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 Theory*	***U24MZL301***	***Cell and Molecular Biology***	***75***	***5***	***25***	***75***	***100***

Objectives: To understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes and organelles**.**

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Recall the history and techniques behind cell biology	**K1**
CO2	Outline Cell theory and cell structure	**K2**
CO3	Explain various cellular component	**K3**
CO4	Interpret the basics structure of chromosomes	**K4**
CO5	Appreciate the principle behind cell cycle	**K5**

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

Unit – I Techniques for studying Cell (15 Hours)

History of Cell Biology, Tools and Techniques of Cell Biology: Cell Fractionation, Homogenization, Centrifugation, Isolation of sub cellular Components. Histological techniques - Staining - Vital Stains. – Cytoplasmic and Nuclear Stains. Micro Technique Methods, Microscopes - Types - Light, Phase contrast, SEM, TEM - Units of measurement.

Unit – II Cell structure and function (15 Hours)

The Cell - Cell theory - Viruses -Types and Structure - Bacteria – Bacterial membrane - Ultra structure of Plant & Animal cell - Cytoplasm - Structure and Composition, Function - Extra Cytoplasmic Structure - Cilia Flagella - Cytoplasmic Inclusions.

Unit – III Cellular components (15 Hours)

Cell components - Plasma Membrane Ultra Structure - Different Models - Functions - Ultrastructure, Composition and Function of Endoplasmic reticulum, Ribosomes, Golgi Complex, Lysosomes, Centrioles, Microtubules Microfilaments, Mitochondria and Microsomes.

Unit – IV Genetic material (15 Hours)

Nucleus - Ultrastructure, Composition and Functions - Nuclear Membrane - Nucleoplasm - Chromosomes - Heterochromatin and Euchromatin - Nucleolus - Nucleolus Cycle - DNA and RNAs - Protein Synthesis & regulation.

Unit – V Cell cycle (15 Hours)

Cell Divisions and Cell Cycle - Amitosis, Mitosis and Meiosis and their Significance - Cancer, Biology – Characteristics of cancer cells, types, theories on Carcinogenesis, Ageing of Cells – Apoptosis and Stem cell studies.

 # _____# Self-Study Component for Seminar/Assignment:

(Questions should not be asked from self-study component in the End Semester Examinations)

Text Books:

1. Ambrose, E.J. and Dorothy, M. Easty, 1970. Cell Biology, Thomas Nelson & Sons Ltd., 500 pp.
2. Kumar P. and Mina U. (2018) Life Sciences: Fundamentals and Practice, Part-I, 6th Edn., Pathfinder Publication. p.608.
3. Veer Bala Rastogi, Introductory cytology. Kedar Nath Ram Nath. Meerut 250 001.
4. Verma, P.S. and V. Agarwal, 1995. Cell and Molecular Biology, 8th Edition, S. Chand & co., New Delhi - 110 055, 567 pp.
5. Verma P.S. and Agarwal V.K. (2016) Cell Biology (Cytology, Biomolecules, Molecular Biology), Paperback, S. Chand and Company Ltd.

Reference Books:

1. Albert B., Hopkin K., Johnson A.D., Morgan D., Raff M., Roberts K. and Walter P. (2018) Essential Cell Biology 5th Edn., (paperback) W.W. Norton & Company p.864.
2. Burke, Jack. D., 1970. Cell Biology, Scientific Book Agency, Calcutta.
3. Challoner J. (2015) The Cell: A visual tour of the building block of life, The University of Chicago Press and Ivy Press Ltd., p.193.
4. Cohn, N. S., 1979, Elements of Cytology, Freeman Book Co., New Delhi – 110007, 495 pp
5. Cooper G.M. (2019) The Cell – A Molecular Approach, 8th Edn., Sinauer Associates Inc., Oxford University Press p.813.
6. DeRobertis, E.D.P. and E.M.F. De Robertis, 1988. Cell and Molecular Biology, 8th Edition, International Edition, Info med, Hong Kong, 734pp.

e-Resources

1. http://www.microscopemaster.com/organelles.html
2. https://bit.ly/3tXwDSB
3. https://bit.ly/3tWNpRX
4. https://bit.ly/3AuYR9M
5. https://rsscience.com/cell-organelles-and-their-functions/

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

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

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. S. Abdul Majeed & Dr. Ajaz Haja Mohideen	Dr. R. Rafi Mohamed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*CC Practical*	***U24MZLP31***	***Practical III - Cell and Molecular Biology***	***75***	***3***	***25***	***75***	***100***

