

Books for Reference: Y. Daniel Liang, “Introduction to Programming using Python”, Pearson,2012.

E-Resources:*https://docs.python.org/3/tutorial/*

Methodology of Teaching:

ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Ability to code for hierarchical programming	**K1, K2**
CO2	Protect data for unauthorized usage	**K3, K2**
CO3	Design user defined exception mechanisms	**K6, K2**
CO4	Perform mining of data	**K3, K4**
CO5	Create a file for permanent storage	**K6**

K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO1	✓		✓		✓		✓		✓	
CO2		✓		✓		✓		✓		✓
CO3	✓		✓		✓		✓		✓	
CO4		✓		✓		✓		✓		
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 29 , 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**
UBDSAL31	**OEC5**	**Allied - Computer Oriented Statistical Methods I**	**5**	**4**

Course Objectives

4. To familiar and to develop learning mindsets to analyze statistical data through Computational methods.
5. To train students with essential tools for statistical analyses
6. To learn scientific view to conduct the survey in proper way to collect the data about specific perspective.

Unit-I	**INTRODUCTION AND GRAPHICAL REPRESENTION**	**15 Hours**

Definitions of Statistics, Importance of statistics, Advantages and Limitations, Scope of Statistics, Collection of Data ,Types of Data, Attributes and variables, Construction of Frequency, Cumulative and Relative ,Frequency distributions, Graphical representation of Frequency distribution:(Histogram, Frequency Polygon, Frequency Curve and Cumulative Frequency curves (Ogive curves)).Diagrammatic representations: Simple bar, Subdivided bar, Pie diagrams.

Unit-II	**MEASURES OF CENTRAL TENDENCY& DISPERSION**	**15 Hours**

Concept of Central Tendency: Arithmetic Mean, Median, Mode, Quartiles: Definition, Formulae and computation for ungrouped and grouped data, Merits and Demerits

Concept of Dispersion: Range, Standard Deviation, Variance, Coefficient of variance: Definition, Formulae and Computation for ungrouped and grouped data

Unit-III	**CORRELATIONS**	**15 Hours**

Definition of Correlation, Types of Correlation, Karl Pearson's coefficient of correlations for ungrouped data and problems.

Unit-IV	**PROBABILITY AND DISTRIBUTION FUNCTIONS**	**15 Hours**

Probability – Expectation – Fitting of Distributions – Binomial, Poisson and Normal

Unit-V	**TIME SERIES**	**15 Hours**

Definition and components of time series, Measures of trends, Moving average method and least square method and problems.

Books for study:

1. Fundamentals of Statistics by A.M. Gun, M.K.Gupta and B. Dasgupta
2. Statistical Methods by S.P. Gupta.

Books for Reference:

1. Business Statistics by S. Shaha
2. Modern Elementary Statistics by J.E. Freund
3. Fundamentals of Statistics by S C Gupta.
4. Fundamentals of Applied Statistics by Gupta and Kapoor.

E-Resources: *Business Statistics - Course (nptel.ac.in)*

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Organize, manage and present data.	**K1**
CO2	Calculate and interpret the correlation between two variables.	**K1,K2**
CO3	Analyze statistical data using measures of central tendency, dispersion and location.	**K4**
CO4	Use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions.	**K3**
CO5	Identify the type of statistical situation to which different distributions can be applied.	**K6,K2**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO1	✓	✓		✓		✓		✓		
CO2	✓		✓		✓		✓		✓	
CO3	✓	✓		✓		✓		✓		✓
CO4	✓		✓		✓		✓		✓	
CO5	✓	✓		✓		✓		✓		✓
Number of matches = 27, 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	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBDSAP31	**OCE6**	**Allied- Computer Oriented Statistical Methods Lab I**	**3**	**3**

Course Objectives

1. To familiar and to develop learning mindsets to analyze statistical data through Computational methods
2. To train students with essential tools for statistical analyses
3. To learn scientific view to conduct the survey in proper way to collect the data about specific perspective.

Lab Experiments Using R/Excel

1. Construction of histogram for given statistical data.
2. Construction of frequency polygon for given statistical data.
3. Construction of frequency curve for given statistical data.
4. Construction of ogive for given statistical data.
5. Construction of simple bar diagram for given statistical data.
6. Construction of subdivided bar diagram for given statistical data
7. Construction of pie diagram for given statistical data
8. To compute various measure of central tendency (mean, median, mode)
9. To compute various measure of dispersion (range, standard deviation, CV)
10. To compute coefficient of correlation

Books for study: Department Lab Manual

Books for Reference: J.N. Kapur And H.C. Saxena S.Chand Publications 12th Ed 2016

E-Resources: Business Statistics - Course (nptel.ac.in)

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Organize, manage and present data.	**K1**
CO2	Calculate and interpret the correlation between two variables.	**K1,K2**
CO3	Analyze statistical data using measures of central tendency, dispersion and location.	**K4**
CO4	Use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions.	**K3**
CO5	Identify the type of statistical situation to which different distributions can be applied.	**K6,K2**

K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create

Course Outcomes (COs)	ProgrammeSpecific 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**
UBDSAL32	**OEC5**	**Allied - Discrete Mathematics**	**5**	**4**

Course Objectives

1. Able to understand the concepts of Logics and Proofs
2. Understand the basic concepts of Combinatorics and set functions
3. Understand the concepts of algebraic systems and graphs

Unit-I	LOGICS AND PROOFS	**12 Hours**

Propositions – Logical connectives – Compound propositions – Conditional and bi-conditional propositions – Truth tables – Tautologies and contradictions – Contra positive – Logic equivalences and implications. Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements. *Suggested Reading:* Basics of logical operators

Unit-II	COMBINATORICS	**12 Hours**

Mathematical Induction-Strong induction and well ordering – the basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – inclusion and exclusion and applications. *Suggested Reading:* Basics of probability

Unit-III	SETS AND FUNCTIONS	**12 Hours**

Sets: Relations on sets – Types of relations and their properties – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram. Functions: Characteristic function of a set – Hashing functions – Recursive functions – Permutation functions. *Suggested Reading:* Basic concepts of sets and Functions

Unit-IV	ALGEBRAIC SYSTEMS	**12 Hours**

Groups, Cyclic Groups, Subgroups, Cosets, Lagrange's theorem, Normal subgroups – Codes and group codes – Decodes. *Suggested Reading:* Basics of Groups

Unit-V	GRAPHS	**12 Hours**

Graphs and graphs models – Graph terminology and special types of graphs – Representing raphs and graph isomorphism – connectivity – Euler and Hamilton paths. *Suggested Reading:* Basics of Graphs

Books for study:

3. Singaravelu, M. P. Jeyaraman, "Discrete Mathematics", Meenakshi Agency, 2013.
4. Kenneth H. Roshan, "Discrete Mathematics and its Applications", Tata McGraw Hill, 2011

Books for Reference:

4. Trembly J.P and Monohar R, “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw Hill, 2003.
5. Trivedi.K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd Edition, 2002
6. J. A. Bondy and U.S.R Murty, “Graph Theory”, Springer, 2008.

E-Resources: http://nptel.ac.in/courses/106106094/

Methodology of Teaching: Chalk and Talk, ICT Presentation, Video lectures,

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Write an argument using logical notation and determine if the argument is valid or not valid.	K1
CO2	Understand the ideas of permutations and combinations.	K1,K2
CO3	Demonstrate an understanding of relations and functions	K4
CO4	Recognize the principles of the group theory.	K3
CO5	Design model problems in computer science using Graphs.	K6,K2
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	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**
UBDSAP32	**OEC6**	**Discrete Mathematics Lab- I**	**3**	**3**

Course Objectives

4. Able to understand the concepts of Logics and Proofs
5. Understand the basic concepts of Combinatorics and set functions
6. Understand the concepts of algebraic systems and graphs

Lab Experiments using C

1. Write a program to find intersection set of two sets
2. Write a program to find union set of two sets …
3. Write a program to find Compliment set of the given set
4. Write a program to find difference set of two sets
5. Write a program to find symmetric difference set of two sets
6. Write a program to prove the D'Morgan's Laws of set theory
7. Write a program to find the power set of the given set
8. Write a program to find permutation of the set
9. Find the cardinality of the set and prove

   $|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$

Books for study: Department Lab Manual

Books for Reference: Lab manual

E-Resources:
http://nptel.ac.in/courses/106106094/

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Write an argument using logical notation and determine if the argument is valid or not valid.	K1
CO2	Understand the ideas of permutations and combinations.	K1,K2
CO3	Demonstrate an understanding of relations and functions	K4
CO4	Recognize the principles of the group theory.	K3
CO5	Design model problems in computer science using Graphs.	K6,K2

K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create

Course Outcomes (COs)	ProgrammeSpecific 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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBDS4001	**DSC6**	**R Programming**	**6**	**4**

Course Objectives

1. The basics of statistical computing , data analysis and make use of R for analytical programming
2. To implement data structure in R, R loop functions and debugging tools.
3. Understanding custom R functions.
4. Prepare students for predictive analysis
5. Prepare the students to infer R for statistical applications

Unit-I	**R Fundamentals**	**15 Hours**

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

Unit-II	**R Controls and Functions**	**15 Hours**

R Programming Structures, Control Statements, Loops, - Looping Over Non vector Sets- IfElse, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion.

Unit-III	**R Math and Simulation**	**15 Hours**

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability Cumulative Sums and Products-Minima and Maxima- Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files.

Unit-IV	**R Graphics**	**15 Hours**

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot () Function – Customizing Graphs, Saving Graphs to Files.

Unit-V	**Correlation and Regression Analysis, Statistical Inference**	**15 Hours**

Introduction to Correlation and Regression Analysis – Correlation Analysis – **Regression Analysis:** lattice package in R - 1D, 2D, 3D plots using lattice ggplot2 package in R- 1D, 2D, 3D plots using ggplot2, **Statistical Inference :** Introduction to Statistical Inference – Hypothesis Testing. Analysis of Variance: Introduction to Analysis of Variance – Implementing Analysis of Variance – Variants of ANOVA – ANOVA in R.

