



MANONMANIAM SUNDARANAR UNIVERSITY,  
TIRUNELVELI-12

## SYLLABUS

### UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Zoology  
(Choice Based Credit System)

(with effect from the academic year 2021-2022 onwards )



Semester-IV				
Part	Subject Status	Subject Title	Subject Code	Credit
I	Language	TAMIL/MALAYALAM/HINDI	C1TL41/ C1MY41/ C1HD41	4
II	Language	ENGLISH	C2EN41	4
III	Core	GENETICS	CMZO41	4
III	Practical- IV	GENETICS - PRACTICAL	CMZOP4	1
III	Allied-II	EMBRYOLOGY, PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY	CABO21	3
III	Allied Practical- II	ALLIED PRACTICAL- II	CABOP2	1
III	Skill Based- Core	VERMITECHNOLOGY	CSZO42	4
IV	Non- Major Elective	BOTANY FOR COMPETITIVE EXAMINATION - II(B)/ ARIMUGA TAMIL PAPER - II	CNBO41/ CNTL41	2
IV	Common	COMPUTER FOR DIGITAL ERA	CCDE41	2
V	Extension Activity	NCC/NSS/YRC/YW/PE	C5EA41	2



**Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks**

**A. Scheme for internal Assessment:**

Maximum marks for written test: **20 marks**

**3 internal tests**, each of **1 hour** duration shall be conducted every semester.

To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:

Written test- 20 marks; Assignment -5 marks Total - 25 marks

**B. Scheme of External Examination**

**3 hrs.** examination at the end of the semester

A – Part : 1 mark question two - from each unit

B – Part : 5 marks question one - from each unit

C – Part : 8 marks question one - from each unit

➤ **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

➤ **Cumulative Grade Point Average (CGPA)**

$$\text{CGPA} = \frac{\sum (\text{GP} \times \text{C})}{\sum \text{C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➤ **Classification**

- First Class with Distinction : CGPA  $\geq 7.5^*$
- First Class : CGPA  $\geq 6.0$
- Second Class : CGPA  $\geq 5.0$  and  $< 6.0$
- Third Class : CGPA  $< 5.0$



## பொதுத்தமிழ்

பாடத்திட்டத்தின் நோக்கங்கள் ( Course Objectives)		
சங்க இலக்கியத்தின் சிறப்புகளை உணர வைத்தல்		
எதிர்பார்க்கும் படிப்பின் முடிவுகள் (Expected Course Outcomes)		
CO1	மாணவர் பன்மைத் தமிழரின் பண்பாட்டினை அறிந்து கொள்வர்	K <sub>1</sub> ,K <sub>4</sub> ,K <sub>6</sub>
CO2	வாழ்வியலுக்கான பொருள் இலக்கணத்தைக் கற்றுக் கொள்வர்	K <sub>2</sub> ,K <sub>5</sub>
CO3	இலக்கியங்கள் வாயிலாக வாழ்வியல் அறங்களைப் புரிந்து கொள்வர்.	K <sub>1</sub> ,K <sub>3</sub> ,K <sub>5</sub>
CO4.	வரலாற்றுப் பின்புலங்களை மையமாகக் கொண்டு நாடகங்கள் படைக்கும் உந்துதலைப் பெறுவர்.	K <sub>2</sub> ,K <sub>6</sub>
CO5	சங்க இலக்கியங்களின் வரலாற்றையும், தனிச்சிறப்புகளையும் அறிந்து கொள்வர்.	K <sub>2</sub> ,K <sub>5</sub>
K1 – நினைவில் கொள்ளுதல் (Remember) K2 – புரிந்து கொள்ளுதல் (understand) K3 – விண்ணப்பித்தல்(Apply) K4 – பகுத்தாய்தல் ( Analyze) K5 – மதிப்பிடு		

### அலகு:1 - செய்யுள்

நற்றிணை முதல் பட்டினப்பாலை வரை  
நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்., திருநெல்வேலி-1  
தொலைபேசி எண்: 0462 2323990

### அலகு:2 - இலக்கணம்

1. பொருள் இலக்கணம்
2. ஒரெழுத்து ஒருமொழிகள்
3. மரபுச் சொற்கள்
4. பிறமொழிச் சொற்களை நீக்கி எழுதுதல்

### அலகு:3 - உரைநடை

வாழ்வியல் அறம் - தொகுப்பாசிரியர் - முனைவர் ச.பொ.சீனிவாசன்  
நெஸ்லிங் புக்ஸ் பப்ளிஷர்ஸ் அன்ட் டிஸ்ட்ரிபிட்டர்ஸ் (பி) லிட்., சென்னை -50  
தொலைபேசி எண் : 044-26251968, 26258410, 48601884

### அலகு:4 - நாடகம்

ஆதி அத்தி - ஆசிரியர் - பெ.தூரன் - பதிப்பாசிரியர் - முனைவர் சொ.சேதுபதி  
நியூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட்., சென்னை -50  
தொலைபேசி எண் : 044-26251968, 26258410, 48601884



**அலகு:5 - இலக்கிய வரலாறு**

1. எட்டுத்தொகை நூல்கள்
2. பத்துப்பாட்டு நூல்கள்
3. சங்க இலக்கியங்களின் சிறப்பியல்புகள்

**மேற் பார்வை நூல்கள்**

இலக்கணம் : புறப்பொருள் வெண்பாமாலை

இலக்கிய வரலாறு : ஆசிரியர் முனைவர் சி. பாலசுப்பிரமணியன்.