Objectives: Understanding DNA as genetic material, fine structure of DNA & RNA molecules, as well as physico-chemical properties of macromolecules in pro and eukaryotes**.**

Course Outcomes (COs) and Cognitive Level Mapping:

COs	**CO Statement** (After completing the course, the students will be able to)	**Cognitive Level**
CO1	Recall the structure and functions of different cells	**K1**
CO2	Explain the principle and application of cytometry techniques	**K2**
CO3	Demonstrate the modern applications of instrument in Cell Biology	**K3**
CO4	Contrast the cell division of plants and animals	**K4**
CO5	Justify the blood components of animals	**K5**

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

Cytometry

1. Compound microscope, camera Lucida, Stage ad Ocular Micrometers

Histochemistry and Micro technique- Fixation and Fixatives: Types of fixatives, Chemistry of fixation, Choice of Fixatives (Demo)

Tissue processing: Dehydration, Clearing and Embedding Microtomy: Types of microtomes, Sectioning of Paraffin blocks (Demo)

Staining of paraffin sections: Principle and methods of staining. Histological stains: Hematoxylin and Eosin. (Demo)

Blood Smear Preparation

2. Differential count of W.B.C.
3. Total count of RBC using Hemocytometer.
4. Total count of WBC using Hemocytometer.

Slide Preparation

5. Mounting of Buccal Epithelium.
6. Mitosis in onion root tip squash.
7. Squash preparation of Grass hopper testes (Demo)

Study of prepared slides of histology.

Columnar Epithelium, Ciliated epithelium, Glandular Epithelium. Cartilage T.S., Bone T.S., Cardiac Muscle, Striated muscle, non-striated muscle, Neuron, Male germ cell, Female germ cell.

Study of Instruments.

8. Demonstration of laboratory and ultra-centrifugation.
9. PCR Machine, Western blotting and electrophoresis (Demo)
10. Visit to cell culture lab and Report - compulsory.

Text book:

1. Cohn, N.S., 1979, Elements of Cytology, Freeman Book co., New Delhi.

2. De Robertis, E.D.P. and E.M.F. De Robertis, 1988. Cell and molecular Biology, 8th Edition, International edition Informes Hongkong.

3. Philip Sheeler, Donald E. Bianchi, 1987.Cell and Molecular Biology - John Wiley and Sons, Inc, 3rd Edition.

4. M. Prakash, C.K. Arora,1998 - Microscopical Methods - Anmol Publications Pvt. Ltd., First Edition.

5. M. Prakash, C.K. Arora, 1998 - Laboratory Instrumentation - Anmol Publications Pvt. Ltd. First edition.

Reference Books:

1. Gies, A.C., 1979. Cell Physiology, Saunders co., Philiadelphia, London, Toronto.

2. 4. Powar, C.B.,1989. Essentials of Cytology, Himalaya Publishing House, Bombay.

3. Verma, P.S., and V.K. Agarwal, 1995. Cell and Molecular Biology, 8th Edition, S. Chand & Co., NewDelhi.

e-Resources

1. https://www.bjcancer.org/Sites_OldFiles/_Library/UserFiles/pdf/Cell_Biology_Laboratory_Manual.pdf
2. https://sjce.ac.in/wp-content/uploads/2018/04/Cell-Biology-Genetics-LaboratoryManual-17-18.pdf
3. https://www.deanza.edu/faculty/heyerbruce/b6b_pdf/Bio6B-Manual_W19.pdf
4. https://cellbiolady.com/wp-content/uploads/2019/05/CellBioLab-Manual-1.pdf

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

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

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. K.G.M.T. Ansari & Dr. A. Nazeer Basha	Dr. R. Rafi Mohamed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*Allied*	***U24AZL301***	***Economic Entomology - I (Allied)***	***60***	***4***	***25***	***75***	***100***

Objectives: To study the classification, beneficial, harmful insects and their control measures

Course Outcomes (COs) and Cognitive Level Mapping:

COs	**CO Statement** (After completing the course, the students will be able to)	Cognitive Level
CO1	To know the insect classification upto orders	**K1**
CO2	To understand the rearing and management of beneficial insects	**K2**
CO3	To illustrate the management of insect pests of crops	**K3**
CO4	To analyze different pest control methods	**K4**
CO5	To evaluate different strategies of vector borne diseases	**K5**

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

Unit-1: Insect Classification (12 Hours)

Classification of insects up to order level

Biology of Butterfly

Unit-2: Beneficial Insects (12 Hours)

Beneficial insects-Mode of life, economic importance and management.

