Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*GEL*	***U24FTA301***	***TAMIL - III***	***60***	***3***	***25***	***75***	***100***

OBJECTIVES:

- தமிழர் வரலாற்றையும், வாழ்வியல் தொன்மையையும் அறிந்து கொள்ளுதல்
- தமிழரின் பண்பாட்டினை அறிந்து கொள்ளுதல் மற்றும் தமிழ்நாட்டிற்கு வந்திணைந்த பிற பண்பாட்டுச் சூழலை உணர்ந்து கொள்ளுதல்.
- மண் சார்ந்த சமூக ஆர்வலர்களையும் ஆளுமைகளையும் அறிதல்.

COURSE OUTCOME(S)

COs	**CO Statement** (After completing the course, the students will be able to)	**Cognitive Level**
CO1	தமிழக மற்றும் தமிழர் வரலாற்றை அறிந்து கொள்வர்	**K5**
CO2	தமிழரின் வாழ்வியல் நெறிமுறைகளை உணர்ந்து கொள்வர்	**K3**
CO3	தமிழகத்தின் வெவ்வேறு காலகட்டத்தின் ஆட்சி வரலாற்றை அறிவர்.	**K4**
CO4	தமிழ்ச் சூழலின் இன்றியமையாத காலகட்டங்களை உணர்ந்து கொள்வர்	**K2**
CO5	சமூகத்தின் மேம்பாட்டுக்கு உழைத்திட்ட மறுமலர்ச்சியாளகளைத் தெளிந்து கொள்வவர்.	**K1**

தமிழக வரலாறும் பண்பாடும் - பாடத்திட்டம்

அலகு - 1	**நில வரலாறு** 1. பழங்கால வரலாறு 2. திணை வாழ்வியல் 3. அகழ்வாராய்ச்சியில் தமிழர்	(12 Hours)
அலகு - 2	**சமூக வரலாறு** 1. சங்க கால ஆட்சிமுறை 2. அயல்நாட்டுத் தொடர்புகள் 3. கல்வியும் கலைகளும்	(12 Hours)
அலகு - 3	**ஆட்சியர் வரலாறு** 1. பல்லவர் மற்றும் நாயக்கர் ஆட்சி 2. முகமதியர் மற்றும் மராட்டியர் ஆட்சி 3. போர்த்துகீசியர் மற்றும் ஆங்கிலேயர் ஆட்சி	(12 Hours)
அலகு - 4	**தமிழக விடுதலைப் போராட்டம்** 1. விடுதலைப் போராட்டத்தில் தமிழகம் 2. இந்திய விடுதலையில் தமிழக இசுலாமியர் 3. மொழிப் போராட்டம்	(12 Hours)
அலகு - 5	**சமூக மறுமலர்ச்சியாளர்கள்** 1. நவாப் சி.அப்துல் ஹக்கீம் 2. டாக்டர் ஐடா ஸ்கடர் 3. டாக்டர் மு.வரதராசனார்	(12 Hours)

பார்வை நூல்கள்

1 செய்யுள் திரட்டு - தமிழ்த்துறை, சி.அப்துல் ஹக்கீம் கல்லூரி, 2025 சூன் வெளியீடு

2 தமிழக வரலாறும் தமிழர் பண்பாடும் - டாக்டர் ஆ.இராமகிருட்டினன்
சர்வோதய இலக்கியப் பண்ணை, மதுரை - 01
பத்தாம் பதிப்பு -2012

3 விடுதலைப் போரில் முஸ்லிம்கள் - வி.என்.சாமி
பாவலர் பதிப்பகம், மதுரை - 09
முதல் பதிப்பு -2009

Web Sources

- Tamil Heritage Foundation- www.tamilheritage.org
- Tamil virtual University Library- www.tamilvu.org/ library http://www.virtualvu.org/library
- Project Madurai - www.projectmadurai.org.
- Chennai Library- www.chennailibrary.com .
- Tamil Universal Digital Library- www.ulib.prg .
- Tamil E-Books Downloads- tamilebooksdownloads. blogspot.com

Cos	Programme Outcomes					Programme Specific Outcomes					Mean
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	1	1	3	2	2	-	-	-	-	-	
CO2	1	2	2	3	3	-	-	-	-	-	
CO3	2	2	3	2	3	-	-	-	-	-	
CO4	3	2	2	2	3	-	-	-	-	-	
CO5	3	2	3	2	3	-	-	-	-	-	
Mean Overall Score											

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*GEL*	***U24FTA401***	***TAMIL - IV***	***60***	***3***	***25***	***75***	***100***

OBJECTIVES

- தமிழ் மொழியின் வழியாக அறிவியல் சிந்தனைகளை வளர்த்தல். தமிழ் இணைய பயன்பாட்டையும், அறிவியல் கலைச்சொல்லாக்கத்தையும் பயிற்றுவித்தல்.
- தமிழ்ச் சூழலில் அதிக பேசுபொருளாக இருக்கின்ற மொழி, பக்தி, நாட்டுநடப்பு மற்றும் நட்புறவு போன்றவற்றை மையப் பொருளாகக் கொண்டுள்ள தற்கால இலக்கியச் செய்திகளை விளங்க வைத்தல்.

COURSE OUTCOME(S)

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	தமிழ்மொழியின் வழியாக அறிவியல் பற்றி சிந்திக்கும் திறன் பெறுவர்.	**K4**
CO2	தமிழிலக்கியப் பரப்பில் நிலம்,கருவி,உயிர் முதலியவை அறிவியலால் நிகழ்ந்த மாற்றங்களை நன்கு உணர்வர்.	**K5**
CO3	இணைய பயன்பாட்டையும், தமிழில் அதன் நிலைப்பாட்டையும், கலைச்சொல்லின் முக்கியத்துவத்தையும் தெரிந்து கொள்வர்.	**K3**
CO4	மொழி, இறையான்மை, நாட்டுநடப்புச் சூழல்களை தற்கால கவிதை வழி உணர்ந்து கொள்வர்	**K2**
CO5	வழிபாடு, நட்புறவு, நாட்டுப்பற்று போன்ற சூழ்நிலைகளைத் தமிழ் உரைநடை இலக்கியங்கள் வழி அறிவர்.	**K2**