Books for study:

1. The Art of R Programming, Norman Matloff, Cengage Learning
2. R for Everyone, Lander, Pearson
3. Sandhya Arora ,Latesh Malik , ―R Programming for beginners‖,UniversitiesPressIInis)Pvt Limited 2020.

Books for Reference:

1. R Cookbook, Paul Teetor, Oreilly.
2. R in Action, Rob Kabacoff, Manning

E-Resources: Introduction to R Software - Course (nptel.ac.in)

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	To acquire the knowledge on R fundamentals, data structures and arrays.	**K1**
CO2	UnderstandthebasicsinRintermsofconstructs,controlstatements, stringfunctions.	**K2**
CO3	To solve the complex real time problems in various applications mathematical modeling and simulation approach has been used.	**K3,K5**
CO4	Analyze data and generate reports based on the input data.	**K4**
CO5	Correlation strengthens pair of variables; regression expresses the relationship in the form of an equation a*nd Statistically* infers properties of an underlying distribution of probability.	**K1,K3**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO1	✓	✓								✓
CO2	✓	✓	✓	✓		✓			✓	
CO3		✓	✓		✓			✓		✓
CO4		✓	✓	✓	✓	✓				✓
CO5	✓	✓	✓	✓			✓	✓		
Number of matches = 26, Correlation: High										

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBDSPR41	**DSC7**	**R -Lab**	**3**	**3**

Course Objectives

1. Acquiring the knowledge on basics of statistical computing and data analysis.
2. Access online resources for R and import new function packages into the R workspace
3. Import, review, manipulate and summarize data-sets in R.
4. Explore data-sets to create testable hypotheses and identify appropriate statistical tests.
5. Deal intensively with statistical tests using R and Prepare students to create models and do predictive modeling.

LIST OF PROGRAMS:

1. Demonstrate the usage of Numbers and Vectors in R
2. Simple manipulations on Numbers and Vectors, Objects- modes and attributes, Ordered and unordered Factors.
3. Implement the concepts of Arrays and Matrices.
4. Demonstrate the usage of Data Frames and Lists and its attributes -attach, detach, scan and importing a file.
5. Implement the concept of grouping and conditional execution on Data Frames and Lists
6. Demonstrate the usage of apply( ) functions.
7. Implement the usage of dplyr package
8. Utilize a lattice package to plot 1D, 2D and 3D plots for a given dataset.
9. Demonstrate Pearson correlation and regression analysis.
10. Demonstrate ANOVA.

Books for study: Department Lab Manual

Books for Reference: The Art of R Programming, Norman Matloff, Cengage Learning

E-Resources: Introduction to R Software - Course (nptel.ac.in)

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Master the use of the R interactive Environment with vectors , arrays and Matrices.	**K2**
CO2	Combine our knowledge about of *data frames*/datasets to create a new object class for data analysis and manipulations.	**K4** **K6**
CO3	Develop loop constructs ,functions and dplyr packages makes data exploration and data manipulation easy and fast in R.	**K1**
CO4	Use R for Descriptive Statistics and plotting data in different dimension.	**K3**
CO5	Use R for Inferential Statistics.	**K3**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO1	✓	✓								✓
CO2	✓	✓	✓	✓		✓			✓	
CO3		✓	✓		✓			✓		✓
CO4		✓	✓	✓	✓	✓				✓
CO5	✓	✓	✓	✓			✓	✓		
Number of matches = 26, Correlation: High										

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBDSAL41	**OEC8**	**Allied-Computer Oriented Statistical Methods II**	**5**	**4**

Course Objectives

1. To familiar and analyze statistical data through Computational methods
2. To train students with essential tools for statistical analyses
3. To learn scientific view to conduct the survey in proper way and to collect the data .

Unit-I	**Statistical Decision Theory**	**15 Hours**

Statistical Decisions, Statistical Hypotheses, Tests of Hypotheses and Significance, or Decision Rules, Type I and Type II Errors, Level of Significance, Tests Involving Normal Distributions, Two-Tailed and One-Tailed Tests, Special Tests, Operating- Characteristic Curves.

Unit-II	**Small Sampling Theory &Chi-Square Test**	**15 Hours**

Small Samples, Tests of Hypotheses and Significance, Confidence Intervals for Sigma , Definition of chi-square, Significance Tests, The Chi-Square Test for Goodness of Fit, Contingency Tables, Yates' Correction for Continuity, Simple Formulas for Computing chi-square, Coefficient of Contingency, Correlation of Attributes, Additive Property of chi- square.

Unit-III	**Analysis of Variance**	**15 Hours**

t-test, F-test, Analysis of Variance

Unit-IV	**Curve Fitting and the Method of Least Squares**	**15 Hours**

Relationship Between Variables, Curve Fitting, Equations of Approximating Curves, Freehand Method of Curve Fitting, The Straight Line, The Method of Least Squares, The Least-Squares Line, Nonlinear Relationships, The Least-Squares Parabola, Regression, Applications to Time Series, Problems Involving More Than Two Variables.

Unit-V	**Statistical Estimation Theory**	**15 Hours**

Estimation of Parameters, Unbiased Estimates, Efficient Estimates, Point Estimates and Interval Estimates; Their Reliability, Confidence-Interval Estimates of Population Parameters, Probable Error.

Books for study:
Fundamental Of Mathematical Statistics by S.C. Gupta And V.K. Kapoor, 11th Edition, 2011, Sultan Chand Publishers

Books for Reference:
Mathematical Statistics by J.N. Kapur And H.C. Saxena, 12th Ed, 2005, S.Chand Publishers

E-Resources: https://www.coursera.org/learn/statistics-for-data-science-python

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Know the practical issues arising in sampling studies.	**K2**
CO2	Acquire knowledge on vital statistics, Index numbers and calculate an indices from given data.	**K1,K3**
CO3	Appropriately interpret results of analysis of variance tests.	**K4**
CO4	Demonstrate understanding of the concepts of time series and its applications in different areas.	**K5,K6**
CO5	Evaluate the properties of estimators.	**K5**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO1	✓			✓		✓	✓			✓
CO2	✓	✓	✓	✓			✓			
CO3		✓	✓			✓		✓	✓	
CO4	✓		✓	✓	✓					✓
CO5		✓			✓	✓		✓	✓	
Number of matches = 25 , Correlation: High										

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBDSAP41	**OEC9**	**Allied- Computer Oriented Statistical Methods Lab II**	**3**	**3**

Course Objectives

1. To familiar and to develop learning mindsets to analyze statistical data through Computational methods
2. To train students with essential tools for statistical analyses
3. To learn scientific view to conduct the survey in proper way to collect the data about specific perspective.

Lab Experiments with their sub divisions: (preferably Python) R / Scilab

1. Test of Significance
2. Analysis of Variance(One way and Two way classification)
3. Sampling Methods
4. Binomial and Normal Distribution
5. F-Test
6. t-Test
7. Curve fitting

Books for study: Department Lab Manual

Books for Reference: J.N. Kapur And H.C. Saxena S.Chand Publications 12th Ed 2016

E-Resources: Probability and Statistics - Course (nptel.ac.in)

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Know the practical issues arising in sampling studies.	**K1,K2**
CO2	Acquire knowledge on vital statistics, Index numbers and calculate an indices from given data.	**K1,K3**
CO3	Appropriately interpret results of analysis of variance tests.	**K4**
CO4	Demonstrate understanding of the concepts of time series and its applications in different areas.	**K5,K6**
CO5	Evaluate the properties of estimators.	**K3**

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 = 25 , 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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBDSAL42	**OEC8**	**Operation Research**	**5**	**4**

Course Objectives

6. To introduce the concepts, models and problem solving techniques in optimization problems.
7. To solve the linear programming problems using various methods.
8. To implement operation research models for solving transportation and assignment problems.
9. To learn and understand sequencing problems with n-jobs and m-machines.
10. To acquire knowledge in application of queuing models in business for making decisions.

Unit-I	**Introduction of OR and LPP**	**12 Hours**

Origin – Nature of OR – Characteristics of OR – Models in OR – Phases of OR – Uses and Limitations of OR – Mathematical Formulation of LPP – Solution of LPP by Graphical Method.

Unit-II	**Linear Programming Problem**	**12 Hours**

Solution of LPP by Simplex Method – Big-M method – Duality in LPP – Dual Simplex Method -Simple Problems.

Unit-III	**Transportation Problem**	**12 Hours**

Transportation Problem – Formulation – Balanced, Unbalanced Transportation Problem – Initial Basic Feasible Solution – North West Corner Rule – Least Cost Method – Vogel's Approximation Method – Optimum solution – MODI method.

Unit-IV	**Assignment Problem and Sequencing Problem**	**12 Hours**

Solution of Balanced and Unbalanced Assignment Problems – Sequencing Problem – Problems with n - jobs through two machines – n-jobs through three machines – Problems with n-jobs and m-machines.

Unit-V	**Queuing Theory**	**12 Hours**

Basic concepts of queueing theory - Characteristics of a queueing model – classification of queueing models- Average waiting time, expected queue length - variance of queue length - Expression for probability of n customers in the system p(n) for the queueing models (M/M/1: ∞/FIFO) and (M/M/1: N/FIFO) - Simple problems.

Books for study:

3. Kanti Swarup, Gupta P. K, Man Mohan (1980), Operations Research, Sultan Chand and sons, New Delhi.
4. Gupta, P.K., and Man Mohan. (1979). Operations Research: Linear Programming and Theory of Games, Third Edition, Sultan Chand and Sons, New Delhi.

Books for Reference:

4. Taha, H.A (2011). Operations Research: An Introduction, Ninth Edition, Prentice Hall Publishing Company.
5. Sharma J.K. (2013), Operations Research: Problems and Solutions, (Fifth Edition) Macmillan India Limited.
6. Gupta R. K (1985), Operations Research, Krishna Prakashan, Mandir Meerut.