பாவை பப்ளிகேஷன்ஸ் 142இ ஜானி ஜான் கான் சாலை இராயப்பேட்டை

சென்னை – 14 தொலைபேசி எண் : 28482441

முனைவர் பெ. சுயம்பு

பாரதி பதிப்பகம் 113இ இராஜீவ் தெரு திசையன்விளை -57

தொலைபேசி எண் :04637 - 272096

மாணவர்களைக் களஆய்விற்கு அழைத்துச் செல்லலாம்

**Mapping with Programme Outcomes**

CO <sub>5</sub>	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	M	M
CO3	S	M	S	S	M
CO4	S	M	M	S	S
CO5	M	S	S	M	M

S- மிகையான (Strong) M- நடுநிலையான (Medium) L- குறைவான (Low)



## MALAYALAM

### UNIT – 1

#### മാധ്യമഭാഷ

മാധ്യമം - നിർവ്വചനം - ചരിത്രം - സാങ്കേതികവിദ്യ - വിവിധതരം  
മാധ്യമങ്ങളെ - സമൂഹം - സംസ്കാരം - സ്വാധീനം

#### FOR DETAILED STUDY

1. ഡോ. ടി. അനിതകുമാരി - മാധ്യമഭാഷ ഇന്ന്

### UNIT – 2

#### അച്ഛിദ്രമാധ്യമം

അച്ഛിദ്രിയുടെ ചരിത്രം - കരളേതലിലെ ആദ്യകാല പരവർത്തനങ്ങളെ -  
പരമാസികകളുടെ ആദ്യകാലം - പുതിയ കാലത്തെ അച്ഛിദ്ര രീതികളെ - ലിപി  
പരിഷ്കരണം - ഡിടിപി - തന്ത്ര ലിപികളെ

#### FOR DETAILED STUDY

2. ഡോ. എസ്.എസ്. ശ്രീകുമാർ - മലയാള ലിപി പരിഷ്കരണം വരുത്തിയ  
വിനകളെ

### UNIT – 3

#### ഭൃഗുശർവ്വമാധ്യമം

റേഡിയോ - ടെലിവിഷൻ - മട്ടുടിമീഡിയ - സിനിമ - പൊതു സ്വഭാവം -  
ഗുണഭാവങ്ങൾ

#### FOR DETAILED STUDY

3. ടെലിവിഷൻ പഠനങ്ങളെ - സി. എസ്. വെങ്കടശേഖരൻ  
ലേഖനം - ജനകീയതയും റിയാലിറ്റിഷോകളും

### UNIT – 4

#### സംബന്ധമാധ്യമം

ഇന്റർനെറ്റ് - ചരിത്രം - മലയാളത്തിലെ ബ്ലോഗുകൾ - സംബന്ധ  
സാന്നിദ്ധ്യം - സോഷ്യൽ മീഡിയ - സ്മാർട്ട് ഫോൺ ഉപയോഗം -  
ഗുണഭാവങ്ങൾ

#### FOR DETAILED STUDY

4. ഡോ. അച്ഛിദ്ര ശങ്കർ എസ്. നായർ - സംബന്ധ മലയാളം



## UNIT – 5

### പരസ്യകല

പരസ്യം - നിർവ്വചനം - സംസ്കാരം - സ്വാധീനം- വിവിധതരം പരസ്യങ്ങളെ - ആശയബോധനം

### FOR DETAILED STUDY

5. പ്ലായോഗികപരിചയം നേടുന്നതിനാവശ്യമായ പ്ലവർത്തനങ്ങളെ നടത്തുക. പരസ്യം നിർമ്മിക്കുന്നതിനുള്ള വിഷയം നൽകുക.

### REFERENCE BOOKS

പത്മലോകം - ഒരു സംഘം ലേഖകർ - കേരള ഭാഷാ ഇൻസ്റ്റിറ്റ്യൂട്ട്  
 ആ ലോകം മുതൽ ഇ-ലോകം വരെ - ഡോ. ജെ. വി. വിളനിലം  
 മാധ്യമങ്ങളും മലയാളസാഹിത്യവും - കേരള ഭാഷാ ഇൻസ്റ്റിറ്റ്യൂട്ട്  
 പത്മലോകം - കേരള പരസ്യ അക്കാദമി  
 മലയാളഭാഷയും ആഗോളവത്കരണവും - ഡോ. കെ. എസ്. പ്ലക്കാൾ, ഡോ. എസ്. എ. ഷാനവാസ് (പ്രകാശനവിഭാഗം, കേരള സർവ്വകലാശാല)  
 ഭാഷയും മാധ്യമവും - വി. കെ. നാരായണൻ  
 മാധ്യമഭാഷാ മാറ്റങ്ങളെ - കെ. കെ. ശ്രീരാജ്  
 ടലിവിഷൻ പഠനങ്ങളെ - സി. എസ്. വെങ്കിടശ്വരൻ  
 മാധ്യമങ്ങളും മലയാളസാഹിത്യവും - എം. വി. തോമസ്  
 ഇൻറർനെറ്റ് ഇൻഫർമേഷൻ വിപ്ലവവും - കെ. രവിന്ദ്രൻ, ഡോ. കെ. ഇബ്രാഹിം  
 ഇൻഫർമേഷൻ സയൻസ് - ഓമുഖം - ഡോ. ജി. ദേവരാജൻ  
 മലയാള സബ്ബർ സാഹിത്യം - ഡോ. മനോജ് ജെ. പാലക്കുടി  
 സബ്ബർ മലയാളം - സുനീത ടി. വി. (എഡി.)  
 മാറുന്ന ലോകം മാറുന്ന മാധ്യമലോകം - എൻ. പി. രാജനേദ്രൻ  
 Progress in Information Technology - Dr. G. Devarajan  
 The Mass Media and You - Desmond D' Abreo  
 Advertising - Dr. C. N. Santakki