தமிழில் அறிவியலும் சூழலியலும் - பாடத்திட்டம்

அலகு - 1	**தமிழரின் அறிவியல் சிந்தனைகள்** 1. ஐந்திணைப் பகுப்பும் சூழலியலும் 2. தொழில்நுட்ப மேலாண்மை 3. நீர் நில மேலாண்மை	(12 Hours)
அலகு - 2	**இலக்கியங்களில் அறிவியல் சிந்தனைகள்** 1. நிலவியல் 2. உலோகவியல் 3. உயிரியல்	(12 Hours)
அலகு - 3	**இணையத் தமிழ்** 1. இணையத் தமிழ் பயன்பாடு –அறிமுகம் 2. இணையத் தமிழ்க் கல்விக் கழகம், இணைய நூலகம் 3. கலைச்சொல்லாக்கம்	(12 Hours)
அலகு - 4	**தமிழ்ச் சூழலியல் (கவிதை)** 1. கவிஞர். முடியரசன் - மொழி உணர்ச்சி 2. கவிக்கோ அப்துல் ரகுமான் - தவறான எண் 3. ஈரோடு தமிழன்பன் - சென்ரியூ கவிதைகள்	(12 Hours)
அலகு - 5	**தமிழர் சூழலியல் (உரைநடை)** 1. தொ.பரமசிவம் - குலதெய்வம் 2. தி.மு.அப்துல் காதர் - முகத்தில் முகம் பார்க்கலாம் 3. வைரமுத்து - தாய்மண்	(12 Hours)

பார்வை நூல்கள்

1 செய்யுள் திரட்டு - தமிழ்த்துறை, சி.அப்துல் ஹக்கீம் கல்லூரி, 2025 சூன் வெளியீடு
2 அறிவியல் தமிழ் - இராதா செல்லப்பன், பாரதிதாசன் பல்கலைக்கழகம், திருச்சி.
3. இணையத்தமிழ் வரலாறு - மு.பொன்ன வைக்கோ பாரதிதாசன் பல்கலைக்கழகம்,திருச்சி.

Web Sources

- Tamil Heritage Foundation- www.tamilheritage.org
- Tamil virtual University Library- www.tamilvu.org/ library http://www.virtualvu.org/library
- Project Madurai - www.projectmadurai.org
- Chennai Library- www.chennailibrary.com
- Tamil Universal Digital Library- www.ulib.prg
- Tamil E-Books Downloads- tamilebooksdownloads. blogspot.com
- Tamil Books on line- books.tamil cube.com

Cos	Programme Outcomes					Programme Specific Outcomes					Mean
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	2	2	3	2	-	-	-	-	-	
CO2	2	2	3	2	2	-	-	-	-	-	
CO3	2	2	3	2	3	-	-	-	-	-	
CO4	2	2	3	2	3	-	-	-	-	-	
CO5	2	2	2	3	3	-	-	-	-	-	
Mean Overall Score											

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*GEL*	***U24FUR301***	***URDU - III***	***60***	***3***	***25***	***75***	***100***

Objectives:

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	**Understand the historical evolution of the Urdu language and different linguistic perspectives.**	**K2**
CO2	**Analyze the prose and poetry contributions of renowned Urdu writers and poets**	**K4**
CO3	**Gain insights into Urdu drama, its structure, significance, and evaluate**	**K5**
CO4	**Develop an appreciation for Rubaiyat by poets**	**K5**
CO5	**Improve formal letter-writing skills for academic, personal, and professional communication.**	**K6**

Cognitive Levels (K1-Remember**; K2-**Understand**; K3-**Apply**; K4-**Analyze**; K5-**Evaluate**; K6-**Create**)**

Syllabus:

UNIT – I - 15 Hours

Tareek-e-Adab-e-Urdu

Urdu Zaban Ki Ibteda-o-Irthiqa

Urdu Ke Muthaluq Mukthalif Nazriyath

UNIT – II - 15 Hours

Urdu Ke Nasar Nigaar aor shoura

Abdul Haleem Sharar

Prem Chand

Faiz Ahmed Faiz

Akbar Alihabadi

UNIT – III - 15 Hours

DRAMA

Darama Ka Tarruf

Kirshan Chender Ka Tarruf

Darwaz-e-Kholdo

UNIT – IV - 15 Hours

RUBAIYAT

Mir Anees ka tarruf

Gulshan Mein Phiroon Ke Sair Sehra

Dehkoon

Akbar Alahbadi ka tarruf

Gaflath Ki Hansi Se aah Bharna Achcha

Amjad Hyderadi ka tarruf

یونٹ -I

- تاریخ ادبِ اردو
- اردو زبان کی ابتداء و ارتقاء
- اردو کے متعلق مختلف نظریات

یونٹ -II

- اردو کے نثر نگار وشعرائ
- عبدالحلیم شرر
- پریم چند
- فیض احمد فیض
- اکبر الہ آبادی

یونٹ-III

- ڈرامہ
- ڈرامہ کا تعارف
- کرشن چندر کا تعارف
- دروازے کھول دو

یونٹ -IV

- رباعیات
- میر انیس کا تعارف
- گلشن میں پھروں کہ سیر صحرا دیکھوں
- اکبر الہ آبادی کا تعارف
- غفلت کی ہنسی سے آہ بھرنا اچھا
- امجد حیدرآبادی کا تعارف
- اس نام کی زندگی پہ کچھ جان تو ہو؟
- اصغر ویلوری کا تعارف
- ڈھونڈا تو کتابوں میں صداقت نہ ملی

یونٹ -V

- خطوط نگاری
- پرنسپل کے نام چھٹی کا خط
- والد/سرپرست کو خط، جس میں کالج کی فیس کی ادائیگی کے لیے رقم مانگی گئی ہو۔

Is Nam Ki Zandagi Pe Kuch Jan Tho Ho **✾✾Asghar Vellori ka tarruf** **Doonda Tho Kithaboon Mein Sadaqth na Mili** **UNIT – V - 15 Hours** **✾✾Khutoot Nigari** **✾✾Letter to the Principal seeking leave** **✾✾Letter to the Father/Guardian asking money for payment of College fees** **✾✾Letter to the Manager of a Firm seeking employment** **✾✾ Letter to a publisher or book seller placing order for books**	❖ ملازمت کی درخواست کرتے ہوئے مینیجر کے نام خط ❖ کتابوں کا آرڈرکرتے ہوئے پبلشر یا کتاب فروش کے نام خط