Honey bees - Biology of *Apis cerana indica* and composition of honey.

Silk worm (*Bombyx Mori*) - Silk worm rearing.

Lac culture

Unit-3: Harmful Insects (12 Hours)

Taxonomy, binomics, damages and management of pests affecting the following

1. Rice (*Leptocorisa acuta and Scripophaga incertulas*)

2. Cotton (*Aphis gossypii and Platyedra gossypiella*)

3. Groundnut (*Amascta albistriga and Elasmolomus sordidus*)

4. Sugarcane (*Prrilla perpusilla and Cilo infuscatellus*)

Unit-4: Pest control (12 Hours)

Principles and method of pest control – conventional, Physical, Mechanical, Chemical and Biological control

Unit-5: Insect vectors borne diseases & its control (12 Hours)

Mosquitos- Chikungunya, Denque, Zika fever, yellow fever, Filariasis, Malaria.

Tse-tse flies: African trypanosomiasis

Lice: Typhus, Louse-borne relapsing fever

Sandflies: Leishmaniasis, Phlebotomus fever

 # _____# Self-Study Component for Seminar/Assignment:

(Questions should not be asked from self-study component in the End Semester Examinations)

Text Books:

1. B. Vasantharaj David and T. Kumaraswami 1982. Elements of Economic Entomology,
2. Popular book Depot, Chennai.
3. Nayar, K.K., Ananthakrishnan, T.N. and B.V. David, V 1992 General and Applied Entomology Tata McGraw, New Delhi
4. P.G. Fenemore Manual. Silkworm Rearing. FAO Agricultural Service Bulletin, Rome
5. A General textbook of entomology -- A D Imms. Asia Publication
6. Agricultural insect pests and their control. V.B. Awasthi. Scientific Publication.
7. Economic Zoology- Shukla, Upaddhaya and Srivastava. S. Chand Publication

Reference Books:

1. Entomology and Pest Management –Larry P. Pedigo. Pearson Education.
2. General and applied Entomology – David and Ananthakrishnan. Tata McGraw Hill
3. Irwin, M. E. and Kampmeier, G. E. (2002): Commercial products, from Insect. In V. H.
4. Resh and R. Carde (eds.) Encyclopedia of insects. Academic press, San Diego.
5. Text book of Entomology—Ross – John Wiley publ.
6. The Insects - Structure and Function - 4th Edition, R. F. Chapman (ed.) Cambridge University Press 1998.

e-Resources

1. https://doi.org/10.1093/jee/toac095
2. https://www.researchgate.net/publication/327282644_A_Textbook_of_Economic_Entomology_M_Dayib
3. https://drive.google.com/file/d/1dcPkKmGl9QJTTfMNqHw2hY7F3gAKmWEp/view?usp=sharing
4. https://drive.google.com/file/d/1cZ8Y_B3Ofau2ir6CMoGZDMBc2STfflF1/view?usp=sharing
5. https://drive.google.com/file/d/1w6ViPEOLbFz3o8_UdqFArFN50ihZZF9/view?usp=sharing

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

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

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. R. Rafi Mohamed	Dr. R. Rafi Mohamed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
III	*SBS*	***U24SZL301***	***Basics of Marine Biology***	***60***	***2***	***25***	***75***	***100***

Objectives: To understand and learn the physical, chemical and biological aspects of marine environment and to gain knowledge about the management of oceans.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Identify the ecological importance of marine environment	**K1**
CO2	Interpret the various oceanographical processes	**K2**
CO3	Demonstrate the various oceanographic techniques for management	**K3**
CO4	Compare the various oceanographic components	**K4**
CO5	Assess the various pollutants and its control measures	**K5**

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

Unit I: Marine Ecology: (6 Hours)

Marine environment- Classification of marine environment; Pelagic environment – Planktonic and Nektonic adaptations; Benthic environment - intertidal, interstitial and deep-sea. Distribution and ecological role of other coastal environments - coral reefs, estuaries, mangroves, seagrass beds and kelp forests.

Unit II: Physical Oceanography: (6 Hours)

Physical Properties of Seawater- density, viscosity, surface tension, conductivity and their relationship; temperature distribution in the sea - heat budget, El-Nino/La-Nina – global impact; Waves, Currents and Tides, Tsunami.

Unit III: Chemical Oceanography: (6 Hours)

Chemical composition of seawater: constancy- ionic compositions and factors affecting constancy- major and minor elements, trace elements- their importance, distribution. Chemistry of seawater constituents- concept of chlorinity and salinity, nutrients - biogeochemical cycles.