## HINDI

### Objectives:

1. To acquire knowledge regarding fundamental concepts in Hindi grammar.
2. To acquire the ability to master translation skills
3. To develop writing skills for official documentation – Letter, Banking terminologies

### Course Outcomes:

C.O. No.	Upon the completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO 1	Understand the writing skills of novelist - Premchand	F,G	K1,K4
CO 2	Understand the basics of navras, vrith and alankars	B,D	K1,K2
CO 3	Understand the history of Hini Literature – modern and medieval	A,C	K3,K5
CO 4	Apply and analyse administrative Hindi	A,C	K5
CO 5	Writing skills - Essay	B,C,D	K4,K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

### UNIT I

#### NOVEL

1. Nirmala

### UNIT II

#### POETICS

#### KavyaPradeep

1. Ras - Navras
2. Chand – Rola, Doha, Soratta
3. Alankar – Anupras, Upama, Roopak

### UNIT III

#### HISTORY OF HINDI LITERATURE



1. Reethikal – Visheshatha, Pramukh Kavi – Bihari Lal
2. Adhunik Kaal – Chaya Vaad – Pramukh Kavi
3. Gadya Sahithya – Bharadendu, Prem Chand

#### UNIT IV

##### ADMINISTRATIVE HINDI

#### UNIT V

##### ESSAY WRITING

(General Topics – Paryavaran Aur Pradooshan, Bhoomandalikaran Aur Hindi, Varthaman Yug Aur Technique, Nari Ki Desha Aur Disha, Desh Vikas Mein Yuva Peedi Ka Yogdaan)

##### Text book:

1. Nirmala – Premchand – Published by Gyan Bharathi Prakashan, Dariabad, Allahabad
2. Kavya Pradeep – Ram Bhaori Shukla – Published by Lok Bharathi Prakshan, Pehli Manzil, Darbari Building, Mahatma Gandhi Maarg, Allahabad
3. Hindi Sahithy ka Saral Ithihas – Viswanath Tripathi – Published by Orient Publication Private Limited, Himayath Nagar, Hyderabad

##### Books for Reference:

1. Hindi Vathayan – Dr. K M Chandra Mohan – Published by Viswavidyalay Prakashan, Varanasi
2. Essay Writing – General Topics

##### Mapping with POs

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S	S	S	S	S	S	S	M
CO 2	S	S	M	S	M	S	S	S
CO 3	S	S	S	S	S	S	M	S
CO 4	S	S	S	S	S	S	S	S
CO 5	S	S	M	S	S	S	L	S
CO 6	S	S	S	S	M	M	S	S

S – Strong, M – Medium, L – Low





# ENGLISH

## VISION AND MISSION OF DEPARTMENT:

### VISION:

- To offer students adequate communication skills to prepare them for their professional needs in the globalized scenario prevalent today.

### MISSION:

- To impart zestfully and resourcefully the four skills of LSRW

### PREAMBLE:

Language is the primary source of communication. It is the method through which we share our ideas and thoughts with others. Moreover, English is the only language spoken all over the world. As a result every curriculum teaches English as a second language. Given the fact that language proficiency is integral to the learning process TANSCHÉ has focused on quality higher education. So COMMUNICATIVE ENGLISH I & II are so designed for the students to acquire LSRW skills and introduced in I & II Semester respectively. The course syllabi for III and IV Semesters are also designed accordingly along with the evaluation component (with effect from 2021- 2022 onwards)

### PROGRAMME OUTCOMES – PO

At the end of the course students will be able to

**PO1:** Imbibe moral, ethical, and cultural values through various forms of literature.

**PO 2:** Enable the learner to communicate effectively and appropriately in real life situation.

**PO3:** Able to think, speak, and write independently using grammatical forms and Vocabulary.

**PO4:** Improve their writing and reading fluency skills through extensive reading.

**PO5:** Develop their pronunciation by studying the sounds of language.

### PROGRAMME SPECIFIC OUTCOME: PSO

At the end of the course students will be able to:

**PSO1:** Provide the students with an ability to build and enrich their communication skills.

**PSO2:** Critically analyse and appreciate poetry, prose, fiction and play.

**PSO3:** Enhance sufficient practice in Vocabulary, Grammar, Comprehension.

**PSO4:** Study the Phonetic symbols for correct pronunciation.

**PSO5:** Spot language errors and correct them.



## **GENERAL ENGLISH -- PROSE, POETRY, DRAMA, GRAMMAR, LANGUAGE STUDY & ORAL COMMUNICATION SKILLS**

### **UNIT I - PROSE**

1. Give us a Role Model – A.P.J. Abdul Kalam.
2. The Best Investment I have ever made – A.J. Cronin
3. Seven Good Habits – Robin Sharma
4. How much Land does a Man Need - Leo Tolstoy

### **UNIT II – POETRY**

1. 1. Anxiety – A.K. Ramanujam
2. Incident on the French Camp – Robert Browning.
3. Stopping by the woods – Robert Frost
4. Still I raise – Maya Angelo

### **UNIT III - DRAMA - Select scenes from William Shakespeare**

1. Antony and Cleopatra – Death Scene of Cleopatra – Act V, Scene II
2. Macbeth – Sleep Walking Scene – Act V, Scene I
3. King Lear – Heath, before a Hovel – Act III, Scene IV.