 # _____# Self Study Component for Seminar/Assignment:
(Questions should not be asked from self study component in the End Semester Examinations)

Text Books:

NISAB-E-JAMEEL EDITED BY Dr.S.MOHAMED YASSIR & Dr.S.MOHAMED MUDDASSIR

Reference Book:

- Deewan-e-Meer
- Deewan-e-Dard
- Deewan-e-Ghalib
- Kuliyath-e-Momin
- Kuliyath-e-Akbar
- Kuliyath-e- Iqbal
- Kuliyath-e- Jigar
- Kuliyath-e- Saher Ludhyanvi

Web Resources:

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

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2							
CO2	2	3	3	2							
CO3	3	2	3	3							
CO4	3	2	2	2							
CO5	3	3	2	3							

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*GEL*	***U24FUR401***	***URDU - IV***	***90***	***3***	***25***	***75***	***100***

Objectives:

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Understand the fundamentals of Short Story, its definition, and artistic elements.	**K2**
CO2	Analyze and critically appreciate selected works of renowned Urdu fiction	**K4**
CO3	Evaluate the themes, social contexts, and narrative styles of selected Afsanas	**K5**
CO4	Develop critical thinking through Afsanas	**K5**
CO5	Enhance literary expression through general essays and dialogue-writing skills	**K6**

Cognitive Levels (K1-Remember**; K2-**Understand**; K3-**Apply**; K4-**Analyze**; K5-**Evaluate**; K6-**Create**)**

Syllabus:

UNIT – I -- 15 Hours

- **AFSANA**
- Afsane ki Tareef
- Afsane ka fun

UNIT – II -- 15 Hours

- Rajendra Singh Bedi ka tarruf
- Afsana-Bhola
- Prem Chand ka Tarruf
- Afsana- Kafan

UNIT – III -- 15 Hours

- Kirshan Chender ka Tarruf
- Afsana- Jamun Ka Pard
- Ameerunisa ka Tarruf
- Afsana-Dard Ka Ehsaas

UNIT – IV -- 15 Hours

- Ali Akbar Amburi ka Tarruf
- Afsana-KhushNaseeb
- Saadat Hasan Manto ka Tarruf
- Naya Qanoon

UNIT – V -- 15 Hours

- MAZMOON NIGARI
- Mazmoon Nigari Ki Tareef
- Akbaar Bini ke fawaid
- Computer ki Ahmiyath
- Science ke fawaid aur Nuqsanath
- Mukalama Nigari

یونٹ -I

- □ □افسانہ
- □□افسانے کی تعریف
- □□افسانے کا فن

یونٹ - II

- □□راجندر سنگھ بیدی کا تعارف
- □□افسانہ -بھولا
- □□پریم چند کا تعارف
- □افسانہ- کفن

یونٹ -III

- □□کرشن چندر کا تعارف
- □□افسانہ- جامن کا پیڑ
- □□امیرالنساء کا تعارف
- □افسانہ -درد کا احساس

□یونٹ -IV

- □□علی اکبر آمبوری کا تعارف
- □□افسانہ- خوش نصیب
- □□سعادت حسن منٹوکا تعارف
- □افسانہ -نیا قانون

یونٹ -V

- □مضمون نگاری
- مضمون نگاری کی تعریف
- اخبار بینی کے فوائد
- □کمپیوٹر کی اہمیت
- □ سائنس کے فوائد اور نقصانات
- مکالمہ نگاری

 # _____# Self Study Component for Seminar/Assignment:
(Questions should not be asked from self study component in the End Semester Examinations)

Text Books:

NISAB-E-JAMEEL EDITED BY Dr.S.MOHAMED YASSIR & Dr.S.MOHAMED MUDDASSIR

Reference Book:

- Deewan-e-Meer
- Deewan-e-Dard
- Deewan-e-Ghalib
- Kuliyath-e-Momin
- Kuliyath-e-Akbar
- Kuliyath-e- Iqbal
- Kuliyath-e- Jigar
- Kuliyath-e- Saher Ludhyanvi

Web Resources:

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

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2							
CO2	2	3	3	2							
CO3	3	2	3	3							
CO4	3	2	2	2							
CO5	3	3	2	3							

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by

Syllabus for All II Year UG Courses effective from the year 2025-2026

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*GEL*	***U24FEN301***	***English – III***	***60***	***3***	***25***	***75***	***100***

Course Objectives

CO1	To enable learners to acquire self-awareness required in various life situations.
CO2	To enable learners to inculcate positive thinking required in various life situations.
CO3	To help them acquire the attribute of empathy
CO4	To assist them in acquiring creative and critical thinking abilities
CO5	To enable them to learn the basic grammar

Unit I

Prose

1. My Vision for India – Dr. A.P.J. Abdul Kalam
2. On Saying Please – A.G. Gardiner
3. Character is Destiny – Dr. S. Radhakrishnan
4. Time and the Machine – Aldous Huxley

Unit II

Poetry

1. The Daffodils — William Wordsworth
2. Ulysses – Alfred Lord Tennyson
3. The Village School Master—Oliver Goldsmith
4. Telephone Conversation – Wole Soyinka

Unit III

Short Story

1. Three Questions – Leo Tolstoy
2. The Taxi Driver – K.S.Duggal

Unit IV

Readers Theatre

1. The Boy Comes Home – A.A. Milne
2. Love at First Sight – The Tempest – William Shakespeare

Unit V

Lexical Skills

a) Foreign Words and Special Terminology
b) Building Vocabulary
c) Phrasal Verbs
d) Idioms and Phrases

Grammar

a) Adverbs and its kinds
b) Gerund, Participle, Infinitive
c) Tenses – Introduction
d) Present Tense
e) Past Tense
f) Active and Passive Voices
g) Direct and Indirect Speeches

Communication Skills (LSRW)

a) Expressing Sympathy
b) Expressing Gratitude
c) Complaining
d) Apologizing

Composition

a) Public Speaking
b) Seminar
c) Writing a Memorandum
d) Expansion of Proverbs

Prescribed Book: New Vistas in English - III, Board of Editors, Published by Hakeem Publications, Department of English, C. Abdul Hakeem College (Autonomous), Melvisharam-632509. www.cahc.ac.in, Mail: hakeemcollege@edu.in