Unit IV: Biological Oceanography: (6 Hours)

Sea as a biological environment- Plankton- classification based on size, mode of life and habitat. Phytoplankton and Zooplankton - methods of collection, Primary productivity – estimation and factors affecting primary productivity. Eutrophication.

Unit V: Marine Pollution and Ocean Management: (6 Hours)

Ocean pollution- toxic effects and control measures – oil spills, plastics, nuclear waste disposal in marine environment, Role of National and international agencies and organizations in ocean management.

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

Text Books:

1. Thurman, Harold., 2015. Essentials of Oceanography, 11th edition, Prentice Hall Inc. New Jersey. 506 pp.
2. Bertness, M.D, S. D. Gaines and M.K. Hay 2017. Marine Community Ecology Sinauer Associates.
3. Barbara E. Curry, 2016. Advances in Marine Biology, Volume 74, Ist Edition. Academic Press ISBN: 9780128036075

Reference Books:

1. Peter Castro, Michael E. Huber, 2015. Marine Biology; Series Botany, Zoology, Ecology and Evolution. McGraw-Hill Education.
2. Philip V. Mladenov, 2013 Marine Biology: A very short introduction, Ist Edition. Oxford University Press.
3. Venkataraman K, Raghunathan C, Raghuraman R, Sreeraj C. R, 2012. Marine diversity in India. Zoological Survey of India, Kolkata.178 pp.
4. Amy Hill. 2002. Marine Biology: An Introduction to Ocean Ecosystems (Marine Biology Ser) Walch publishing.

e-Resources

1. https://www.livescience.com
2. https://www.icriforum.org
3. https://www.cbd.int

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

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

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. K. Kadharsha	Dr. R. Rafi Mohamed

Sem	Category	Course Code	Course Title	Hours	Credits	Int. Marks	Ext. Marks	Max. Marks
IV	Core	U24MZL401	Genetics	75	4	25	75	100

Objectives: To know about the harmful effects of genetic variations in humans, their cumulative effect in human population and the molecular basis of variations.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Define mendelian laws with suitable examples	K1
CO2	Identify the mutant types of Drosophila	K2
CO3	Demonstrate the various Statistical tools for identifying genetics population	K3
CO4	Compare unique genital patterns of various animals	K4
CO5	Prioritize karyotyping of various genetics syndromes	K5

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

Unit – I **(15 Hours)**

Mendelian Genetics and Inheritance

Mendelian genetics: Mendelian experiments, laws of Mendel, Monohybrid, Dihybrid, back and test cross; Interaction of genes: Incomplete dominance, co dominance, complementary genes, supplementary genes, inhibiting genes, lethal genes and atavism. Inheritance: Polygenic inheritance-skin colour; multiple alleles- ABO blood groups and coat colour in rabbit; extra chromosomal inheritance- shell coiling, kappa particles; sex linked inheritance – eye colour in Drosophila, colour blindness and hemophilia in man.

Unit – II **(15 Hours)**

Linkage and Crossing Over

Linkage: Linked genes, complete and incomplete linkage. Crossing over: molecular mechanisms of crossing over, kinds of crossing over, models of recombination. Chromosome mapping: inference and coincidence, haploid mapping, somatic cell hybridization.

Unit – III **(15 Hours)**

Cytogenetics

Variation in chromosome number and structure: position effect, chromosomal mutation and evolution. Gene mutation: types, molecular basis of mutation, mutational hot spots, reversion; radiation and chemical agents as mutagens; Detection of mutation - ClB method and muller-5 method.

Unit – IV **(15 Hours)**

Human and Microbial Genetics

Human genetics: Karyotype and ideogram; sex determination - Barr body technique, drumstick method; chromosomal abnormalities in humans, Pedigree analysis; diagnosis of genetic abnormalities; Eugenics, Euphenics, and Euthenics. Population genetics and evolution: gene pool, gene frequency and genotype frequency; Hardy-Weinberg law of equilibrium. Unit 5: Bacterial genetics: Conjugation, transformation, transduction and chromosome mapping.

Unit – V **(15 Hours)**

Molecular Genetics

Insertion elements, transposable elements, retroelements; integrons and antibiotic resistance cassettes; the lactose system and operon model, tryptophan operon, role and relative positions of promoters and operators, feedback mechanism.