E-Resources:

http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdfhttp://www.uky.edu/~dsianita/300/online/LP.pdf

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Gain knowledge about various optimization techniques.	**K1**
CO2	Solve the problems related to business and industries by using linear programming techniques.	**K1,K2**
CO3	Execute operations research techniques for finding the optimum solution in real life situations.	**K4**
CO4	Solve the sequencing , transportation and assignment problems	**K3**
CO5	Understand the characteristics of a queuing system.	**K6,K2**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	Programme Specific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO1	✓	✓		✓		✓		✓		✓
CO2	✓		✓		✓		✓		✓	
CO3	✓	✓		✓		✓		✓		✓
CO4	✓		✓		✓		✓		✓	
CO5	✓	✓		✓		✓		✓		✓
Number of matches = 28, Correlation: High										

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBDSAP42	**OEC9**	**Operation Research Lab**	**3**	**3**

Course Objectives

1. Introduction to optimization techniques using both linear and non-linear programming.
2. The focus of the course is on convex optimization though some techniques will be covered for non-convex function optimization too.
3. After an adequate introduction to linear algebra and probability theory, students will learn to frame engineering minima maxima problems in the framework of optimization problems.

Lab Experiments using Python

1. Transportation Problem I
2. Transportation Problem II
3. Linear Programming I
4. Linear Programming II
5. Assignment Problem I
6. Assignment Problem II
7. Queuing Problem
8. Sequencing Problem
9. Game Theory

Books for study: Department Lab Manual

Books for Reference:

1. Taha, H.A (2011). Operations Research: An Introduction, Ninth Edition, Prentice Hall Publishing Company.
2. Sharma J.K. (2013), Operations Research: Problems and Solutions, (Fifth Edition) Macmillan India Limited.
3. Gupta R. K (1985), Operations Research, Krishna Prakashan, Mandir Meerut.

E-Resources:

http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdfhttp://www.uky.edu/~dsianita/300/online/LP.pdf

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basic principles and concepts of Operation Research	**K1**
CO2	Explore the applicability of programming skills in MODI Methods.	**K1,K2**
CO3	Summarize various optimization techniques like LPP models.	**K4**
CO4	Analyze the transportation, inventory and assignment problems.	**K3**
CO5	Explain the concepts of sequencing, game theory.	**K6,K2**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 - Create		

Course Outcomes (COs)	ProgrammeSpecific Outcomes (PSOs)									
	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO1	✓	✓		✓		✓		✓		✓
CO2	✓		✓		✓		✓		✓	
CO3	✓	✓		✓		✓		✓		✓
CO4	✓		✓		✓		✓		✓	
CO5	✓	✓		✓		✓		✓		✓
Number of matches = 28, Correlation: High										

<u>Mapping Correlation Benchmark</u>

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**
UBCC3001	**DSC5**	**C++ & DATA STRUCTURES**	**5**	**4**

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-Design member's functions-Nesting of member functions-Array of class object-Friend function-Static and Data member 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-Working with files-Templates-Class and Function template-Exception Handling.

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 and 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, VI & V).

Books for Reference:

4. C++ the Complete Reference, Herbert Scheldt, Tata McGraw Hill, 4th Edition, 2003.
5. OOP in ANSI C and Turbo C, Ashok N.Kamthene, Pearson Education, 6th Edition,

2008.
6. 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	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCPR31	**DSC7**	**C++ & DATA STRUCTURES LAB**	**3**	**3**

Course Objectives

1. To learn about abstract data types
2. Prepare the learner for composite data structures
3. Develop knowledge of in depth use of pointers
4. Learn about rearranging data
5. Knowledge of efficient searching

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, DFS and Shortest (Dijkstra's).
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%
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**
UBBC3002	**DSC6**	**COMPUTER ORIENTED STATISTICAL METHODS**	**5**	**4**

Course Objectives

1. To familiar and to develop learning mindsets to analyze statistical data through Computational methods.
2. To train students with essential tools for statistical analyses
3. To learn scientific view to conduct the survey in proper way to collect the data about specific perspective.
4. To train students with correlation techniques.
5. Educate students about various time series analysis.

Unit-I	**INTRODUCTION AND GRAPHICAL REPRESENTION**	**12 Hours**

Definitions of Statistics, Importance of statistics, Advantages and Limitations, Scope of Statistics, Collection of Data, Types of Data, Attributes and variables, Construction of Frequency, Cumulative and Relative, Frequency distributions, Graphical representation of Frequency distribution:(Histogram, Frequency Polygon, Frequency Curve and Cumulative Frequency curves (Ogive curves)), Diagrammatic representations: Simple bar, Subdivided bar, Pie diagrams.

Unit-II	**MEASURES OF CENTRAL TENDENCY**	**12 Hours**

Concept of Central Tendency: Arithmetic Mean: Definition, Formulae and computation for ungrouped and grouped data, Merits and Demerits. Median: Definition, Formulae and Computation for ungrouped and grouped data, Merits and Demerits. Quartiles: Definition, Formulae and Computation for ungrouped and grouped data. Mode: Definition, Formulae and Computation for ungrouped and grouped data, Merits and Demerits.

Unit-III	**MEASURES OF DISPERSION**	**12 Hours**

Concept of Dispersion: Range: Definition, Formulae and Computation for ungrouped and grouped data. Standard Deviation: Definition, Formulae and Computation for ungrouped and grouped data. Variance: Definition, Formulae and Computation for ungrouped and grouped data. Coefficient of variance: Definition, Formulae and Computation for ungrouped and grouped data

Unit-IV	**CORRELATIONS**	**12 Hours**

Definition of Correlation, Types of Correlation, Karl Pearson's coefficient of correlations for ungrouped data and problems – Rank Correlation.

Unit-V	**TIME SERIES**	**12 Hours**

Definition and components of time series, Measures of trends, Moving average method and least square method and problems.

Books for study: 3. Fundamentals of Statistics by A.M. Gun, M.K.Gupta and B. Dasgupta 4. Statistical Methods by S.P. Gupta.
Books for Reference: 5. Business Statistics by S. Shaha 6. Modern Elementary Statistics by J.E. Freund 7. Fundamentals of Statistics by S C Gupta. 8. Fundamentals of Applied Statistics by Gupta and Kapoor.
E-Resources: Probability and Statistics - Course (nptel.ac.in)

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Organize, manage and present data.	**K1**
CO2	Calculate and interpret the correlation between two variables.	**K1,K2**
CO3	Analyze statistical data using measures of central tendency, dispersion and location.	**K4**
CO4	Use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions.	**K3**
CO5	Identify the type of statistical situation to which different distributions can be applied.	**K6,K2**
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**	**PSO 9**	**PSO 10**
CO1	✓	✓		✓		✓		✓		
CO2	✓		✓		✓		✓		✓	
CO3	✓	✓		✓		✓		✓		✓
CO4	✓		✓		✓		✓		✓	
CO5	✓	✓		✓		✓		✓		✓
Number of matches = 27, 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**
UBBCSE31	**SEC2**	**COMPUTER ORIENTED STATISTICAL METHODS LAB**	**3**	**3**

Course Objectives

1. To familiar and to develop learning mindsets to analyze statistical data through Computational methods
2. To train students with essential tools for statistical analyses
3. To learn scientific view to conduct the survey in proper way to collect the data about specific perspective.

Lab Experiments using Scilab / Excel

1. Construction of histogram for given statistical data.
2. Construction of frequency polygon for given statistical data.
3. Construction of frequency curve for given statistical data.
4. Construction of ogive for given statistical data.
5. Construction of simple bar diagram for given statistical data.
6. Construction of subdivided bar diagram for given statistical data
7. Construction of pie diagram for given statistical data
8. To compute various measure of central tendency (mean, median, mode)
9. To compute various measure of dispersion (range, standard deviation, CV)
10. To compute coefficient of correlation

Books for study: Department Lab Manual

Books for Reference: J.N. Kapur And H.C. Saxena S.Chand Publications 12th Ed 2016

E-Resources:
https://www.coursera.org/learn/statistics-for-data-science-python

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Organize, manage and present data.	**K1**
CO2	Calculate and interpret the correlation between two variables.	**K1,K2**
CO3	Analyze statistical data using measures of central tendency, dispersion and location.	**K4**
CO4	Use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions.	**K3**
CO5	Identify the type of statistical situation to which different distributions can be applied.	**K6,K2**

K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create

Course Outcomes (COs)	ProgrammeSpecific 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**
UBBCNM31	**OEC4**	**ENTERPRISE RESOURCE PLANNING**	**5**	**2**

Course Objectives

1. To develop the knowledge of business processes.
2. To explain about how a business works
3. To explain about how information systems fit into business operations
4. To explain about how ERP software can improve the performance of these processes

Unit-I	**BUSINESS FUNCTION AND BUSINESS PROCESS**	**12 Hours**

Functional areas and Business Process- Functional area of operations – Business Process – Marketing sales – Supply Chain Management – Accounting and Finance – Human Resource – Functional areas of Information System – The Development of ERP Systems. (*Chapter 1: Section 1.1,1.2,1.3.)(chapter 2 :section 2.1,2.2)*

Unit-II	**MARKETING INFORMATION SYSTEM &SALES ORDER PROCESS IN ERP**	**12 Hours**

The Significance and Benefits of ERP Software And Systems-Inductions to Fitter snacker(FS)-Over view of fitter snacker-Problems with fitter snacker sale Process- Sales and Distribution in ERP – Pre-Sales Activities – Sales Order Processing – Inventory Sourcing – Delivery – Billing – Payment – Customer Relationship Management – Benefits of CRM.
(chapter 2 :section 2.6) *,(Chapter 3 :* ***Section 1.1,1.2,1.3*** *and 3.4,3.5,3.6)*