Web Resources

1.	Telephone Conversation - Wole Soyinka https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html
2.	https://www.litcharts.com/poetry/alfred-lord-tennyson/ulysses
3.	https://www.litcharts.com/poetry/sarojini-naidu/the-gift-of-india
4.	https://onlinefreenotes.com/on-saying-please/
5.	https://sxlearningenglish.blogspot.com/2021/05/neb-grade-xi-three-questions-leo-tolstoy.html
6.	https://www.xjd.com/t-the-taxi-driver-by-kartar-singh-duggal-summary/?srsltid=AfmBOooteYGglXTMpB5PyBIDdNpxxxRY3ylETvzURDpoKydTS_KZxuaB

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*GEL*	***U24FEN401***	***English – IV***	***60***	***3***	***25***	***75***	***100***

Course Objectives

CO1	To facilitate self-awareness for handling diverse life situations.
CO2	To cultivate positive thinking skills for various life scenarios.
CO3	To develop empathy as a core attribute.
CO4	To nurture creative and critical thinking abilities.
CO5	To apply acquired grammar knowledge to improve the quality and effectiveness.

Unit I

Prose

1. On Forgetting—Robert Lynd
2. The Face of Judas Iscariot – Bonnie Chamberlin
3. The Eternal Silence of These Infinite Crowds - Nirad C. Chauduri
4. The Gift of Language — J.G.Bruton

Unit II

Poetry

1. Anxiety Monster- Rhona McFerran
2. A River- A.K. Ramanujan
3. La Belle Dame Sans Merci—John Keats
4. I Know Why the Caged Bird Sings – Maya Angelou

Unit III

Short Story

1. Valiant Vicky, The Brave Weaver - Flora Annie Steel
2. A Retrieved Reformation – O Henry

Unit IV

Reader's Theatre & Extract from a play

1. The Quality of Mercy (Trial Scene from the Merchant of Venice)
2. The Giant's Wife a Tall Tale of Ireland – William Carleton

Unit V

Lexical Skills:

a) Common Errors in English
b) Formation of words
c) Spelling and Sound: Introduction to Phonetics
d) Vowels and Consonants

Grammar:

a) Conjunction and its kinds

b) Interjection and its kinds

c) Regular and Irregular Verbs

d) Future Tense

e) Degrees of Comparison

f) Simple, Complex and Compound Sentences

Communication Skills (LSRW):

a) Phoning

b) Offering Help

c) Asking for Information

d) Making an Appointment

Composition:

a) Designing a Resume and Curriculum Vitae

b) Writing covering letter for Resume & CV

c) Preparing Agenda for Meetings

d) Writing Minutes of Meetings

Prescribed Book: New Vistas in English - IV, Board of Editors, Published by Hakeem Publications, Department of English, C. Abdul Hakeem College (Autonomous), Melvisharam-632509. www.cahc.ac.in, Mail: hakeemcollege@edu.in

Web Resources

1	https://www.orwellfoundation.com/the-orwell-foundation/orwell/essays-and-other-works/why-i-write/
2	https://www.litcharts.com/lit/a-retrieved-reformation/summary-and-analysis https://study.com/academy/lesson/a-retrieved-reformation-summary-themes.html
3	https://www.poetrysoup.com/poem/anxiety_monster_1100885
4	https://allpoetry.com/A-River https://writerjyotijha.medium.com/river-a-k-ramanujan-775dcc791a5e
5	https://www.savemyexams.com/igcse/english-literature/edexcel/16/revision-notes/poetry-anthology/part-3-pearson-edexcel-international-gcse-english-anthology/la-belle-dame-sans-merci/
6	https://www.folger.edu/explore/shakespeares-works/the-merchant-of-venice/read/4/1/

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*CC*	***U24MMA301***	***DIFFERENTIAL EQUATIONS***	***60***	***4***	***25***	***75***	***100***

Objectives:

- Knowledge about the methods of solving Ordinary and Partial Differential Equations.
- The understanding of how Differential Equations can be used as a powerful tool in solving problems in science.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Solve Bernoulli's equation and exact differential equations.	K3
CO2	Discuss the different types of Solvable equations.	K6
CO3	Find the solutions of simultaneous linear differential equations, linear equations of second order and to solve ODE's using the method of variation of parameters.	K6
CO4	Find the complete, singular and general integrals, to solve Lagrange's equations.	K3
CO5	Explain standard forms and Solve Partial differential equations using Charpit's method.	K6

Syllabus:

Unit: I Ordinary Differential Equations (12 Hours)

Variables separable - Homogeneous Equations-Non-Homogeneous Equations of the first order and of the first degree in two variables -Linear Equation - Bernoulli's Equation-Exact differential equations.

Chapter II: Full

Unit – II Equations of the first order but of higher degree (12 Hours)

Equations solvable for dy/dx- Equations solvable for y- Equation solvable for x- Clairaut's form - Linear Equations with constant coefficients - Particular integrals of algebraic, exponential, trigonometric functions and their products.

Chapter IV: Sections 1 to 3 & Chapter V: Sections 1 to 4.

Unit – III Simultaneous linear differential equations (12 Hours)

Simultaneous linear differential equations- Linear equations of the second order -Complete solution in terms of a known Integrals-Method of Variation of Parameters.

Chapter VI: Section-6 only & Chapter VIII- Full.

Unit – IV First order Partial differential equation (12 Hours)

Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular Integral-General Integral-Lagrange's Linear Equations – Simple Applications.

Chapter: XII- Sections 1 to 4.

Unit – V First order Partial differential equation (cont.) (12 Hours)

Special methods – Standard forms-Charpit's method – Simple Applications.

Chapter: XII- Sections 5 to 6.

Text Book:

S. Narayanan, T.K. Manickavachagam Pillay, Differential Equations and its Applications, S Viswanathan (Printers and Publishers) Pvt. Ltd (2011), Chennai-600031.

Reference Books:

1. D.A. Murray, Introductory course in Differential Equations, Orient and Longman
2. H.T. H.Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi, 1985.
3. Horst R. Beyer, Calculus and Analysis, Wiley, 2010.
4. Braun, M. Differential Equations and their Applications. (3rd Edn.), Springer- Verlag, New York. 1983.
5. TynMyint-U and Lognath Debnath. Linear Partial Differential Equations for Scientists and Engineers. (4th Edn.) Birhauser, Berlin. 2007.
6. Boyce, W.E. and R.C. Di Prima. Elementary Differential Equations and Boundary Value Problems. (7th Edn.) John Wiley and Sons, Inc., New York, 2001.
7. Sundrapandian, V. Ordinary and Partial Differential Equations, Tata McGraw Hill Education Pvt. Ltd. New Delhi, 2013.