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

Text Books:

1. Gardner, E. J., M. J. Simmons and D.P. Snustad. 2006. Principles of Genetics. 8th Edition, John Wiley & Sons. INC. New York, pp-740.
2. Brooker, R. J. 2014. Genetics: Analysis and Principles. 5th Edition, McGraw Hill Publsiher, pp-880.
3. Russell, P.J. 2005. Genetics: A Molecular Approach (2nd Edition). Pearson/Benjamin Cummings, San Francisco, pp-850.

Reference Books:

1. Griffiths, A. J. F., H. J. Muller, D. T. Suzuki, R. C. Lewontin and W. M. Gelbart. 2012. An Introduction to Genetic Analysis. 11th Edition, W. H. Greeman. New York.
2. Snustad, D.P., Simmons, M.J. 2015. Principles of Genetics, John Wiley Publications, pp-784.
3. Watson, J. D., T. A. Baker, S. P. Bell, Alexander Gann, Michael Levine, Richard Losick. 2003. Molecular Biology of the Gene, (5th Edition). Cold Spring Harbor Laboratory Press, pp-912.
4. Klug, W. S. and M. R. Cummings, C. A. Spencer. 2005. Concepts of Genetics, Benjamin - Cummings Publishing Company.
5. Harti, D. L. 2002. Essential Genetics, A Genomic Perspective, Jones & Bartlet.

e-Resources

1. https://onlinecourses.swayam2.ac.in/cec21_bt02/preview
2. https://www.khanacademy.org/science/high-school-biology/hs-molecular-genetics/hs-rna-and-protein-synthesis/a/the-genetic-code

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

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

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. R. Rafi Mohamed & Dr. Ajaz Haja Mohideen	Dr. R. Rafi Mohamed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*CC Practical*	***U24MZLP41***	***Practical IV - Genetics***	***45***	***3***	***25***	***75***	***100***

Objectives: Understanding DNA as genetic material, fine structure of DNA & RNA molecules, as well as physico-chemical properties of macromolecules in pro and eukaryotes.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	**CO Statement** (After completing the course, the students will be able to)	**Cognitive Level**
CO1	Define mendelian laws with suitable examples	**K1**
CO2	Identify the mutant types of Drosophila	**K2**
CO3	Demonstrate the various Statistical tools for identifying genetics population	**K3**
CO4	Compare unique genital patterns of various animals	**K4**
CO5	Prioritize karyotyping of various genetics syndromes	**K5**

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

1. Buccal epithelium (Barr body) preparation.
2. Staining and observation of polytene chromosomes in salivary glands of Chironomus larva.
3. Karyotyping (with the help of photographs) – normal male and female karyotypes and study of karyotypes of different genetic syndromes.
4. Verification of the Mendelian laws of inheritance using colored beads. Observation on genetic traits.
5. Culturing and Handling of Drosophila: a) Media Preparation b) Cleaning and Sterilization of bottles c) Handling of Drosophila (2) Morphology and Sexual dimorphism, Study of at least five types of Drosophila, Wing mutant- Curly wing and Vestigial wing. Eye color mutant- Bar eye, red eye.
6. Mounting of Sex Comb of Drosophila (demo).
7. Study of flower colour in Antirrhinum/ Mirabilis. (Chart)
8. Coat colour in Mice. (Chart)
9. Comb pattern in Poultry. (Chart)
10. Human blood grouping.
11. Biometrical Computation of: Mean, Median and Mode, Variance, Standard Deviation. Problems on: Student's 't' test and Chi square test based on genetic characters.
12. Genetic problems on Multiple alleles, Gene Interactions (Complementary/ Supplementary/ Dominant Epistasis gene interactions). (Chart)
13. Genetic Problems on Linkage and Crossing over: a) Drosophila. b) Maize. c) Human (Sex Linkage). (Chart)

Text Books:

1. Gardner, E. J., M. J. Simmons and D.P. Snustad. 2006. Principles of Genetics. 8th Edition, John Wiley & Sons. INC. New York, pp-740.
2. Brooker, R. J. 2014. Genetics: Analysis and Principles. 5th Edition, McGraw Hill Publsiher, pp-880.
3. Russell, P.J. 2005. Genetics: A Molecular Approach (2nd Edition). Pearson/Benjamin Cummings, San Francisco, pp-850.