Unit-III	**PRODUCTION & SUPPLY CHAIN MANAGEMENT INFORMATION SYSTEMS**	**12 Hours**

Production Overview – The Production Planning Process – The SAP ERP Approach to Production Planning – Sales Forecasting – Sales and Operation Planning – Demand Management – Material Requirement Planning in SAP ERP – ERP and Suppliers – Supply Chain*(Chapter 4 : Section 4.1,4.2,4.3,4.4.)*

Unit-IV	**ACCOUNTING IN ERP SYSTEMS**	**12 Hours**

Accounting Activities – Using ERP for Accounting Information – Operational Decision-Making problem - Credit Management – Industrial Credit Management in SAP ERP – Product Profitability Analysis –**ERP and Inventory Cost Accounting-**Cost Management Reporting with ERP System – Document Flow for Customer Service*(Chapter 5 : Section 5.1,5.2,5.3,5.4,5.5,5.6)*

Unit-V	**HUMAN RESOURCE PROCESS IN ERP**	**12 Hours**

HR with ERP – Advance HR Features: Time management,Payroll, Travel management, Training and Development – Management by Objectives – ERP Process Modeling*(Chapter 6: Section 6.3,6.4,6.5 & Chapter 7 : Section 7.2)*

Books for study:

1. Enterprise Resource Planning, Ellen Monk & Bret Wagner, Cengage Learning India & Co,3rd Ed. 2009.
Books for Reference: 1. Enterprise Resource Planning , Alexis Leon, Tata McGraw Hill, 3rd Edition, 2015 2. Enterprise Resource Planning, Mary Sumner, Pearson Education, 5th Edition, 2018
E-Resources

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Apply the principles of Business Functions and Business Process	**K3**
CO2	Develop the sales order process and inventory sourcing	**K6**
CO3	Acquire the knowledge of production planning and Sales operation planning	**K1,K2**
CO4	Design the material requirement plan and build supply chain, Describe Accounting activities and operational decision making	**K5,K6**
CO5	Acquire knowledge of Human Resource with ERP, Time Management and Travel management	**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	PSO9	PSO10
CO1		✓	✓		✓					
CO2	✓	✓		✓				✓		
CO3		✓	✓	✓			✓			
CO4		✓	✓				✓	✓		
CO5		✓		✓	✓		✓	✓		✓
Number of matches = 21, Correlation: Moderate										

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**
UBBCNM32	**OEC4**	**COMPUTER GRAPHICS**	**5**	**2**

Course Objectives

1. To provide a comprehensive introduction to computer graphics.
2. To understand computer graphics techniques (2-D/3-D), focusing on 3D modeling, image synthesis, and rendering.
3. Analyze the elementary mathematical techniques that allow us to position objects in three dimensional spaces and techniques necessary
4. Introduce geometric transformations, geometric algorithms
5. To explore the interdisciplinary nature of computer graphics which is emphasized in the wide variety of examples and applications.

Unit-I	**GRAPHIC SYSTEMS**	**12 Hours**

Video Display Devices : Refresh CRT -Raster scan display-Random scan display- Raster Scan Systems – Random Scan Systems.

Unit-II	**OUTPUT PRIMITIVES**	**12 Hours**

Output Primitives :DDA line algorithm– Bresenham Line Drawing Algorithms –Bresenham Circle Generating Algorithm – GUI: Logical Classification of Input Devices – Interactive Picture Construction Methods.

Unit-III	**2D TRANSFORMATION AND VIEWING**	**12 Hours**

2D Geometric transformations: Translation-Rotation-Scaling - Homogenous Coordinates-Composite Transformation-other Transformation - 2D Viewing : Viewing pipeline- Window to Viewport Co-ordinate Transformation – point clipping-Cohen Sutherland Line Clipping Algorithms – Liang Barsky Line Clipping Algorithm-Sutherland Hodgeman polygon Clipping Algorithm.

Unit-IV	**3D TRANSFORMATION AND VIEWING**	**12 Hours**

3D Geometric Transformation :Translation, Rotation, Scaling-General 3D rotation - 3D viewing: viewing pipeline-viewing coordinates-Projections: parallel projection-perspective projection.

Unit-V	**VISIBLE SURFACE DETECTION**	**12 Hours**

Classification- Back Face detection- Depth buffer method- A buffer method- Scan line method-BSP tree method-Area subdivision method-Octree methods – Ray Casting method.

1. **Books for study:** D. Hearn and M.P. Baker – Computer Graphics (C version) with OpenGL

– Pearson Education-4th edition- Second Impression – 2016
Books for Reference: 1. W.M. Newman and R.F. Sproull – Principles of Interactive Computer Graphics – McGraw Hill International Edition – 2nd Edition, 2001 2. Tay Vaughan-Multimedia making it work -TMH publication-9th Edition, 2014
E-Resources Computer Graphics - Course (nptel.ac.in)

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Identify right picture generation	**K6**
CO2	Animate 2D objects	**K3,K2**
CO3	Visualize 3D objects	**K3**
CO4	Project 3D objects on 2D surfaces	**K3 K6**
CO5	Identify hidden surfaces of 3D objects	**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 = 29 , 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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBCNM33	**OEC4**	**THEORY OF COMPUTATION**	**5**	**2**

Course Objectives

1. Able to understand the concepts of theory of computation in computer science.
2. To acquire insights into the relationship among formal languages, formal grammars, and automata.
3. Able to learn and design automats and Turing machine

Unit-I	**Introduction to Theory of Computation**	**12 Hours**

Introduction to theory of computation and basic Mathematical objects: Sets, Logic, Function, Relation, Languages

Unit-II	**Mathematical Induction and Recursive Definition**	**12 Hours**

Types of proof, The Principle of Mathematical Induction, The Strong principle of Mathematical Induction, Recursive Definition, Structural Induction.

Unit-III	**Regular Language and Finite Automata**	**12 Hours**

Regular Languages and Regular expressions, Finite automata and Memory required to recognize a Language, Distinguishing one string from another, Union, Intersections and Complements, Non deterministic Finite Automata, Non deterministic Finite Automata with ^ - transition, Kleens theorms, Conversions from NFA-^ to NFA,NFA to DFA

Unit-IV	**Regular and Non Regular Languages**	**12 Hours**

A Criterion for Regualarity, Minimal Finite Automata, The Pumping Lemma for Regular Languages, Decision Problems

Unit-V	**Context Free Grammars , Pushdown Automata and Turing Machines**	**12 Hours**

Introduction to grammars, Derivation trees and Ambiguity, An unambiguous CFG for Algebric Expressions,Simplified Forms and normal Forms. Definations,Deterministics Push down Automata,A PDA corresponding to Given Grammar, A CFG corresponding to given PDA, Introduction to Parsing. Introduction to Puming lemma for Context free Languages Turing machines Definitions and ExamplesCombining turing machines, Multitape TM, Universal Turing Machines – Halting Problem of Turing Machines – Church's Thesis

Books for study: Theory of Computation by John C Martin.

Books for Reference:

1. Theory of Computation by V Sarthi.
2. Formal Languages and automata theory by C K Nagpal

E-Resources: www.geeksforgeeks.org/theory-of-computation-automata-tutorials

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the properties of formal language and automata, their equivalence.	**K1,K2**
CO2	Apply the theoretical foundations of computer science	**K3**
CO3	Evaluate Regular and Non regular Language and Finite automata.	**K2,K5**
CO4	Understand the concept with Turing machines	**K2**
CO5	Understand the concept of Context Free Grammars and Pushdown Automata, conversion techniques.	**K2,K6**
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	ProgrammeSpecific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO 9	PSO 10
CO1		✓	✓					✓		
CO2	✓	✓		✓	✓		✓		✓	
CO3		✓	✓	✓			✓			
CO4	✓	✓				✓	✓	✓		
CO5		✓	✓	✓		✓	✓		✓	✓
Number of matches = 25, 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

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Demonstration

SEMESTER III				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAL31	**OEC5**	**COMPUTER ORIENTED FINANCIAL ACCOUNTING – I**	**5**	**4**

Course Objectives

4. To enlighten the students with various Principles, Concepts and Conventions in Accounting.
5. To impart practical knowledge in the Preparation of Final Accounts and Depreciation Accounts.
6. To provide insights to the students about Single Entry and Computerized Accounting Systems.

Unit-I	**Introduction to Accounting**	**15Hours**

Conceptual Framework: Accounting Principles - Accounting Concepts - Accounting Conventions – Introduction to Accounting Standards and Indian Accounting Standards - Accounting Process: Journal – Ledger – Trial Balance.

Unit-II	***Final Accounts***	**15 Hours**

Preparation of Final Accounts – Trading Account – Profit & Loss Account – Balance Sheet – Adjustments in Final Accounts: Outstanding Expenses – Prepaid Expenses – Accrued Income - Income Received in Advance - Depreciation and Appreciation of Fixed Assets – Interest on Capital – Interest on Drawings.

Unit-III	**Depreciation Accounting**	**15 Hours**

Meaning of Depreciation – Causes of Depreciation – Methods of providing Depreciation – Straight Line Method – Diminishing Balance Method – Annuity Method – Sinking Fund Method (Simple Problems only)

Unit-IV	**Single Entry System**	**15 Hours**

Meaning – Objectives – Features – Limitations – Differences between Single Entry and Double Entry System – Ascertainment of Profit through Networth Method (Statement of Affairs) and Conversion Method.

Unit-V	**Computerized Accounting System**	**15 Hours**

Meaning – Role of Computer in Accounting – Need for Computerised Accounting – Salient Feature of Computerised Accounting –Fundamentals of Accounting System – Comparison between Manual and Computerised –Advantages of Computerised Accounting System – Limitations of Computerised Accounting System.