### **UNIT IV – GRAMMAR**

1. Transformation of Sentences
2. Synthesis of Sentences
3. Spot the Error

### **UNIT V – LANGUAGE STUDY AND ORAL COMMUNICATION**

1. Phonetics – Vowel sounds
2. Dialogue Writing
3. One word Substitution
4. Report writing.

**COURSE OUTCOMES:** At the end of the course students will be able to

Course Outcomes		Cognitive level
CO1	Use English accurately across the curriculum	K1, K2, K3
CO2	Attained enhanced vocabulary and improved language skills	K2, K3, K4



CO3	Analyse and interpret prescribed text	K2, K4
CO4	Conceptualize the Shakespearean drama in the prescribed text	K2, K4
CO5	Gain proficiency in LSRW skills	K1, K2, K3, K4, K6

K1- Remember, K2- Understand, K3- Apply ,K4- Analyse , K5- Evaluate,K6- Create

### MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

CO/ PO	PO1	PO2	PO3	PO4	PO5	POS1	POS2	POS3	POS4	POS5
CO1	S	M	S	S	S	S	M	S	M	S
CO2	M	S	M	M	M	M	M	M	S	M
CO3	M	S	M	S	M	S	M	S	M	S
CO4	S	M	S	M	M	S	S	M	S	M
CO5	M	M	M	S	M	S	S	M	S	M

S – Strongly correlated, M – Moderately Correlated, w- weakly correlated, No Correlation - 0

### E- LINKS

1. [https:// www.msuniversity.ac.in](https://www.msuniversity.ac.in)
2. <https://www.bdu.ac.in>
3. <https://www.scribd.com>
4. <https://www.goodreads.com>
5. <https://casenglishdepartment.wordpress.com>
6. <https://www.poetryfoundation.org>
7. <https://www.britannica.com>
8. <https://englishgrammar.org>



# GENETICS

## LEARNING OBJECTIVES (LOs)

The objectives of the course are enabling the student to

- learn the basic principles of inheritance at the molecular, cellular and organismal levels.
- understand causal relationships between molecule/cell level phenomena - “modern” genetics and organism-level patterns of heredity - “classical” genetics.
- learn the mechanism of Mutation and will be able to understand how mutations bring changes in an organism.
- understand the human genetics and modern approaches in gene concept.

## COURSE OUTCOMES (COs)

On successful completion of the course the student will be able to

**CO1:** analyse the basic principles of Mendelian inheritance and Genic interaction.

**CO2:** construct Chromosome map using crossing over.

**CO3:** explain the concept and factors involved in gene mutation.

**CO4:** assess the impact of chromosomal abnormalities in human.

**CO5:** relate Eugenics & Euthenics and Inbreeding & Outbreeding.

**CO6:** apply Hardy-Weinberg law in a population and find out the percentage of heterozygotes.

**CO7:** combine the knowledge about gene transfer techniques helps to develop new techniques in biotechnology

## UNIT I

### MENDELIAN GENETICS

**Mendelian Laws of Inheritance:** Monohybrid experiment – Dihybrid experiment- Back Cross and Test Cross. Genic Interaction: Non-Allelic gene interaction (Complete dominance - Incomplete dominance – Co-dominance), Allelic gene interaction (Complementary genes - Supplementary genes - Lethal genes) and Epistasis. Multiple Alleles: ABO Blood Group – Rh Blood group. Multiple Genes: Skin colour of Man.

## UNIT II

### CHROMOSOMES

Linkage - Crossing over - Mechanism and theories. Chromosomal maps & its construction. Chromosomal Aberrations, Gene Mutations– Physical & Chemical mutagens – DNA repair.



**UNIT III****INHERITANCE**

Sex determination in *Drosophila* and Man. Sex Linked Inheritance: X- linked (Haemophilia and Colour Blindness) & Y- linked (Hypertrichosis) inheritance – Genic Balance theory - Barr bodies. Chromosomal variation & Non-disjunction: Euploidy, Aneuploidy, Monosomy, Trisomy - Klinefelter's, Turner's & Down's syndromes – Cytoplasmic inheritance.

**UNIT IV****HUMAN GENETICS**

Inborn errors of Metabolism: Phenylketonuria, Alkaptonuria, Albinism, Sickle cell anaemia. Pedigree Analysis - Eugenics – Euthenics - Genetic Counselling - Inbreeding and Out breeding - Hardy-Weinberg Law and its Applications.

**UNIT V****MODERN GENETICS**

Concept of Gene: Cistron – split gene – promoter – repetitive DNA – Transposons. Bacterial Genome: Transformation – Conjugation – F- factor – Sex duction – Transduction – Generalised & Specialised - Plasmids. Operon Concept (Lac & Tryp operon- brief outline only).