E-Resources:

1. https://nptel.ac.in

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	2	3	2	1
CO2	3	3	2	2	-	2	3	2	1
CO3	2	2	2	2	-	2	3	2	1
CO4	3	3	2	2	-	2	2	2	1
CO5	3	3	2	2	-	2	3	2	1
Mean	2.8	2.8	2	2		2	2.8	2	1

Prepared by	Verified by
SH	HOD

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*CC*	***U24MMA302***	***VECTOR CALCULUS***	***60***	***4***	***25***	***75***	***100***

Objectives:

- Knowledge about differentiation of vectors, differential operators, derivatives of vector functions.
- Skills in evaluating line, surface and volume integrals.
- The ability to analyze the physical applications of derivatives of vectors.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Determine derivatives of Scalar and Vector point functions.	K5
CO2	Analyze the Divergence and Curl and to Explain Solenoidal and Irrotational vectors.	K4
CO3	Evaluate simple Line Integrals.	K5
CO4	Evaluate Surface Integrals and Volume Integrals.	K5
CO5	Evaluate the integrals using Gauss, Stoke's and Green's theorems.	K5

Syllabus:

Unit: I Vector Differentiation (12 Hours)

Derivative of a vector function- Geometric significance of vector differentiation -Vector point function - Scalar point function - Gradient of a scalar point function and Directional Derivative of a scalar point function.

Chapter 1: Page Nos. 1 to 22.

Unit – II Vector Differentiation (Cont.) (12 Hours)

Divergence & Curl of a vector point function -Solenoidal and Irrotational vectors -Vector Identities -Simple problems.

Chapter 1: **Page Nos. 22 to 53.**

Unit – III Vector Integration (12 Hours)

Line integral – simple problems.

Chapter 2: Page Nos. 54 to 75.

Unit – IV Vector Integration (Cont.) (12 Hours)

Surface integral - Volume integral – Simple problems.

Chapter 2: Page Nos. 75 to 89

Unit – V Vector Integration (Cont.) (12 Hours)

Gauss divergence theorem, Stoke's theorem, Green's theorem in two dimensions (Without proofs)- Simple Problems.

Chapter 2: Page Nos. 89 to 142.

Text Book:

P.R. Vittal. (1999) Vector Analysis, Analytical Solid Geometric and Sequences and Series, Margham Publications, Chennai-600017.

Reference Books:

1. G.B. Thomas and R. L. Finney. (1998) Calculus and Analytic Geometry, Addison Wesley (9th Edn), Mass. (Indian Print).
2. M.K. Venkataraman. (1992) Engineering Mathematics-Part B. National Publishing Company, Chennai.
3. B.S. Grewal. Higher Engineering Mathematics (2002), Khanna Publishers, New Delhi.
4. P. Duraipandiyan and Kayalal Pachaiyappan, Vector Analysis, S. Chand & Co. Ltd.

E-Resources:

1. https://nptel.ac.in

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	2	3	2	1
CO2	3	3	2	2	-	2	3	2	1
CO3	2	3	2	2	-	2	3	2	1
CO4	3	3	2	2	-	2	3	2	1
CO5	3	3	2	2	-	2	3	2	1
Mean	2.8	3	2	2		2	3	2	1

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SH	HOD

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*DSSEC*	***U24SMAP31***	***Practical - Computational Mathematics (SBS - IV)***	***30***	***2***	***25***	***75***	***100***

Objectives:

The main objective of this course is to enable students to see how the computational techniques they have learned in the previous semesters can be put into action with the help of open software SageMath.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	**CO Statement (After completing the course, the students will be able to)**	**Cognitive Level**
CO1	Solve the system of linear equations and polynomial equations	K6
CO2	Evaluate limit, differentiation and integral of a function	K5
CO3	Utilize SageMath software, perform algebraic, matrix and vector operations	K3
CO4	Create 2D and 3D plots	K6
CO5	Solve problems in permutation and combinations using SageMath	K6

Syllabus:

1. Exploring integers
2. Solving system of linear equations
3. Limit of function
4. Derivatives and integrals
5. Partial differentiation
6. Matrices
7. Polynomials and Polynomial equations
8. 2d and 3d plotting
9. Vectors
10. Permutations and combinations

Reference Books:

Paul Zimmermann, Computational Mathematics using SageMath, 2018.

E-Resources:

1. https://doc.sagemath.org/html/en/tutorial/index.html
2. https://onlinecourses.nptel.ac.in/noc21_ma29/preview
3. https://sagecell.sagemath.org/
4. https://cloud.sagemath.com/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	3	2	2
CO2	3	3	3	-	-	-	2	2	2
CO3	3	3	3	-	-	-	2	3	2
CO4	2	3	3	-	-	-	2	2	2
CO5	3	3	3	-	-	-	2	2	3
Mean	2.8	3	3	-	-	-	2.2	2.2	2.2

Prepared by	Verified by
Dr. S.SURESH KUMAR	HOD

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*CC*	***U24MMA401***	***Elements of Mathematical Analysis***	***75***	***5***	***25***	***75***	***100***

Objectives:

To provide rigorous foundations for calculus and mathematical analysis.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Examine the completeness property of real numbers and subsets of real numbers.	K4
CO2	Assess whether a sequence is bounded or unbounded and explain the implications of boundedness and monotonicity on convergence.	K5
CO3	Apply the operations on convergent and divergent sequences and check whether the resulting sequence converges or diverges.	K3
CO4	Analyze the series using different tests and distinguish between absolute and conditional convergence.	K4
CO5	Evaluate limits in metric spaces and assess the behaviour of continuous functions on metric spaces.	K5

Syllabus:

Unit: I Sets and Functions (15 Hours)

Sets and elements- Operations on sets- Functions- Real valued functions- Equivalence- Countability- Real numbers- Least upper bounds.

Chapter 1: Sections 1.1 – 1.7.

Unit – II Sequences of Real Numbers (15 Hours)

Definition of a sequence and sub sequence -Limit of a sequence – Convergent sequences– Divergent sequences- Bounded Sequences-Monotone sequences.

Chapter 2: Sections 2.1 – 2.6.