Books for Study

6. **Neeraj Goyal & Rohit Sachdeva**, Computerised Accounting, Kalyani Publishers, New Delhi.
7. **S.M.Shukla**, Financial Accounting &Computerised Accounting, Sahitya Bhawan Publications, New Delhi.
8. **R.L.Gupta& M. Radhaswamy,** Financial Accounting, Sultan Chand & Sons., New Delhi.
9. **S. Thothadri& S. Nafeesa,** Financial Accounting, McGraw Hill Education, Chennai.
10. **T.S. Reddy & Murthy,** Financial Accounting, Margham Publications, Chennai.

Books for Reference:

6. **M.C.Shukla, T.S.Grewal, S.C. Gupta,** Advanced Accounts – Volume I, S.Chand& Co., New Delhi.
7. **S.P. Jain &K.L.Narang,** Financial Accounting, Kalyani Publishers, Ludhiana.
8. **Mukherji & M. Hanif,** Financial Accounting, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
9. **DhaneshKhatri**, Financial Accounting, McGraw Hill Education, Chennai.
10. **K Murugadoss & M Ja**ya, Financial Accounting, Vijay Nicole Imprints Private Ltd., Chennai.

E-Resources: https://www.udemy.com/course/fundamentals-of-computer-based-financial-accounting/

Methodology of Teaching:

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the concepts of Accounting and Pass Journal Entries and Prepare Ledgers.	**K2,K3**
CO2	Prepare Final Accounts.	**K2,K3**
CO3	Calculate Depreciation and Prepare Depreciation Account.	**K2,K3**
CO4	Prepare Statement of Affairs and Statement of Profit or Loss in Single Entry System.	**K2,K3**
CO5	Understand the basics of Computerised Accounting Systems.	**K2,K3**

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
CO1	✓	✓		✓	✓		✓	✓
CO2		✓				✓	✓	
CO3	✓		✓	✓	✓		✓	✓
CO4		✓				✓		
CO5	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches = 25 , Correlation: High								

<u>Mapping Correlation Benchmark</u>

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**
UBCCAP31	**OEC6**	**COMPUTER ORIENTED FINANCIAL ACCOUNTING LAB– I**	**3**	**3**

Course Objectives

1. To acquaint students to Computerised Accounting System.
2. To impart skills related to recording of Business Transactions in a Computerized Accounting System.
3. To enable students to generate Financial Statements electronically.

Unit-I	**Introduction to Computerised Accounting**	**12 Hours**

Computerised Accounting – Different Application Software used for Computerized Accounting - Function Keys in Tally with its purpose - Preparation of Journal - Ledger - Trial Balance.

Unit-II	***Creation of Company & Enabling Features in Tally ERP 9***	**12 Hours**

Basics of Tally – Installing - Configuring Tally ERP9 - Creating Company – Data Path for Storing and Retrieving Tally Data – Altering Company Information and Deleting Company – Selecting Company from the List of Companies - Shutting a Company.

Unit-III	**Creating Accounting Ledgers and Groups**	**12 Hours**

Creating Accounting Ledgers - Predefined Ledgers in Tally - Creating Accounting Masters in Tally ERP 9 - Creating Ledgers – Single Ledger – Multiple Ledger – Altering and Deleting Ledgers. Creating Accounting Groups - Predefined Accounting Groups in Tally – Creating Groups – Altering and Deleting Groups.

Unit-IV	**Creating Inventory Items and Stock Groups Creation**	**12 Hours**

Creating Inventory Items - Creating different stock items for business– Selecting proper group for each stock item – Creating unit of measurement – Altering and Deleting Stock Item -Entering opening stock items – Fixing unit price of items.

Unit-V	**Voucher Entry& Report Generation**	**12 Hours**

Introduction to Vouchers - Accounting Vouchers - Predefined Accounting Vouchers – Creation and Alteration of Vouchers – Cancellation and Deletion of Vouchers - Recording of Business transactions using appropriate Accounting Vouchers. Generating Reports.

Books for Study

6. **Dr. P. Rizwan,** Tally ERP 9, Margham Publications, Chennai.
7. **Asok K Nadhani,** Tally ERP 9 Made Simple: Basic Financial Accounting, BPB Publications, New Delhi.
8. **Vishnu P.Singh, —**Tally-ERP 9 -Computer, Publications Ltd, New Delhi.
9. **Soumya Ranjan Behera,** Learn Tally.ERP 9, BK Publications Pvt. Ltd, New Delhi.
10. **S. Palanivel,** Tally - Accounting Software, Margham Publications, Chennai.

Books for Reference:

6. Kogent Learning Solutions Inc., Tally ERP 9 in Simple Steps, DreamTech Press Inc. New Delhi.
7. **Shraddha Singh,** Navneet Mehra, Tally ERP 9 – Power of Simplicity, V & S Publishers, New Delhi.
8. DT Editorial ServicesTally.ERP 9 with GST in Simple Steps — Dream Tech Press – New Delhi.
9. **Shraddha Singh,** Tally ERP 9 (Power of Simplicity), V & S Publishers – New Delhi.
10. **A.K. Nadhani& K.K. Nadhani,** Tally 9, BPB Publications, New Delhi.

E-Resources: https://www.udemy.com/course/fundamentals-of-computer-based-financial-accounting/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of Computerised Accounting and various computersied accounting softwares used in business.	**K1, K2**
CO2	Create company, ledgers and alter company details.	**K2, K3**
CO3	Create inventory items and stock groups.	**K2, K3**
CO4	Pass Voucher Entries of daily transactions in Business.	**K3, K4**
CO5	Generate Invoices and other Financial Statements.	**K3, K4**
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
CO1	✓		✓	✓	✓	✓	✓	✓
CO2		✓		✓				✓
CO3	✓		✓			✓		✓
CO4		✓		✓	✓		✓	✓
CO5	✓		✓		✓	✓	✓	✓
Number of matches = 25 , 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**
UBCCAL32	**OEC5**	**DISCRETE MATHEMATICS**	**5**	**4**

Course Objectives

7. Able to understand the concepts of Logics and Proofs
8. Understand the basic concepts of Combinatorics and set functions
9. Understand the concepts of algebraic systems and graphs

Unit-I	LOGICS AND PROOFS	**12 Hours**

Propositions – Logical connectives – Compound propositions – Conditional and bi-conditional propositions – Truth tables – Tautologies and contradictions – Contra positive – Logic equivalences and implications. Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements. *Suggested Reading:* Basics of logical operators

Unit-II	COMBINATORICS	**12 Hours**

Mathematical Induction-Strong induction and well ordering – the basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – inclusion and exclusion and applications. *Suggested Reading:* Basics of probability

Unit-III	SETS AND FUNCTIONS	**12 Hours**

Sets: Relations on sets – Types of relations and their properties – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram. Functions: Characteristic function of a set – Hashing functions – Recursive functions – Permutation functions. *Suggested Reading:* Basic concepts of sets and Functions

Unit-IV	ALGEBRAIC SYSTEMS	**12 Hours**

Groups, Cyclic Groups, Subgroups, Cosets, Lagrange's theorem, Normal subgroups – Codes and group codes – Decodes. *Suggested Reading:* Basics of Groups

Unit-V	GRAPHS	**12 Hours**

Graphs and graphs models – Graph terminology and special types of graphs – Representing raphs and graph isomorphism – connectivity – Euler and Hamilton paths. *Suggested Reading:* Basics of Graphs

Books for study:

5. **Singaravelu, M. P. Jeyaraman, "Discrete Mathematics", Meenakshi Agency, 2013.**
6. **Kenneth H. Roshan, "Discrete Mathematics and its Applications", TMH, 2011**

Books for Reference:

7. **Trembly J.P and Monohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, 2003.**
8. **Trivedi.K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd Edition, 2002**
9. **J. A. Bondy and U.S.R Murty, "Graph Theory", Springer, 2008.**

E-Resources:
http://nptel.ac.in/courses/106106094/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**Write an argument using logical notation and determine if the argument is valid or not valid.**	K1
CO2	**Understand the ideas of permutations and combinations.**	K1,K2
CO3	**Demonstrate an understanding of relations and functions**	K4
CO4	**Recognize the principles of the group theory.**	K3
CO5	**Design model problems in computer science using Graphs.**	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										

<u>Mapping Correlation Benchmark</u>

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	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAP32	**OEC6**	**DISCRETE MATHEMATICS LAB**	**3**	**3**

Course Objectives

1. Able to understand the concepts of Logics and Proofs
2. Understand the basic concepts of Combinatorics and set functions
3. Understand the concepts of algebraic systems and graphs

Lab Experiments using C

1. Write a program to find intersection set of two sets
2. Write a program to find union set of two sets
3. Write a program to find Compliment set of the given set
4. Write a program to find difference set of two sets
5. Write a program to find symmetric difference set of two sets
6. Write a program to prove the D'Morgan's Laws of set theory
7. Write a program to find the power set of the given set
8. Write a program to find permutation of the set
9. Find the cardinality of the set and prove

   $|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$

Books for study: Department Lab Manual

Books for Reference: Lab manual

E-Resources:
http://nptel.ac.in/courses/106106094/

Methodology of Teaching:
Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**Write an argument using logical notation and determine if the argument is valid or not valid.**	K1
CO2	**Understand the ideas of permutations and combinations.**	K1,K2
CO3	**Demonstrate an understanding of relations and functions**	K4
CO4	**Recognize the principles of the group theory.**	K3
CO5	**Design model problems in computer science using Graphs.**	K6,K2
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	ProgrammeSpecific 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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCC4001	**DSC8**	**PROGRAMMING IN JAVA**	**5**	**4**

Course Objectives

1. To impart knowledge of Object Orientation
2. To impart knowledge of Remote Access
3. To impart knowledge of Data Security
4. To impart knowledge of Networking
5. To impart knowledge of concurrent processing

Unit-I	**Object Orientation with Java**	**15 Hours**

OOP and Java - The Primaries – Control Statements – Arrays and Methods.*(Chapter: 1, 2, 3, 4)*

Unit-II	**Classes and Objects**	**15 Hours**

Classes and Objects – Inheritance and Polymorphism – Abstract Class-Interfaces and Packages-Applets.*(Chapter: 5, 6, 7, 8)*

Unit-III	**Abstract Windowing Toolkit**	**15 Hours**

Abstract Windowing Toolkit-I – Abstract Windowing Toolkit-II - Swing-Exception Handling-Multi Threading.*(Chapter: 9, 10, 11, 12, 13)*

Unit-IV	**Java packages, Streams**	**15 Hours**

I/O Streams-Networking-java.lang.package(The String class and StringBuffer class)*(Chapter: 14, 15, 16)*

Unit-V	**JDBC and RMI**	**15 Hours**

Java Database Connectivity-Servlets-Remote Method Invocation-Java Beans(MathsBean).*(Chapter: 18, 19, 20, 21)*

Books for study: Programming with JAVA, Muthu, Tata McGraw Hill, 2nd Edition, 2011.