**Books for reference**

1. Gardner EJ Principles of genetics. London, UK, John Wiley & Sons, Inc. .
2. Meyyan RP Fundamendals of Genetics, Saras Publication Nagercoil.
3. Primrose SB, Twyman R. Principles of gene manipulation and genomics. John Wiley & Sons; 2013 May 28.
4. Strickberger MW, Genetics, Pearson publishers.
5. Verma P.S & Agarwa,l V.K Genetics, S. Chand Publishers, New Delhi
6. Farnsworth : Genetics (Harper and Row).
7. P.K.Gupta: Genetics (Rastogi Publications)
8. Altonburg, E: Genetics (Oxford & IBH publishing company)
9. Burns G.W.: The Science of Genetics (Mac Millan)
10. A.C.Pai: Foundations of Genetics (Mc Gaw –Hill)
11. J.A.Serra: Modern Genetics (3 Volumes)
12. Sinnot, Dunn and Dobzhansky: Principles of Genetics (McGraw Hill)



**COs at Cognitive level and mapping with POs and PSOs**

SEMESTER IV																	
PART III- CORE COURSE: 4.1 - GENETICS																	
CO	COGNITIVE LEVEL	PO							PSO								
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	
CO1	K-4 Analyse	3	3	1	3	2	1	1	3	3	1	1	3	3	1	0	
CO2	K-3 Apply	3	3	1	3	1	2	1	3	3	1	1	3	3	1	1	
CO3	K-2 Understand	3	3	3	3	3	1	2	3	3	1	1	1	3	1	0	
CO4	K-5 Evaluate	3	3	3	3	1	2	1	3	2	1	1	1	3	2	2	
CO5	K-1 Remember	3	3	3	1	3	0	0	3	3	1	1	2	3	1	0	
CO6	K-3 Apply	3	3	3	1	1	0	0	3	3	1	1	3	3	1	2	
CO7	K-6 Create	3	3	1	3	1	3	1	3	3	1	1	3	3	2	1	

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

**CORE PRACTICAL IV: GENETICS****LEARNING OBJECTIVES (LOs)**

The objectives of the practical course are enabling the student to

- prove the monohybrid and dihybrid ratio of Mendelian laws with colour beads.
- elucidate the blood group inheritance among students.
- test the inheritance of simple mendelian traits in student population.
- study the polygenic inheritance with height and weight of the students.
- observe the models and charts to know their genetic importance.

**COURSE OUTCOMES (Cos):**

On successful completion of the practical course the student will be able to

CO1: explain the segregation and assortment of chromosomes during inheritance of the characters with colour beads and prove chi-square test.

CO2: describe and prove the inheritance of simple mendelian traits.

CO3: develop the skill to interpret the polygenic inheritance with quantitative traits.

CO4: analyse the pattern of inheritance of ABO and Rh grouping in students.

CO5: design an experiment to explain the genetic concepts.

**PRACTICALS**

1. Breeding Experiment: Chi Square test to be illustrated with beads/ coin tossing  
a) Monohybrid Cross b) Dihybrid Cross.
2. Observation of Simple Mendelian traits in man – to be recorded.
3. Observation and study of Polygenic inheritance of quantitative traits to be



interpreted in graphs:-a) height of student b) weight of students / length of shells / length of pods.

4. Blood group to be analyzed in a population with a minimum of 30 students.
5. Spot Tests: Models of genetic significance to be studied *E. coli*, T4 Phage-Down's syndrome, Klinefelter's syndrome, Turner's syndrome, Sex -linked inheritance (Colour Blindness, Haemophilia, Hypertrichosis, and Webbed toes).
6. Culture and Observation of *Drosophila* life cycle and mutants.

### COs at Cognitive level and mapping with POs and PSOs

SEMESTER: IV																
PART III: CORE COURSE PRACTICAL IV : GENETICS																
CO	COGNITIVE LEVEL	PO							PSO							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K-2 Understand	3	2	2	3	2	1	1	2	3	3	3	3	3	3	1
CO2	K-3 Apply	3	2	2	3	2	1	1	3	3	1	3	2	2	2	1
CO3	K-4 Analyse	3	3	2	2	2	1	1	3	2	1	-	1	-	3	1
CO4	K-5 Evaluate	3	3	1	3	2	1	1	3	3	1	=	1	2	3	1
CO5	K-6 Create	2	3	1	2	3	1	1	3	2	1	-	2	2	3	3

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

## VERMITECHNOLOGY

### LEARNING OBJECTIVES (LOs)

The objectives of the course are enabling the student to

- gain knowledge of agro based small scale industries using vermicompost preparation.
- understand the environmental conservation process and its importance, pollution control, biodiversity and protection of earthworms through vermiculture.
- assure that Vermitechnology is used to control environmental pollution and global warming.
- contribute their knowledge to develop organic fertilizer with rural and urban biodegradable wastes using the Earthworms.

### COURSE OUTCOMES (COs)

On successful completion of the course the student will be able to

**CO1:** find out Vermicomposting is an eco-friendly, economically and socially acceptable technology.

**CO2:** illustrate that Vermitechnology is useful for stabilization and recycling of both industrial and domestic organic waste.



- CO3:** utilize Vermitechnology to improve the soil texture, soil aeration, improve the water retention capacity in the soil.
- CO4:** apply Vermitechnology to convert rural and urban garbage into nutrient rich ecofriendly organic manure.
- CO5:** apply the ethical principles and commit to pledge responsibilities to protect and save environment.
- CO6:** improve Vermitechnology to manufacture the vermicompost in small scale industry by which the economy of the farmer is improved. It provides the employment opportunity in rural and urban areas.
- CO7:** justify and prove that the Earthworms are having the capacity to observe heavy metals into their body tissues and converting the soil without heavy metals.