Reference Books:

1. Griffiths, A. J. F., H. J. Muller, D. T. Suzuki, R. C. Lewontin and W. M. Gelbart. 2012. An Introduction to Genetic Analysis. 11th Edition, W. H. Greeman. New York.
2. Snustad, D.P., Simmons, M.J. 2015. Principles of Genetics, John Wiley Publications, pp-784.
3. Watson, J. D., T. A. Baker, S. P. Bell, Alexander Gann, Michael Levine, Richard Losick. 2003. Molecular Biology of the Gene, (5th Edition). Cold Spring Harbor Laboratory Press, pp-912.
4. Klug, W. S. and M. R. Cummings, C. A. Spencer. 2005. Concepts of Genetics, Benjamin - Cummings Publishing Company.

e-Resources:

1. https://www.jove.com/
2. https://vlab.amrita.edu/?sub=3&brch=77
3. http://cbii-au.vlabs.ac.in/
4. https://media.hhmi.org/biointeractive/vlabs/transgenic_fly/index.html
5. https://www.ibiology.org/biology-techniques/

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

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

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. KGMT Ansari & Dr. A. Nazeer Basha	Dr. R. Rafi Mohamed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*Allied*	***U24AZL401***	***Economic Entomology - II (Allied)***	***60***	***4***	***25***	***75***	***100***

Objectives: To study the basic concepts of niches of insects, pesticides and integrated pest control

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Define the interaction and niches of insects in different environments	**K1**
CO2	Describe the different insecticides and their action	**K2**
CO3	Illustrate the principles of insecticides formulation and application	**K3**
CO4	Categorize the precautions in handling insecticides and environmental issues	**K4**
CO5	Evaluate the Insects population, damage assessment and surveillance techniques	**K5**

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

Unit – I Insects & Environment (12 Hours)

Insects and their interrelations with environments, insects as Pollinators parasitoids, Scavengers and weed killers.

Unit – II Insecticides (12 Hours)

Classification of insecticides – based on mode of action, contact, systemic, fumigants, nerve and stomach poison. Biological control. Integrated pest control

Unit – III Plant protection appliances (12 Hours)

Basic principles of insecticide formulation and their application in pest control – plant protection appliances- Principles and instructions for proper use of equipment- working and application of Dusters, Sprayers, Nozzle, spraying and dusting equipment.

Unit – IV Pesticide handling (12 Hours)

Classification of insecticides, toxicity categories and colour coding; extremely toxic, highly toxic, moderately and slightly toxic; biodegradable and non-biodegradable insecticides -Precautions in handling of insecticides. Insecticides and environmental pollution

Unit – V Insect pest damage (12 Hours)

Assessment of insect pest population, Estimation of insect pest damage – Insect pest outbreak and surveillance.

 # _____# Self-Study Component for Seminar/Assignment:

(Questions should not be asked from self-study component in the End Semester Examinations)

Text Books:

1. Entomology and Pest Management –Larry P. Pedigo. Pearson Education.
2. General and applied Entomology – David and Ananthakrishnan. Tata McGraw Hill

Reference Books:

1. Irwin, M. E. and Kampmeier, G. E. (2002): Commercial products, from Insect. In V. H.
2. Resh and R. Carde (eds.) Encyclopedia of insects. Academic press, San Diego.
3. Text book of Entomology—Ross – John Wiley publ.

e-Resources

1. https://doi.org/10.1093/jee/toac095
2. https://www.researchgate.net/publication/327282644_A_Textbook_of_Economic_Entomology_M_Dayib
3. https://drive.google.com/file/d/1dcPkKmGl9QJTTfMNqHw2hY7F3gAKmWEp/vie w?usp=

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

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

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. R. Rafi Mohamed	Dr. R. Rafi Mohamed

Sem	Category	Course Code	Course Title	Hours	Credits	Int. Marks	Ext. Marks	Max. Marks
IV	Allied	U24AZLP41	Allied Practical - Economic Entomology	30	2	25	75	100

Objectives: To study the collection, identification and control of Insect pests

Course Outcomes (Cos) and Cognitive Level Mapping:

Cos	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Identify the life cycles of insects of agricultural and medical importance	K1
CO2	Explain the pest management strategies	K2
CO3	Apply the knowledge of insect anatomy in pest eradication	K3
CO4	Analyze the impact of agricultural and medical pests and their management	K4
CO5	Evaluate the importance of insect collection and preservation methods	K5

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

MAJOR PRACTICAL

Model / chart – Draw and comment

Life cycle of Holometabolous, Hemimetabolous and Ametabolous Insects [At least one example in each]

MINOR PRACTICAL

1. Mounting -Mouth parts – Bed Bug, Mosquito and House fly
2. Sting apparatus of Honeybee

SPOTTERS

Insect formulations and plant protection appliances

Pests of agricultural Importance – citrus Butterfly, Rhinoceros beetle, Stem borer – Rice, Sugar cane, Fruit borer, Rhizome borer, Brinjal spotted beetle, grasshopper, Crickets, Pod Borer [pulses], Rice weevil, Mango nut weevil.