Unit – III Sequences of Real Numbers(cont.) (15 Hours)

Operations on convergent sequences – operations on divergent sequences – Limit superior and Limit Inferior-Cauchy sequences.

Chapter 2: Sections 2.7 – 2.10.

Unit – IV Series of Real Numbers (15 Hours)

Convergence and divergence – Series with nonnegative terms - Alternating series- Conditional convergence and absolute convergence- Tests for absolute convergence.

Chapter 3: Sections 3.1 – 3.4, 3.6.

Unit – V **Limits and Metric Spaces** **(15 Hours)**

Limit of a function on a real line - Metric spaces - Limits in metric spaces – Continuous Functions on Metric Spaces: Function continuous at a point on the real line-Function continuous on a metric space.

Chapter 4: Sections 4.1 – 4.3.
Chapter 5: Sections 5.1, 5.3.

Text Book:

Richard R. Goldberg, Methods of Real Analysis: Oxford and IBH Publishing, (2020)

Reference Books:

1. T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002.
2. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P.Ltd., 2000.
3. E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4. K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003.

E-Resources:

1. https://nptel.ac.in/courses/111106053.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	3	2	2	3
CO2	3	2	2	2	-	2	2	2	3
CO3	3	2	2	2	-	2	2	2	3
CO4	3	2	2	1	-	2	3	2	3
CO5	3	3	2	2	-	3	3	2	3
Mean	3	2.2	2	1.8	-	12	12	10	3

Prepared by	Verified by
A Mohammed Hakil	H. O. D

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*CC*	***U24MMA402***	***Transformation Techniques***	***45***	***3***	***25***	***75***	***100***

Objectives:

- The basic knowledge about Laplace Transforms and its inverse.
- To solve ODEs using Laplace Transform.
- To solve problems in Fourier series and Fourier Transforms.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Explain the properties of Laplace Transforms.	K2
CO2	Solve second order ODE's with constant coefficients by using the Laplace Transform.	K6
CO3	Develop Fourier series for Periodic Functions of Period 2π, Odd and Even Functions.	K3
CO4	Analyze the Fourier Transforms, Infinite Fourier Transforms and explain their properties.	K5
CO5	Evaluate Fourier sine and cosine transform and their properties.	K5

Syllabus:

Unit: I The Laplace Transforms (9 Hours)

Definition- Sufficient conditions for the existence of the Laplace Transforms (without Proof)- Laplace Transform of Periodic Functions – Some general theorems – Evaluation of Integrals using Laplace Transform – Problems.

Chapter 5: Sections 1–5

Unit – II The Inverse Laplace Transforms (9 Hours)

The Inverse Laplace Transforms – problems.

Chapter 5: **Sections 6 - 8**

Unit – III Fourier Series (9 Hours)

Fourier series- expansion of periodic functions of Period 2π – Expansion of even and odd functions – problems.

Chapter 6: Sections 1–3

Unit – IV Fourier Transforms (9 Hours)

Fourier Transform – Infinite Fourier Transform (Complex Form) – Properties of Fourier Transform – problems.

Chapter 6: Sections 9 –10

Unit – V Fourier Transforms (Continued) (9 Hours)

Fourier Cosine and Sine Transform – Properties - Problems.

Chapter 6: Sections 11 - 12

Text Book:

S. Narayanan and T. K. Manicavachagom Pillay, Calculus, Volume III, S. Viswanathan Publishers Pvt. Ltd. 2013.

Reference Books:

1. P. R. Vittal, Differential Equations (1999), Differential Equations, Fourier and Laplace Transforms, Margham Publications.
2. B.S.Grewal, Higher Engineering Mathematics (2002), Khanna Publishers, New Delhi.
3. P. Kandasamy and Others, Engineering Mathematics Volume III, S. Chand and Co.
4. Stanley Gross man, William and R. Devit Advanced Engineering Mathematics.
5. A. Singaravelu, Engineering Mathematics III(2008), Meenakshi Agency, Chennai.

E-Resources:

1. **Laplace Transform and Inverse Laplace Transform: NPTEL – Online (YouTube) Lectures (23 -38):**

   https://youtube.com/playlist?list=PLs7oDAL8_ouJ5w8wCPtKnK2I09MlKC6kP&si=tu_5QsXzx40wL1lu

2. **Fourier Series and Fourier Transform: NPTEL – Online (YouTube) Lectures (47 - 57):** https://youtu.be/JzaaQxkL6Ak

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	2	3	2	1
CO2	2	3	2	-	-	2	3	2	1
CO3	3	3	2	-	-	2	3	2	1
CO4	3	3	2	-	-	2	3	2	1
CO5	3	3	2	-	-	2	3	2	1
Mean	2.8	3	2			2	3	2	1

Prepared by	Verified by
N. Mohamedazarudeen	HOD

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*DSSEC*	***U24SMAP41***	***Practical - Mathematical Documentation using LaTeX (SBS - V)***	***30***	***2***	***25***	***75***	***100***

Objectives:

The main aim of introducing LaTeX software is to enable undergraduate students to

- Know and create basic types of LaTeX documents.
- Format words, lines, and paragraphs, design pages, create lists, tables, and figures in LaTeX.
- Create professional presentation slides using LaTeX.
- Typeset mathematics symbols.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Create basic types of LaTeX documents	K6
CO2	Create complex mathematical formulae by using LaTeX.	K6
CO3	Create tables and arrays	K6
CO4	Create graphics, picture lists	K6
CO5	Create Slides with Beamers	K6

Syllabus:

1. Structure of LaTeX document. Defining class of the document through document class.
2. Creating a Title, chapters and sections and their labeling. Additionally, the basics of LaTeX syntax will be introduced.
3. Page style, fonts, font sizes, font styles.
4. Introduction to mathematics environment, writing Greek symbols and some basic mathematics type structure like fractions, superscript, subscript, over line, underline etc.
5. Equations and Arrays. Equation references.
6. Introduction to amsmath package. Various mathematical operation symbols.
7. Inserting pictures and tables. Special environments enumerate, tabular, cases etc.
8. Presentations in LaTeX. Introduction to beamer class. Themes of beamer presentations.

Reference Books:

1. Helmut Kopka, Patrick W.Daly, Guide to LaTeX, fourth edition, Addison Wesley Longman Limited 2004.
2. H. J. Greenberg. A Simplified introduction to LaTeX, 2010.