## **UNIT I**

### **TAXONOMY OF EARTHWORM**

Morphological and anatomical – Classification of earthworms – Food habits – Digestive system – Excretion – Reproduction and Life cycle – Earthworm as farmer's friend.

## **UNIT II**

### **TYPES OF EARTHWORM**

Exotic and native species – South Indian and North Indian species used in Vermicomposting – Collection and Preservation of earthworms for vermicomposting – Culture techniques of earthworms.

## **UNIT III**

### **VERMICOMPOST PRODUCTION**

Requirements – Different methods of Vermicomposting – Heap method – Pot method and Tray method – changes during Vermicomposting.

## **UNIT IV**

### **ROLE OF EARTHWORMS IN SOIL FERTILITY**

Use of Vermicompost for crop production – Use of earthworms in land improvement and land reclamation – Economics of Vermicompost and Vermiwash production. Earthworms as animal feed – Medicinal value of earthworm meal – Roles of Earthworms in Solid Waste, Sewage and faecal waste management and Vermifilters. Earthworms as bioreactor.

## **UNIT V**

### **INTERACTIONS OF EARTHWORMS WITH OTHER ORGANISMS**

Influence of chemical inputs on earthworm activities – Large scale manufacture of





Vermicompost, packaging of vermicompost and its marketing – Financial supporting – Government and NGOs for vermiculture work.

### Books for Reference: (Latest edition)

1. Invertebrate Zoology – Ekambaranatha Ayyar.
2. Earthworm in Agriculture – S. C. Talashikar and Dosani, Agrobios Publications, Near Nasarani Cinema, Jodhpur, 342 002.
3. Vermicompost for sustainable Agriculture – P. K. Gupta Agrobios 2nd Edition.
4. Organic Farming for sustainable Agriculture – A. K. Dahama, Agrobios.
5. A Hand book of Organic farming – A. K. Sharma. Agrobios publication.
6. Earthworm ecology – Clive A. Edwards St. Lucie press – CRC Press Washington DC.
7. Biology of Earthworm - Edward and Lofti – Chapman and Hall Publication.
8. Vermicology – Sultan A. Ismail – Orient Longman Press.
9. Vermiculture Biotechnology – U.S. Bhawalkar BERI, PUNE

### COs at Cognitive level and mapping with POs and PSOs

SEMESTER IV																
PART III: SKILL BASED CORE COURSE - 4.2B: VERMITECHNOLOGY																
CO	COGNITIVE LEVEL	PO							POS							
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8
CO1	K1 Remember	3	3	3	3	2	3	1	3	3	3	3	3	3	2	1
CO2	K2 Understand	3	3	3	2	2	3	3	3	3	3	3	2	3	3	3
CO3	K3 Apply	3	2	3	3	3	2	2	3	3	3	2	3	2	3	2
CO4	K3 Apply	3	3	3	2	3	2	3	2	3	3	1	3	3	3	1
CO5	K3 Apply	3	2	3	3	3	3	2	3	2	2	3	3	3	2	1
CO6	K4 Analyse	2	3	3	2	3	3	1	3	3	3	2	2	3	1	1
CO7	K5 Evaluate	3	3	2	3	1	3	2	2	3	2	3	3	2	3	1

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)



# **EMBRYOLOGY, PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY**

## **UNIT – I**

Structure and development of microsporangium; Structure, types and development of megasporangium; Development of male and female gametophyte; Double fertilization, Endosperm - types. Structure of dicot embryo.

## **UNIT – II**

Meristem - Structure and classification. Simple tissues, complex tissues; Primary structure of Dicot and Monocot stem and root; Structure of leaf; Normal secondary thickening in dicot stem.

## **UNIT – III**

Absorption of water - diffusion, osmosis, imbibition, mechanism of absorption of water; Ascent of sap - (cohesion theory only); Transpiration - Types, Mechanism of stomatal transpiration (Starch - sugar hypothesis); Photosynthesis - importance of photosynthesis, Mechanism of Photosynthesis - Light and dark reaction (Calvin cycle).

## **UNIT – IV**

Nostoc - Morphology, Use as Biofertilizer and Mass cultivation; Structure, multiplication (budding and fission) and Mass culture of Yeast.

## **UNIT – V**

Tissue Culture - Scope and importance - totipotency. Nutrient media (M.S medium) Callus and Meristem Culture; Applications of plant tissue culture.

## **REFERENCES:**

1. Bojwani, S.S and Bhatnagar, S.P. 1987. The Embryology of Angiosperms, VikasPublications, New Delhi.
2. Dubey, R.C. 2002. A text Book of Biotechnology, S.Chand and Co; New Delhi
3. Jain, V.K. 2001. Fundamentals of Plant Physiology, S. Chand and Co; New Delhi
4. Pandey, B.P. 2002. Plant Anatomy, S. Chand and Co; Ram Nagar, New Delhi
5. Pandey, K.K. Sinha, B.K. 1988. Plant Physiology, Vikas Publications, New Delhi



## EMBRYOLOGY, PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY- PRACTICAL

1. Dissect out young embryo from Tridax flower bud.
2. Make suitable micro-preparations of dicot and monocot stem, root and leaf.
3. Demonstrate the physiology experimental set up - Potato osmoscope, Ganong's light screen, Bell jar experiment.
4. Identify the Photograph/Slide/Specimen/setup slides showing mature anther, ovule, dicot embryo, (i) Nostoc (ii) Yeast (iii) Callus culture, (iv) Meristem culture.
5. Maintain a record note book for external and internal evaluation.