SPOTTERS

Pest of Medical Importance – Mosquito, Housefly, cockroach, Louse, Bed Bug.

RECORD

Collection and preservation of insects – Chart

Note: The students may be asked to submit a minimum of 10 whole mounts of the insects

Visit to Insect Museum (Mandatory)

Text Books:

1. Entomology and Pest Management –Larry P. Pedigo. Pearson Education.
2. General and applied Entomology – David and Ananthakrishnan. Tata McGraw Hill

Reference Books:

1. Irwin, M. E. and Kampmeier, G. E. (2002): Commercial products, from Insect. In V. H.
2. Resh and R. Carde (eds.) Encyclopedia of insects. Academic press, San Diego.
3. Text book of Entomology—Ross – John Wiley publ.

e-Resources

1. https://doi.org/10.1093/jee/toac095
2. https://www.researchgate.net/publication/327282644_A_Textbook_of_Economic_Entomology_M_Dayib
3. https://drive.google.com/file/d/1dcPkKmGl9QJTTfMNqHw2hY7F3gAKmWEp/view?usp=sharing

Mapping of Course Outcomes (Cos) with Programme Outcomes (Pos) and Programme Specific Outcomes (PSOs)

Cos	Programme Outcomes						Programme specific outcomes			Mean
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3
Mean	3	3	3	3	3	3	3	3	3	3

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. K. Kadharsha	Dr. R. Rafi Mohamed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*SBS*	***U24SZL401***	***Food, Nutrition and Health***	***30***	***2***	***25***	***75***	***100***

Objectives: To understand the basic concepts of balanced diet for people of different ages and to maintain a good health.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Define the basic concept of food nutrition	**K1**
CO2	Discuss various macro and micronutrients in human	**K2**
CO3	Demonstrate various nutrient deficiency and malnutrition among human	**K3**
CO4	Analyze different types of communicable and non-communicable diseases	**K4**
CO5	Justify various pathogenic diseases and its preventive measures	**K5**

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

Unit I: Nutrition and dietary nutrients: (6 Hours)

Basic concepts of Food: Components and nutrients. Concept of balanced diet, nutrient requirement and dietary pattern for different groups viz., adults, pregnant and nursing mothers, infants, school children, adolescents and elderly people.

Unit II: Macro nutrients and micronutrients: (6 Hours)

Macronutrients. Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role. Micronutrients. Vitamins- Water-soluble and Fat-soluble vitamins- their sources and importance. Important minerals viz., Iron, Calcium, Phosphorus, Iodine, Selenium and Zinc: their biological functions.

Unit III: Malnutrition and nutrient deficiency diseases: (6 Hours)

Definition and concept of health: Common nutritional deficiency diseases- Protein Malnutrition (e.g., Kwashiorkor and Marasmus), Vitamin A deficiency, Iron deficiency and Iodine deficiency disorders- their symptoms, treatment, prevention and government initiatives.

Unit IV: Life style diseases (6 Hours)

Life style dependent diseases- hypertension, diabetes mellitus, and obesity their causes and prevention. Social health problems- smoking, alcoholism, narcotics. Acquired Immuno- Deficiency Syndrome (AIDS): causes, treatment and prevention.

Unit V: Diseases caused by microorganisms: (6 Hours)

Food hygiene: Potable water- sources and methods of purification at domestic level. Food and Water-borne infections: Bacterial diseases: cholera, typhoid fever - viral diseases: Hepatitis, Poliomyelitis - Protozoan diseases: amoebiasis, giardiasis - Parasitic diseases: taeniasis and ascariasis their transmission, causative agent, sources of infection, symptoms and prevention. Causes of food spoilage and its prevention (self-study).

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

Text Books:

1. Mudambi, S.R. and Rajagopal, M.V. (2007). Fundamentals of Foods, Nutrition and Diet Therapy; Fifth Ed;; New Age International Publishers.
2. Srilakshmi, B. (2007). Food Science; Fourth Ed; New Age International (P) Ltd.
3. Swaminathan, M. (1986). Handbook of Foods and Nutrition; Fifth Ed; BAPPCO.