E-Resources:

1. https://www.overleaf.com/learn/latex/Beamer#Reference_guide
2. https://tug.org/tutorials/tugindia/
3. https://cocalc.com/features/latex-editor
4. https://www.ctan.org/tex-archive/info/simplified-latex/

C. Abdul Hakeem College (Autonomous), Melvisharam.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	3	3	3
CO2	3	2	2	-	-	-	3	3	3
CO3	3	2	2	-	-	-	3	3	3
CO4	2	3	2	-	-	-	3	2	3
CO5	3	3	2	-	-	-	2	2	2
Mean	2.8	2.6	2	-	-	-	2.8	2.6	2.8

Prepared by	Verified by
Dr. S.SURESH KUMAR	HOD

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*DSSEC*	***U24SMAP42***	***Practical - Statistics with R (SBS - VI)***	***30***	***2***	***25***	***75***	***100***

Objectives:

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Evaluate the appropriateness of different data types, objects and functions in R for solving statistical and computational problems.	K5
CO2	Construct and optimize R scripts utilizing vector manipulation to achieve data processing tasks.	K6
CO3	Evaluate R scripts utilizing matrix manipulation to achieve data processing tasks.	K5
CO4	Design and implement complex data processing in R using loops, conditional statements and data transformation techniques to solve analytical problems.	K6
CO5	Formulate and develop statistical models by integrating measures of central tendency, dispersion, skewness, covariance and correlation to analyze complex datasets and draw meaningful insights.	K6

Syllabus:

Unit: I The building blocks of R (6 Hours)

Creating an Object in R – Data types in R – Object and Data Types – Coercion Rules in R – Functions in R – Functions and Arguments – Objects and Functions.

Unit – II Vectors and Vector Operations (6 Hours)

Introduction to Vectors – Vector Recycling – Naming a Vector in R – Slicing and Indexing a Vector – Changing the dimensions of a Vector

Unit – III Matrices (6 Hours)

Creating a Matrix in R – Indexing and Slicing a matrix in R – Matrix Operations in R – Categorical Data – Factors in R – Lists in R.

Unit – IV Fundamentals of Programming in R (6 Hours)

Relational and Logical Operators – If, Else, Else If Statements in R – For, While loops in R – Creating a Data frame in R – Data Import and Export in R – Indexing and Slicing a data frame in R – Data transformation with R – Tidying data in R – Visualizing data in R.

Unit – V Statistical Analysis (6 Hours)

Mean, Median and Mode – Skewness, Variance and Standard Deviation – Covariance and Correlation.

Reference Books:

1. R for Dummies, 2nd Edition, Andrie de Vries, John Wiley & Sons.
2. Introductoty Statistics with R, Peter Dalgaard, Springer

E-Resources:

https://onlinecourses.nptel.ac.in/noc19_ma33/preview

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	2	3	3	-	2	3	1	2	2
CO2	3	3	2	-	2	2	2	2	3
CO3	3	3	2	-	2	2	2	1	3
CO4	2	3	2	-	2	2	1	1	2
CO5	2	3	2	-	2	3	1	2	2
Mean	12	15	11	-	10	12	7	8	12

Prepared by	Verified by
A Mohammed Hakil	HOD

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*GEL*	***U24ACH301***	***CHEMISTRY FOR PHYSICAL SCIENCES - I (ALLIED)***	***60***	***4***	***25***	***75***	***100***

Objectives:

- To know the concepts of molecular bonding and nuclear chemistry
- To Study about fuels, silicones and fertilizers
- To understand the basic concepts of hybridization, thermodynamics and chromatography

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Summarize the molecular orbital theory and nuclear reactions	**K2**
CO2	Explain the properties and uses of fuels, silicones and fertilizers	**K2**
CO3	Differentiate the hybridization, geometries of molecules and mechanism involved in the organic reactions.	**K4**
CO4	Outline types of systems and various laws of thermodynamics	**K4**
CO5	Discuss the principles of volumetric analysis, separation techniques and chromatography	**K2**

Cognitive Levels (K1-Remember**; K2-**Understand**; K3-**Apply**; K4-**Analyze**; K5-**Evaluate**; K6-**Create**)**

UNIT I - Chemical Bonding and Nuclear Chemistry: (12 Hours)

Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. Molecular orbital diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties.

Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions - group displacement law. Nuclear binding energy - mass defect - calculations. Nuclear fission and nuclear fusion – differences. Stellar energy. Applications of radioisotopes - carbon dating, rock dating and medicinal applications.

UNIT II - Industrial Chemistry: (12 Hours)

Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required).

Silicones: Synthesis, properties and uses of silicones.

Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate.

UNIT III - Fundamental Concepts in Organic Chemistry: (12 Hours)

Hybridization: Orbital overlap, hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Electronic effects: Inductive effect and consequences on K_a and K_b of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric effect- examples.

Aromatic electrophilic substitution; nitration, halogenation, Friedel – Craft`s alkylation and acylation.

Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.

UNIT IV - Thermodynamics: **(12 Hours)**

Types of systems, reversible and irreversible processes, isothermal, adiabatic processes and spontaneous processes. Statements of first law and second law of thermodynamics. Carnot cycle and efficiency of heat engine. Entropy and its significance. Free energy change and its importance (no derivation).

Conditions for spontaneity in terms of entropy and Gibbs free energy. Relationship between Gibbs free energy and entropy.

UNIT V - Analytical Chemistry: **(12 Hours)**

Introduction to qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques - extraction, distillation and crystallization.

Chromatography: principle and applications of column, paper and thin layer chromatography.

 # _____# Self Study Component for Seminar/Assignment:
(Questions should not be asked from self study component in the End Semester Examinations)

Recommended Books:

1. V. Veeraiyan, Text book of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009.
2. S. Vaithyanathan, Text book of Ancillary Chemistry; PriyaPublications, Karur, 2006.
3. S. Arun Bahl, B.S. Bahl, Advanced Organic Chemistry; S. Chand and Company, New Delhi, twenty third edition, 2012.
4. P.L. Soni, H.M. Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.