CO. NO	Description	PO Addressed	PSO Addressed	CL
CO. 1	To understand the structure and development of microsporangium and megasporangium and Endosperm – types.	PO1, PO2	PSO1, PSO2	C
CO. 2	To meristem - structure and classification and Primary structure of Dicot and Monocot stem and root; Structure of leaf.	PO2, PO3	PSO3, PSO4	K, C
CO. 3	To examine and analyse absorption of water and Ascent of sap and Transpiration and Photosynthesis.	PO2, PO3	PSO3, PSO4	An
CO. 4	To examine and analyse Morphology, Use as Biofertilizer and Mass cultivation	PO3, PO4, PO5	PSO5, PSO6	An
CO. 5	To appraise the Tissue Culture - Scope and importance and Nutrient media review their economic importance.	PO4, PO5	PSO6, PSO7	Ap, E

K: Knowledge; C: Comprehension; Ap: Application; An: Analysis; S: Synthesis; E: Evaluation

### Mapping

EMBRYOLOGY, PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY												
CO/PO/PSO	PO					PSO						
	1	2	3	4	5	1	2	3	4	5	6	7
1	2	2	3	3	2	2	3	3	3	3	2	2
2	2	1	3	2	2	3	3	3	3	3	2	2
3	2	1	3	2	1	3	3	1	3	3	2	1
4	2	2	3	2	1	3	3	1	3	3	2	1
5	2	3	3	3	2	2	2	3	3	3	2	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation



# BOTANY FOR COMPETITIVE EXAMINATION

## Objectives:

- The basic Principles of Botany to the students which are vital role for facing competitive examinations.

## UNIT – I

**Basics of the Plant Kingdom:** Brief Classification of Plant Kingdom; Diagnostic features of Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms, Bacteria, Viruses, Economic importance of these groups.

## UNIT – II

**Basics of Angiosperm Taxonomy:** A brief account of Natural systems of classification (Bentham and Hooker's system) and Phylogenetic system of classification (Engler and Prantl's system) Binomial Nomenclature. A Brief account of the following Families and their Economic Importance – Fabaceae, Cucurbitaceae, Poaceae.

## UNIT – III

**Medicinal Importance:** *Zingiber officinale*, *Vetiveria zizanioides*, *Ocimum sanctum*, *Azadirachta indica*, *Solanum trilobatum*, *Phyllanthus emblica*, *Andrographis paniculata* and *Acalypha indica*.

## UNIT – IV

**Basics of Plant physiology:** Basics of Absorption of Water, Transpiration, Photosynthesis, Respiration, Protein synthesis.

## UNIT – V

**Cell Organelles:** Tissues and Tissue systems; An Introduction to Genetics - Mendelism, Monohybrid cross and Dihybrid Cross. Genetic Engineering: Enzymes used in Gene Cloning experiments. An introduction to Plant Tissue culture; Biofertilizers.

## REFERENCES

1. Bhattacharya, Hait, Ghosh. 2014. A Text Book of Botany-(Volume:2),
2. New Central Book Agency (P) Ltd, Kolkata.
3. Pandey S.N, Misra, S.P, Trivedi, P.S- 2012. A Text Book of Botany – Vikas Publishing House Pvt Ltd, Noida
4. Soni, N.K and Vandana soni-2010 Fundamentals of Botany (Volume 1,2,3) Tata Mc Graw Hill Education Private Limited, New Delhi
5. Wallis, T.E. 2005 Text Book of Pharmacognosy C B S Publishers, New Delhi.
6. Yoganarasimhan.2000 Medicinal Plants of India Cyber media, Bangalore.



<https://www.youtube.com/watch?v=0Uor8MxdOeU>  
<https://www.youtube.com/watch?v=30pYa0-ppJI>  
<https://www.youtube.com/watch?v=Kt0Lgy17I78>  
<https://www.youtube.com/watch?v=EoUjXI4W2us>  
<https://www.youtube.com/watch?v=M-qDzKG3RB0>

### BOTANY FOR COMPETITIVE EXAMINATION

CO. NO	Description	PO Addressed	PSO Addressed	CL
CO. 1	To make the students to understand the plant kingdom.	PO1, PO2	PSO1, PSO2, PSO3	K, C
CO. 2	To study the Basics of Angiosperm Taxonomy.	PO1, PO2	PSO1, PSO2, PSO4	K
CO. 3	To help the student to study the medicinal values of local plants.	PO3, PO4	PSO5, PSO6, PSO7	An, Ap
CO. 4	To study about the basics of plant physiology.	PO1, PO2	PSO1, PSO2, PSO3, PSO4	K
CO. 5	To create awareness to the students to understand in Tissue systems, Genetics, Genetic Engineering and Plant Tissue culture.	PO4, PO5	PSO6, PSO7	K, C

K: Knowledge; C: Comprehension; Ap: Application; An: Analysis; S: Synthesis; E: Evaluation

### Mapping

BOTANY FOR COMPETITIVE EXAMINATION												
CO/PO/PSO	PO					PSO						
	1	2	3	4	5	1	2	3	4	5	6	7
1	3	3	3	3	2	2	3	3	3	3	2	2
2	3	3	3	3	2	2	3	3	3	3	2	2
3	3	3	3	3	2	1	3	3	3	3	2	1
4	3	3	3	3	2	1	3	3	3	3	2	1
5	2	3	3	3	2	2	2	3	3	3	2	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)