Reference Books:

1. Bamji, M.S.; Rao, N.P. and Reddy, V. (2009). Text Book of Human Nutrition; Oxford & IBH Publishing Co. Pvt Ltd.
2. Lakra, P. and Singh M.D. (2008). Textbook of Nutrition and Health; First Ed;Academic Excellence.
3. Gibney, M.J. et al. (2004). Public Health Nutrition; Blackwell Publishing.

e-Resources

1. https://ugcmoocs.inflibnet.ac.in/assets/uploads/1/127/4397/et/2%20Script200302070703031616.pdf
2. https://egyankosh.ac.in/bitstream/123456789/14655/1/Unit-1.pdf
3. https://nios.ac.in/media/documents/srsec321newE/321-E-Lesson-4.pdf

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

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

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
A. Fazul Akram	Dr. R. Rafi Mohamed

Sem	*Category*	*Course Code*	*Course Title*	*Hours*	*Credits*	*Int. Marks*	*Ext. Marks*	*Max. Marks*
IV	*SBS*	***U24SZL402***	***Animal Behaviour***	***30***	***2***	***25***	***75***	***100***

Objectives: To learn the origin and development of animal behaviour and to understand the influence of genetics, environment on animal behaviours.

Course Outcomes (COs) and Cognitive Level Mapping:

COs	CO Statement (After completing the course, the students will be able to)	Cognitive Level
CO1	Recall the basic concepts of genetic material and their roles in the inheritance of behavior.	**K1**
CO2	Explain the different evolutionary strategies influencing behavior patterns within animal populations	**K2**
CO3	Apply the understanding of biological and cognitive principles in animal learning processes	**K3**
CO4	Assess the interactions between instinctive and learned behaviors in animals.	**K4**
CO5	Evaluate the organization and function of circadian systems in animals, focusing on molecular and physiological clocks.	**K5**

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

Unit I: Overview of Animal Behaviour: (6 Hours)

Definition-mechanism-types-Pavlov's experiment- significance of animal behaviour.

Unit II: Approaches to Animal Behaviour: (6 Hours)

Tools and techniques: Study of animal behaviour in natural and laboratory conditions-neurophysiological techniques-capturing, marking and tracking animals and animal signs.

Unit III: Animal and the Environment: (6 Hours)

Coordination and Orientation, Homeostasis and Behaviour, Physiology and Behaviour in changing environments, Animal Learning, Conditioning and Learning, Biological aspects of learning, Cognitive aspects of learning.

Unit IV: Understanding Complex Behaviour: (6 Hours)

Instinct and learning, Displacement activities, Ritualization and Communication, Decision making behaviour in Animals, Complex behaviour of honey bees, Animal awareness and Emotion.

Unit V: Chronobiology: (6 Hours)

Organization of circadian system in animals; tidal rhythm of red knots, circadian and semi-lunar emergence of marine midge, lunar reproductive cycles of bristle wors. Circadian pacemaker system in Drosophila (self-study); Photoreception and photo-transduction.

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

Text Books:

1. David McFarland, 1985.Animal Behaviour, Longman Scientific & Technical, UK.576pp.
2. Harjindra Singh, 1990. A Text Book of Animal Behaviour, AnomolPublication,293pp.
3. Hoshang S. Gundevia and Hare Govind Singh,1996. Animal Behaviour, S.Chand & Co, 280pp.
4. Shukla, J. P 2010, Fundamentals of Animal Behaviour, Atlantic, 587pp.
5. Vinod Kumar, 2002. Biological Rhythms. Narosa Publishing House, Delhi.

Reference Books:

1. Michael D. Breed and Janice Moore, 2012. Animal Behaviour, Academic Press, USA, 359pp.
2. Aubrey Manning and Martin Stamp Dawkins, 2012. An Introduction to Animal Behaviour, 6th Edition, Cambridge University Press, UK. 458pp.
3. Davis E.Davis, 1970. Integral Animal Behaviour, Mac Millan Company,London, 118pp.
4. Jay, C. Dunlap, Jennifer, J. Loros, Patricia J. De Coursey (ed). 2004. Chronobiology Biological time Keeping, Sinauer Associates Inc, Publishers, Sunderland, MA.

e-Resources

1. https://www.ncbs.res.in/content/animal-behaviour
2. https://bit.ly/3i6wUxR
3. https://www.behaviour.univie.ac.at/
4. https://www.ru.nl/bsi/

Mapping of Course Outcomes (Cos) with Programme Outcomes (Pos) and Programme Specific Outcomes (PSOs)

Cos	Programme Outcomes						Programme specific outcomes			Mean
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
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CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3
Mean	3	3	3	3	3	3	3	3	3	3

3 – Strong; 2 – Medium; 1 – Low

Prepared by	Verified by
Dr. B. Khaja Magdoom	Dr. R. Rafi Mohamed