Reference Books:

1. P.L. Soni, Mohan Katyal, Textbook of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007.
2. B.R. Puri, L.R. Sharma, M.S. Pathania, Textbook Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018.
3. B.K. Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

COs	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	3	3	3
CO2	3	3	3	-	-	-	3	3	3
CO3	3	3	3	-	-	-	3	3	3
CO4	3	3	3	-	-	-	3	3	3
CO5	3	3	3	-	-	-	3	3	3
Mean	3	3	3	-	-	-	3	3	3

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. K. Abdul Wasi	Dr. S. Zaheer Ahmed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*GEL*	***U24ACH401***	***Chemistry for Physical Sciences - II (Allied)***	***60***	***4***	***25***	***75***	***100***

Objectives:

- To understand the concepts of Coordination Chemistry and Water Technology
- To know about Carbohydrates and Amino acids
- To study the basics of electrochemistry, catalysis and photochemistry

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Explain Werner`s theory, chelation and hardness of water.	**K2**
CO2	Illustrate the classifications and properties of carbohydrates and amino acids	**K2**
CO3	Examine the principles of electrochemistry, fuel cells and corrosion.	**K4**
CO4	Examine reaction kinetics and types of catalysts	**K4**
CO5	Outline the various type of photochemical process.	**K2**

Cognitive Levels (K1-Remember**; K2-**Understand**; K3-**Apply**; K4-**Analyze**; K5-**Evaluate**; K6-**Create**)**

UNIT I - Coordination Chemistry and Water Technology: (12 Hours)

Coordination Chemistry: Definition of the terms - IUPAC Nomenclature – Werner`s theory – EAN rule – Pauling`s theory – postulates – Applications to $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$, $[Co(CN)_6]^{3-}$ - Chelation - Biological role of Hemoglobin and Chlorophyll (elementary idea) - Applications in qualitative and quantitative analysis.

Water Technology: Hardness of water, determination of hardness of water using EDTA method - Purification techniques – reverse osmosis and distillation method.

UNIT II – Carbohydrates and Aminoacids: (12 Hours)

Carbohydrates: Classification, preparation and properties of glucose, fructose and sucrose. Discussion of open chain ring structures of glucose and fructose. Properties of starch and cellulose.

Amino acids: Classification - preparation and properties of aminoacid, preparation of dipeptides using Bergmann method. RNA and DNA (elementary idea only).

UNIT III –Electrochemistry: (12 Hours)

Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials - electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pK_a, pK_b. Conductometric titrations - buffer solutions and its biological applications - electroplating - Nickel and chrome plating.

Types of cells - fuel cells - corrosion and its prevention.

UNIT IV – Kinetics and Catalysis: **(12 Hours)**

Order and molecularity. Integrated rate expression for first order reactions. Evaluation of first order rate constant by graphical method. Pseudo first order reaction, Half-life period. Concept of energy of activation and Arrhenius equation.

Catalysis - Characteristics - Types - Homogeneous and Heterogeneous catalysis – Examples.

UNIT V – Photochemistry: **(12 Hours)**

Grothus – Draper`s law and Stark - Einstein law of photochemical equivalence, Quantum yield – Hydrogen - chlorine reaction. Fluorescence, Phosphorescence, Chemiluminescence and Photosensitization (definition with examples).

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4. P.L. Soni, H.M. Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.

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2. B.R. Puri, L.R. Sharma, M.S. Pathania, Textbook Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018.
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CO4	3	3	3	-	-	-	3	3	3
CO5	3	3	3	-	-	-	3	3	3
Mean	3	3	3	-	-	-	3	3	3

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. K. Abdul Wasi	Dr. S. Zaheer Ahmed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*GEL*	***U24ACHP41***	***ALLIED PRACTICAL - CHEMISTRY FOR PHYSICAL SCIENCES***	***30***	***2***	***25***	***75***	***100***

Objectives:

- To understand laboratory safety
- To learn handling of glass wares
- To study quantitative estimation
- To analyze the organic compounds

Course Outcomes (COs) and Cognitive Level Mapping:

COs	**CO Statement** (After completing the course, the students will be able to)	**Cognitive Level**
CO1	Demonstrate the safety usage of chemicals and common apparatus	**K2**
CO2	Explain the principles of volumetric analysis	**K2**
CO3	Develop the skill to estimate the amount of a substance present in a given solution.	**K6**
CO4	Analyze an organic compound using appropriate test	**K4**
CO5	Identify the presence of special elements and functional groups in an unknown organic compound	**K5**

Cognitive Levels (K1-Remember**; K2-**Understand**; K3-**Apply**; K4-**Analyze**; K5-**Evaluate**; K6-**Create**)**

VOLUMETRIC ANALYSIS:

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of hydrochloric acid using standard oxalic acid.
3. Estimation of ferrous sulphate using standard Mohr's salt.
4. Estimation of oxalic acid using standard ferrous sulphate.
5. Estimation of magnesium using EDTA.

SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS:

The analysis must be carried out as follows:

(a) Functional group tests: [Acids (mono & di), aromatic primary amine, Diamide, aldehyde and carbohydrate].

(b) Detection of elements (N, S, Halogens).

(c) To distinguish between aliphatic and aromatic compounds.

(d) To distinguish – Saturated and unsaturated compounds.

Reference Books:

1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand: New Delhi, 2012.
2. Manna, A.K. Practical Organic Chemistry, Books and Allied: India, 2018.
3. Gurtu, J. N; Kapoor, R. Advanced Experimental Chemistry (Organic), Sultan Chand: New Delhi, 1987.
4. Furniss, B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. Vogel's Textbook of Practical Organic Chemistry, 5th ed.; Pearson: India,1989.
5. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; An advanced course in Practical *Chemistry,* 3rd ed.; New Central Book Agency: Kolkata, 2007.

e-Resources:

1. https://olseh.iisc.ac.in/wp-content/uploads/2019/03/IIScSafetyManual_Ver1_01.pdf
2. https://chemdictionary.org/titration-indicator
3. https://youtu.be/kc0Nc77t5Ig?si=egmDsIw6W87AQhuo
4. https://youtu.be/4VltXjR64SU?si=RCqrQV8spBW8U5Zu
5. https://microbenotes.com/laboratory-safety-symbols/
6. https://www.vlab.co.in/broad-area-chemical-sciences
7. https://byjus.com/chemistry/steam-distillation/
8. https://youtu.be/SnbXQTTHGs4?si=zhbFDrA5i1Txu6Ae

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CO3	3	3	3	-	-	3	3	3	3
CO4	3	3	3	-	-	1	3	3	3
CO5	3	3	3	-	-	1	3	3	3
Mean	3	3	3	-	-	2.2	3	3	3

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
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