## அறிமுகத்தமிழ்

### அலகு- 1 : செய்யுள் பகுதி

1. கடவுள் வாழ்த்து
2. கல்வி:
3. அறம்
4. ஆத்திசூடி
5. ஓடி விளையாடு பாப்பா
6. பசுவும் கன்றும் பாடல்

### குறிப்பு:- மனப்பாடப்பகுதி

1. கடவுள் வாழ்த்து
2. கல்வி
3. அறம்
4. ஆத்திசூடி

### அலகு-2: கதை வாசித்து கதை சொல்லல்

1. பணிமிருந்தும் பட்டினி
2. அறிவால் வெல்லுவேன்

### அலகு-3 : பொதுக்கட்டுரை

1. ஒன்றுபட்டால் உண்டு வாழ்வு
2. வாய்மையே வெல்லும்

### அலகு -4 : சொற்பொருள் அறிதல்

### அலகு- 5: மொழித்திறன் பயிற்சி



# COMPUTERS FOR DIGITAL ERA

## Objectives:

1. To create the awareness about the digital India among the student community.
2. To make the student to understand the role of computer in the day to day living.
3. To create the awareness about the e-learning and security issues.

## Unit I

### FUNDAMENTALS OF COMPUTERS

The role of computers in the modern society – Types of Computers and their specifications – Server – Desk Top Computers - Lap Top – Tablet – Smart Phones - Block diagram of Digital Computer –Working Principle of Computer, I/O Devices – Central Processing Unit – Types of Memory - Display – Port – UPS – Setting up and Maintenance of Computer.

## Unit II

### TYPES OF SOFTWARE AND OFFICE AUTOMATION

Types of Software with examples – System Software – Application Software – Utility Software - Operating System – Basics on Windows – Introduction to Android –Application Software - Free Open source software – Database and its applications – Office Automation Software – applications of Microsoft Word – Microsoft Power Point – Microsoft Excel.

## Unit III

### INTERNET AND MOBILE APPLICATIONS

Introduction to computer networks – LAN – WAN – MAN – Wired and wireless network – Wi Fi Networks - Network Devices – Modem – Switch – Router – Broad Band – Leased Lines- Internet – WWW – URL- Browser – e-mail – SMS – MMS - Client Server Computing - Cloud – Public and Private cloud – Mobile Applications.

## Unit IV

### E – GOVERNANCE IN INDIA

E-Governance initiative by the Government – Digital India Platform – Agencies enabling Digital India - Electronic Payment and Receipt – Digital Locker – e-district service – electronic signature service – Digital AIIMS – India BPO Scheme – Integrated Nutrient Management – GIS – Mobile Seva App Store- GARV- Grameen Vidutikaran



**Unit V****E – LEARNING AND MOOC**

E – Learning – Digital Library – E- Journals – Introduction to MOOC – Edex – Course era etc - SWAYAM – NPTEL – Cyber Security – Virus – Malware – Network Security - Hacking – Big Data – Data Analytics – Social Networks – Social Media Analytics- Introduction to IT Act.

➤ **10 Hours Practical Sessions are to be allotted for Computer & Mobile Applications**

**Suggested List of Exercises:**

1. Setting up of computers – Connecting I/O device, UPS, CPU, Printers, Mouse, Key Boards, Pen Drives, etc. (Mandatory)
2. Minor fault findings.
3. Preparing a word Document and saving, copying files, deleting files, renaming files, etc. (Mandatory)
4. Preparing slides – Animation – Slide Transition – Back Ground Changing – Word Art , etc. (Mandatory)
5. Preparing Mark Sheet with Excel - Calculating First Class, second class, etc. (Mandatory)
6. Browsing – Searching for documents – e-mail id creation - Useful mobile apps – downloading. (Mandatory)
7. Data/Wi-Fi Connectivity and Exchanging of Data.
8. Electronic Payment – Online Application Processing
9. Browsing for NPTEL/ SWAYAM Courses
10. Browsing the useful e-learning sites

**Learning Outcomes:**

At the end of the course the students will be able to:

1. apply the computing technology in their day to day life
2. create awareness regarding digital India initiatives to their surroundings
3. identify the areas where he can extend the digital computing for their benefits.

**Text Book:**

1. E- Materials of Manonmaniam Sundaranar University on “Computer for Digital Era”, <http://msuniv.ac.in>





**References:**

1. Andrew S. Tanenbaum, Computer Networks, 4th Edition, Eastern Economy Edition, PHI Private Ltd, New Delhi, 2003.
2. Gautam Shroff, Enterprise Cloud Computing, Technology, Architecture, Applications, Cambridge University Press, First Edition, 2010.
3. Reza B'Far, Mobile Computing Principles, Cambridge University Press, First Edition, 2005.
4. Charles P Pfleeger, Shari Lawrence Pfleeger, Security in Computing, I Edition, Pearson Education, 2003.
5. <https://swayam.gov.in>
6. <http://www.digitalindia.gov.in/content/social-media-analytics>

Scheme of Examination	
Internal – 25 Marks	External – 75 Marks
Internal Break Up - 15 for Continuous Assessment Test (CAT) + 5 for Assignment + 5 for Seminar. 3 CATs ( Two tests on Theory and one on Practical )are to be conducted	