Books for Reference:

3. The Complete Reference Java 2, Patrick Naughton, Herbert Schildt, Tata McGraw Hill, 5th Edition, 2006.
4. Java Programming, E. Balagurusamy, Tata McGraw Hill, 4th Edition, 2011.
3. Programming with Java, John R. Hubbard, Schaum Series, 2011

E-Resources:

https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/download/java/LearnJava.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**Apply Java based code for solving low complexity problems**	**K1**
CO2	**Utilize Object Oriented Features in Java for solving medium complexity problems**	**K1,K2**
CO3	**Exploit Exception Handling Feature in Java**	**K4**
CO4	**Develop Multi-Threaded Java Applications**	**K3**
CO5	**Utilize appropriate Java Stream Classes to Solve IO Related Problems.**	**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										

<u>Mapping Correlation Benchmark</u>

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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCPR41	**DSC10**	**PROGRAMMING IN JAVA LAB**	**3**	**3**

Course Objectives

1. To impart knowledge of Object Orientation
2. To impart knowledge of remote access
3. To impart knowledge of data security
4. To impart knowledge of networking
5. To impart knowledge of concurrent processing

Lab Experiments:

Module 1:

1. Write a java program to multiply two given matrices
2. Write a java program to implement method overloading and constructors overloading
3. Write a java program to implement method overriding

Module 2:

1. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
2. Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Module 3:

1. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
2. Write a java program that correct implements of producer consumer program.

Module 4:

1. Write a java program that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with “STOP” or “READY” or ”GO” should appear above the buttons in selected color. Initially, there is no message shown.
2. Write a java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*, % operations. Add a text field to display the result. Handle any possible exception like divided by zero.

Module 5:

1. Implementation of Using TCP,Using UDP

2. Implementation of RMI(Addition of two numbers) 3. Implementation of Java Beans(MathsBean)
Books for study: Department Lab Manual
Books for Reference: Programming with JAVA, Muthu, Tata McGraw Hill, 2nd Edition, 2011.
E-Resources: https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/download/java/LearnJava.pdf

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Able to create classes and object	**K1**
CO2	Utilize Object Oriented Features in Java for solving medium complexity problems	**K1,K2**
CO3	Exploit Exception Handling Feature in Java	**K4**
CO4	Develop Multi-Threaded Java Applications	**K3**
CO5	Utilize appropriate Java Stream Classes to Solve IO Related Problems.	**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%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBC4002	**DSC9**	**DATA MINING AND DATA WAREHOUSING**	**5**	**4**

Course Objectives

1. Introduce the concepts of data ware house and data mining
2. Explain the methodologies used for analysis of data
3. Impart knowledge of various association rules
4. Prepare the learner to visualize data
5. Impart knowledge of decision tree.

Unit-I	**Introduction to Data Mining**	**15 Hours**

Fundamentals of data mining, data mining functionalities, data and attribute types, Statistical Description of Data, Pre-Processing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

Unit-II	**Data Warehousing**	**15 Hours**

Basic Concepts, Data Warehousing Modeling, Data Cube and OLAP, Data Warehouse design and implementation.

Unit-III	**Mining Frequent Patterns and Associations**	**15 Hours**

Basic Methods, Frequent item set mining, Apriori Algorithms, Pattern Evaluation Methods.

Unit-IV	**Classification**	**15 Hours**

Basic Concepts, Decision Tree Induction, Bayes Classification:Naive-Bayes methods, Model Evaluation.

Unit-V	**Cluster Analysis**	**15 Hours**

Basic Concepts, Clustering Structures, Major Clustering Approached, Partitioning Methods, Hierarchical Methods, Density Based Methods, The Expectation Maximization Method, Cluster Based Outlier Detection Essential Reading.

Books for study:

1. Data Mining Concepts and Techniques - Third Edition, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann Publisher, 2012.

Books for Reference:

3. Insight into Data mining Theory and Practice, K.P. Soman, Shyam Diwakar and V. Ajay, Easter Economy Edition, Prentice Hall of India, 2006.

4. Introduction to Data Mining with Case Studies, G. K. Gupta, Easter Economy Edition, Prentice Hall of India, 2006.
5. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach and Vipin Kumar, , Pearson Education, 2007.
6. Modern Data Warehousing, Mining and Visualization, Marakas, George M, Pearson Education, 2011.

E-Resources: Data Mining Resources (ccsu.edu)

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the functionality of the various data mining and data warehousing component	**K2**
CO2	Describe different methodologies used in data mining and data ware housing.	**K2 K3**
CO3	Explain the analyzing techniques and Online Analytical Processing	**K4**
CO4	Explain about the association rule mining and classification	**K4**
CO5	Compare different approaches of data ware housing and data mining with various technologies	**K5 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 = 29 , 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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBCSE41	**SEC3**	**DATA MINING LAB**	**3**	**3**

Course Objectives

1. Introduce the concepts of data ware house and data mining
2. Explain the methodologies used for analysis of data
3. Impart knowledge of various association rules
4. Prepare the learner to visualize data
5. Impart knowledge of decision tree.

Module 1:

1. Create an Employee Table with the help of Data Mining Tool WEKA
2. Create a Weather Table with the help of Data Mining Tool WEKA.
3. Apply Pre-Processing techniques to the training data set of Weather Table
4. Apply Pre-Processing techniques to the training data set of Employee Table

Module 2:

1. Filters and Feature Selection.
2. Normalize Weather Table data using Knowledge Flow.
3. Normalize Employee Table data using Knowledge Flow
4. Finding Association Rules for Buying data.
5. Finding Association Rules for Banking data.

Module 3:

1. To Construct Decision Tree for Weather data and classify it.
2. To Construct Classifier.
3. To Construct Decision Tree for Location data and classify it.
4. Write a procedure for Visualization for Weather Table.

Module 4:

1. Write a procedure for Visualization of Banking Table.
2. Write a procedure for cross-validation using J48 Algorithm for weather table
3. Write a procedure for Clustering Buying data using Cobweb Algorithm.
4. Write a procedure for Clustering Weather data using EM Algorithm

Module 5:

1. Write a procedure for Banking data using Farthest First Algorithm.
2. Write a procedure for Employee data using Make Density Based Cluster Algorithm.
3. Write a procedure for Clustering Customer data using Simple K-Means Algorithm

Books for study: Department Lab Manual

Books for Reference: Data Mining Concepts and Techniques - Third Edition, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann Publisher, 2012.

E-Resources: Data Mining Resources (ccsu.edu)

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the functionality of the various data mining and data warehousing component	**K2**
CO2	Describe different methodologies used in data mining and data ware housing.	**K2 K3**
CO3	Explain the analyzing techniques and Online Analytical Processing	**K4**
CO4	Explain about the association rule mining and classification	**K4**
CO5	Compare different approaches of data ware housing and data mining with various technologies	**K5 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 = 29 , 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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBCNM41	**OEC7**	**DIGITAL MARKETING ANALYTICS**	**5**	**2**

Course Objectives

1. Able to analyze digital media and analytics
2. Understand the concepts of digital marketing
3. To categorizes the digital influence and listening
4. Able to understand the business intelligence.

Unit-I	DIGITAL MEDIA AND ANALYTICS	**12 Hours**

Digital media types – Owned and earned social metrics – Paid searches and Organic Searches - Aligning Digital and Traditional Analytics – Identifying social media listening tools – Understanding social media engagement software – Social media engagement tools.

Unit-II	**TOOLS FOR DIGITAL ANALYTICS**	**12 Hours**

Social Media Listening Tools - Evolution, Social analytics life cycle, Social media monitoring software: Sysomos, Radian6, Visible Technologies, Zoho social and others. Search Analytics Tools – Basics of search, Search analytics use cases, Search data, Google trends, YouTube trends, Google Adwords keyword, Yahoo clues, Collecting insights through search data. Audience Analysis Tools – Audience Analysis Use Cases, Audience analysis tool types – Audience analysis Techniques, Event Triggers. Content Analysis Tools - Content Audits- Optimizing Content Distribution, Analysing Content Consumption. Engagement Analysis Tools – Social Media Engagement Software (SMES), using SMES, study of different SMES in the market.

Unit-III	**DIGITAL INFLUENCE AND LISTENING**	**12 Hours**

Reality of Digital Influence - Media List - Klout, PeerIndex - Online Versus Offline Influence - Using the Influencer List - Developing Social Media Listening Program - Using Listening Data for Program Planning - Implementing Listening Program - Conversation Audit - Online Influencers - Conducting Social brand benchmarking - Use of Online data for crisis anticipation - Identifying known issues - Crisis day monitoring and ongoing reporting - Corrections after crisis - Improving customer service - Social customer service conflict - Social customer service models.

Unit-IV	**RESEARCH PLAN AND SEARCH ANALYSIS**	**12 Hours**

Launching new product – Product life cycle – Introduction Phase – Growth Phase – Maturity Phase. Formulating research plan – Developing source list – Research methods – Constructing reports – Delivering reports – Report use cases – Building central repository of information – Search analytics for digital strategy – Search analytics for content strategy and planning – Search analytics for paid advertising.

Unit-V	ROI, MOBILE ANAYTICS AND BUSINESS INTELLIGENCE	12 Hours

Return on Investment (ROI) – Return on Engagement, Influence, Experience – Tracking ROI – Understanding measurement fundamentals – Measurement reporting cadence - Mobile Analytics – Mobile market landscape – Mobile marketing measurement – Marketing activities – Audience/visitor metric – Mobile app performance - Social CRM – Social CRM initiative – Social CRM Initiative - Future of Digital Data – Business Intelligence

Books for study:

1. Chuck Hemann and Ken Burbary, "Digital Marketing Analytics: Making Sense of Consumer Data in a Digital World", Que Publishing, 1 edition, ISBN-13: 978-0789750303, 2013.

Books for Reference:

1. Simon Kingsnorth, "Digital Marketing Strategy: An Integrated Approach to Online Marketing", Kogan Page Publisher, First edition, ISBN-13: 978-0749474706, 2016.

2. Dave Chaffey, Fiona Ellis-Chadwick, "Digital Marketing – Strategy, Implementation and Practice", Pearson Education, Sixth edition, ISBN-13: 978-1292077611, 2016.

E-Resources:

- Eric Enge, Andy Crestodina, Larry Kim, Steve Rayson and Chad White, "How the Pros Turn Marketing Analytics Into Effective Marketing Strategies", Alexa, An Amazon Company.
- https://blog.alexa.com/wp-content/uploads/2016/12/How-to-Pros-Turn-Marketing Analytics-into-Effective-Marketing-Strategies-ebook.pdf

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**Relate to digital media marketing and the need for analytics on the data captured.**	K1
CO2	**Choose the appropriate tools for performing different digital analytics on the digital marketing data.**	K1,K2
CO3	**Analyze and appraise the outcomes of digital influence and listening.**	K4
CO4	**Formulate a research plan and perform search analysis on the digital marketing data.**	K3
CO5	**Formulate a research plan and perform search analysis on the digital marketing data.**	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	PSO9	PSO10
CO1		✓	✓		✓					
CO2	✓	✓		✓				✓		
CO3		✓	✓	✓			✓			
CO4		✓	✓				✓	✓		
CO5		✓		✓	✓		✓	✓		✓
Number of matches = 21, Correlation: Moderate										

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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBCNM42	**OEC7**	**MULTIMEDIA**	**5**	**2**

Course Objectives

1. Able to understand the concepts of multimedia
2. Construct the MIDI fundamentals
3. Understand the concepts of Digital image compression
4. Able to understand Multimedia Animation
5. Project Case Study

Unit-I	**Introduction to Multimedia**	**12 Hours**

Definition - Classification - MM application - MM H/w - MM s/w - CDROM - DVD.

Unit-II	**MIDI Fundamentals**	**12 Hours**

MM Audio: Digital medium - Digital audio technology - sound cards - recording - editing - MP3 - MIDI fundamentals - Working with MIDI - audio file formats - adding sound to MM project.

Unit-III	**Digital Image Compression**	**12 Hours**

MM TEXT: Text in MM - MM graphics: coloring - digital imaging fundamentals - development and editing - file formats - scanning and digital photography

Unit-IV	**Multimedia Animation**	**12 Hours**

MM Animation: Computer animation fundamentals - Kinematics - morphing - animation s/w tools and techniques. MM Video: How video works - broadcast video standards - digital video fundamentals - digital video production and editing techniques - file formats.

Unit-V	**Multimedia Case Study**	**12 Hours**

MM Project : stages of project - MM skills - design concept - authoring - planning and costing – MM team

Books for study: Multimedia Magic - S.Gokul revised and updated second edition – BPB

Books for Reference:

1. Multimedia Making it Work - TayVaughen 6th edition – TMH
2. Kiran Thauras,Prabhutk.andleigu – Multimedia System Design - Printice Hall India.
3. Malay k pakhira ,Computer graphics,Multimedia and Animation - Printice Hall India

E-Resources:CIT-003: Web Based Technologies and Multimedia Applications - Course (swayam2.ac.in)

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	**Describe the classification of multimedia application**	K1,K2
CO2	Apply the digital medium of sound to multimedia project.	K3
CO3	To impart the digital imaging fundamentals of graphics.	K2,K3
CO4	To understand concepts about multimedia animation.	K2
CO5	Identify and Creating multimedia projects.	K4,K6
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	ProgrammeSpecific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO 9	PSO 10
CO1		✓	✓					✓		
CO2	✓	✓		✓	✓		✓		✓	
CO3		✓	✓	✓			✓			
CO4	✓	✓				✓	✓	✓		
CO5		✓	✓	✓		✓	✓		✓	✓
Number of matches = 25, Correlation: High										

<u>Mapping Correlation Benchmark</u>

Mapping	1-30%	31-60%	61-70%	71-100%
Matches	1-12	13-24	25-28	29-40
Correlation	Poor	Moderate	High	Very High

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

SEMESTER IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBBCNM43	**OEC7**	**OBJECT ORIENTED ANALYSIS AND DESIGN**	**5**	**2**

Course Objectives

1. To understand the fundamentals of object modeling
2. To understand and differentiate Unified Process from other approaches.
3. Design with static UML diagrams.
4. Design with the UML dynamic and implementation diagrams.
5. Improve the software design with design patterns.
6. Test the software against its requirements specification

Unit-I	**UNIFIED PROCESS AND USE CASE DIAGRAMS**	**12 Hours**

Introduction to OOAD with OO Basics – Unified Process – UML diagrams – Use Case –Case study – the Next Gen POS system, Inception -Use case Modelling – Relating Use cases – include, extend and generalization – When to use Use-cases

Unit-II	**STATIC UML DIAGRAMS**	**12 Hours**

Class Diagram— Elaboration – Domain Model – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition – Relationship between sequence diagrams and use cases – When to use Class Diagrams

Unit-III	**DYNAMIC AND IMPLEMENTATION UML DIAGRAMS**	**12 Hours**

Dynamic Diagrams – UML interaction diagrams – System sequence diagram – Collaboration diagram – When to use Communication Diagrams – State machine diagram and Modelling – When to use State Diagrams – Activity diagram – When to use activity diagrams Implementation Diagrams – UML package diagram – When to use package diagrams – Component and Deployment Diagrams – When to use Component and Deployment diagrams

Unit-IV	**DESIGN PATTERNS**	**12 Hours**

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller, Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioural – Strategy – observer –Applying GoF design patterns – Mapping design to code

Unit-V	**TESTING**	**12 Hours**

Object Oriented Methodologies – Software Quality Assurance – Impact of object orientation on Testing – Develop Test Cases and Test Plans

Books for study:

1. Craig Larman, ―Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development‖, Third Edition, Pearson Education, 2005.
2. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition – 1999

Books for Reference:

1. Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, ―Design patterns: Elements of Reusable Object-Oriented Software‖, Addison-Wesley, 1995.

E-Resources: Object Oriented Analysis and Design - Course (nptel.ac.in)

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Assignments

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Express the knowledge of software design with UML diagrams	K1
CO2	Understand and Identify various scenarios based on software requirements	K2
CO3	Apply the UML based software design into pattern based design using design patterns	K3
CO4	Understand the various testing methodologies for OO software	K2
CO5	Evaluate and Design software applications using OO concepts	K4,K5
K1- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	ProgrammeSpecific Outcomes (PSOs)									
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO 9	PSO 10
CO1		✓	✓					✓		
CO2	✓	✓		✓	✓		✓		✓	
CO3		✓	✓	✓			✓			
CO4	✓	✓				✓	✓	✓		
CO5		✓	✓	✓		✓	✓		✓	✓
Number of matches = 25, 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 IV				
COURSE	COURSE	COURSE TITLE	HRS/	CREDIT

CODE			WEEK	
UBCCAL41	**OEC8**	**COMPUTER ORIENTED FINANCIAL ACCOUNTING – II**	**5**	**4**

Course Objectives

1. To enlighten the students about Computation of Average Due Date and Insurance Claims.
2. To make the students to prepare Branch Accounts and Departmental Accounts.
3. To impart practical knowledge on Accounting for Non-Profit Organization and Accounting Software.

Unit-I	**Average Due Date and Fire Insurance Claims**	**15 Hours**

Meaning of Average Due Date – Determination of Due Date – Calculation of Interest.Meaning of Fire Insurance – Need for Fire Insurance – Computation of Claims to be lodged for loss of stock – Average Clause.

Unit-II	***Branch Accounting***	**15 Hours**

Meaning and Types of Branches – Branch Accounting – Objectives of Branch Accounting - Accounting for Dependent Branches – Debtors System – Stock and Debtors System – Final Account System.

Unit-III	**Departmental Accounting**	**15 Hours**

Distinction between Departments and Branches – Allocation of Common Expenses – Expenses which cannot be allocated – Preparation of Departmental Accounts – Inter Departmental Transfers at cost price. (Simple Problems only).

Unit-IV	**Accounting for Non-Profit Organizations**	**15 Hours**

Preparation of Receipts and Payments Account – Preparation of Income and Expenditure Account. (Simple Problems only).

Unit-V	**Accounting Software**	**15 Hours**

Accounting Software – Features of Accounting Software – Types of Accounting Software – Readymade Software – Customized Software – Tailored-made Software - Tally ERP 9 –Quick Book –Clean Book.

Books for Study

1. **Neeraj Goyal & Rohit Sachdeva**, Computerised Accounting, Kalyani Publishers, New Delhi.
2. **S.M.Shukla**, Financial Accounting &Computerised Accounting, SahityaBhawanPublications , New Delhi.
3. **R.L.Gupta& M. Radhaswamy,** Financial Accounting, Sultan Chand & Sons., New Delhi.
4. **S. Thothadri& S. Nafeesa,** Financial Accounting, McGraw Hill Education, Chennai.
5. **T.S. Reddy & Murthy,** Financial Accounting, Margham Publications, 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 &K.L.Narang,** Financial Accounting, Kalyani Publishers, Ludhiana.
3. **Mukherji& M. Hanif,** Financial Accounting, Tata McGraw Hill Pub. Co. Ltd., New

Delhi.
4. **DhaneshKhatri**, Financial Accounting, McGraw Hill Education, Chennai.
5. **K Murugadoss & M Ja**ya, Financial Accounting, Vijay Nicole Imprints Private Ltd., Chennai.

E-Resources: https://www.udemy.com/course/fundamentals-of-computer-based-financial-accounting/

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Calculate Average Due Date and Fire Insurance Claims.	**K2, K3**
CO2	Prepare Accounts for different Branches.	**K2, K3**
CO3	Prepare Departmental Trading and Profit & Loss Accounts.	**K2, K3**
CO4	Prepare Receipts and Payment Account and Income and Expenditure Account.	**K2, K3**
CO5	Understand various computersied accounting software.	**K2, K3**
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 = 26 , 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 IV

COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT
UBCCAP41	**OEC9**	**COMPUTER ORIENTED FINANCIAL ACCOUNTING LAB– II**	**3**	**3**

Course Objectives

1. To enable students in preparing and maintaining Suppliers' and Customers' transactions in computerized accounting.
2. To assist students in preparing and generating GST Invoices using Tally ERP 9 Software.
3. To help students in preparing Payroll of Employees.

Unit-I	**Receivable and Payment Management**	**12 Hours**

Receivables and Payables Management – Activating Bill Wise Details – Sales Entries - Purchase Entries - Activating Debit Note and Credit Note for passing entries - Entries for Discount Allowed and Discount Received - Purchase Returns and Sales Returns - Entries for Receipt of Money from Credit Customers and Payment to Suppliers.

Unit-II	***Payroll Management***	**12 Hours**

Introduction – Salient features of Tally ERP 9's Payroll – Enabling Payroll in Tally – Payroll Configuration - Create Pay Heads – Create Employee Masters – Employee Group Creation.

Unit-III	**Creating GST Ledgers**	**12 Hours**

Goods and Services Tax (GST) – Features - Creating GST Ledgers – Creating of CGST Account - SGST Account - IGST Account and UTGST Account under Duties & Taxes.

Unit-IV	**Passing of GST Voucher Entries**	**12 Hours**

Passing GST Voucher Entries for Purchases and Sales. Entries for Local Purchase and Inter State Purchase – Entries for Local Sales and Inter State Sales - Entries for Return Inwards and Outwards

Unit-V	**Generating Invoice & Statutory Reports**	**12 Hours**

Display and Generate GST Bill/Invoice for Purchases and Sales – Displaying and Generating Reports – GSTR 1 – Generating Inter State Sales and Purchase Reports – Generating Intra State Sales and Purchase Reports

Books for study:

1. **Dr. P. Rizwan,** Tally ERP 9, Margham Publications, Chennai
2. **Asok K Nadhani**, Tally ERP 9 Made Simple: Basic Financial Accounting, BPB Publications, New Delhi.
3. **Vishnu P.Singh**, **—**Tally-ERP9‖-Computer, Publications Ltd, New Delhi.
4. **Soumya Ranjan Behera**, Learn Tally.ERP 9, BK Publications Pvt. Ltd, New Delhi.
5. **S. Palanivel**, Tally - Accounting Software, Margham Publications, Chennai.

Books for Reference:

1. **Kogent LearningSolutions Inc.**, Tally ERP 9 in Simple Steps, DreamTech Press Inc. New Delhi.
2. **Shraddha Singh, Navneet Mehra,** Tally ERP 9 – Power of Simplicity, V & S Publishers, New Delhi. 36
3. **DT Editorial** Services Tally. ERP 9 with GST in Simple Steps — Dream Tech Press – New Delhi
4. **Shraddha Singh**, Tally ERP 9 (Power of Simplicity), V & S Publishers – New Delhi.
5. **A.K. Nadhani& K.K. Nadhani**, Tally 9, BPB Publications, New Delhi

E-Resources: https://www.udemy.com/course/fundamentals-of-computer-based-financial-accounting/

Methodology of Teaching:

ICT Presentation, Video lectures, Assignments on problems

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Prepare and maintain Bills Receivables and Payables in Tally ERP 9.	**K2, K3**
CO2	Create GST Ledgers for Purchases and Sales (Local and Inter-State)	**K2, K3**
CO3	Create and Maintain Payroll of Employees in Tally ERP 9	**K2, K3**
CO4	Pass entries for GST Local and Inter-State Purchases and Sales	**K2, K3**
CO5	Generate Reports: Invoices, Final Accounts and GSTR 1	**K2, K3**
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
CO1	✓	✓	✓	✓		✓	✓	✓
CO2		✓			✓			
CO3		✓	✓	✓	✓	✓		
CO4	✓		✓			✓		✓
CO5	✓		✓	✓	✓		✓	✓
Number of matches = 24 , Correlation: Moderate								

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 IV				
COURSE CODE	**CATEGORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAL42	**OEC8**	**OPERATION RESEARCH**	**5**	**4**

Course Objectives

1. To introduce the concepts, models and problem solving techniques in optimization problems.
2. To solve the linear programming problems using various methods.
3. To implement operation research models for solving transportation and assignment problems.
4. To learn and understand sequencing problems with n-jobs and m-machines.

To acquire knowledge in application of queuing models in business for making decisions.

Unit-I	**Introduction of OR and LPP**	**12 Hours**

Origin – Nature of OR – Characteristics of OR – Models in OR – Phases of OR – Uses and Limitations of OR – Mathematical Formulation of LPP – Solution of LPP by Graphical Method.

Unit-II	**Linear Programming Problem**	**12 Hours**

Solution of LPP by Simplex Method – Big-M method – Duality in LPP – Dual Simplex Method -Simple Problems.

Unit-III	**Transportation Problem**	**12 Hours**

Transportation Problem – Formulation – Balanced, Unbalanced Transportation Problem – Initial Basic Feasible Solution – North West Corner Rule – Least Cost Method – Vogel's Approximation Method – Optimum solution – MODI method.

Unit-IV	**Assignment Problem and Sequencing Problem**	**12 Hours**

Solution of Balanced and Unbalanced Assignment Problems – Sequencing Problem – Problems with n - jobs through two machines – n-jobs through three machines – Problems with n-jobs and m-machines.

Unit-V	**Queuing Theory**	**12 Hours**

Basic concepts of queueing theory - Characteristics of a queueing model – classification of queueing models- Average waiting time, expected queue length - variance of queue length - Expression for probability of n customers in the system p(n) for the queueing models (M/M/1: ∞/FIFO) and (M/M/1: N/FIFO) - Simple problems.

Books for study:

1. Kanti Swarup, Gupta P. K, Man Mohan (1980), Operations Research, Sultan Chand and

sons, New Delhi.
2. Gupta, P.K., and Man Mohan. (1979). Operations Research: Linear Programming and Theory of Games, Third Edition, Sultan Chand and Sons, New Delhi.

Books for Reference:

1. Taha, H.A (2011). Operations Research: An Introduction, Ninth Edition, Prentice Hall Publishing Company.
2. Sharma J.K. (2013), Operations Research: Problems and Solutions, (Fifth Edition) Macmillan India Limited.
3. Gupta R. K (1985), Operations Research, Krishna Prakashan, Mandir Meerut.

E-Resources:
http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdfhttp://www.uky.edu/~dsianita/300/online/LP.pdf

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

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Gain knowledge about various optimization techniques.	**K1**
CO2	Solve the problems related to business and industries by using linear programming techniques.	**K1,K2**
CO3	Execute operations research techniques for finding the optimum solution in real life situations.	**K4**
CO4	Solve the sequencing , transportation and assignment problems	**K3**
CO5	Understand the characteristics of a queuing system.	**K6,K2**
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	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 IV				
COURSE CODE	**CATE GORY**	**COURSE TITLE**	**HRS/ WEEK**	**CREDIT**
UBCCAP42	**OEC9**	**OPERATION RESEARCH LAB**	**3**	**3**

Course Objectives

1. Introduction to optimization techniques using both linear and non-linear programming.
2. The focus of the course is on convex optimization though some techniques will be covered for non-convex function optimization too.
3. After an adequate introduction to linear algebra and probability theory, students will learn to frame engineering minima maxima problems in the framework of optimization problems.

Lab Experiments using Python

1. Transportation Problem I
2. Transportation Problem II
3. Linear Programming I
4. Linear Programming II
5. Assignment Problem I
6. Assignment Problem II
7. Queuing Problem
8. Sequencing Problem
9. Game Theory

Books for study: Department Lab Manual

Books for Reference:

1. Taha, H.A (2011). Operations Research: An Introduction, Ninth Edition, Prentice Hall Publishing Company.
2. Sharma J.K. (2013), Operations Research: Problems and Solutions, (Fifth Edition) Macmillan India Limited.
3. Gupta R. K (1985), Operations Research, Krishna Prakashan, Mandir Meerut.

E-Resources:http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdfhttp://www.uky.edu/~dsianita/300/online/LP.pdf

Methodology of Teaching:

Chalk and Talk, ICT Presentation, Video lectures, Demonstration

CO	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	Understand the basic principles and concepts of Operation Research	**K1**
CO2	Explore the applicability of programming skills in MODI Methods.	**K1,K2**
CO3	Summarize various optimization techniques like LPP models.	**K4**
CO4	Analyze the transportation, inventory and assignment problems.	**K3**
CO5	Explain the concepts of sequencing, game theory.	**K6,K2**
KI- Remembering/Knowledge, K2- Understand, K3-Apply, K4-Analyse, K5 Evaluate, K6 – Create		

Course Outcomes (COs)	ProgrammeSpecific 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

****