

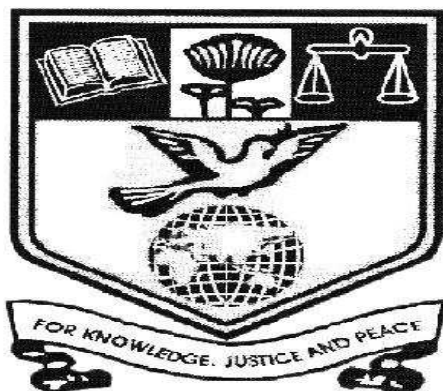
# NEHRU MEMORIAL COLLEGE (AUTONOMOUS)

Nationally Accredited with “A” Grade by NAAC  
PUTHANAMPATTI – 621 007  
TIRUCHIRAPPALLI – Dt

## ***SYLLABUS***

***B.Sc., BOTANY***

**Under -Graduate Programmes – Course Structure under CBCS  
(Candidates admitted from the year 2019 onwards)**



**PG& RESEARCH DEPARTMENT OF BOTANY  
2019**

**NEHRU MEMORIAL COLLEGE (AUTONOMOUS), PUTHANAMPATTI,  
POST GRADUATE & RESEARCH DEPARTMENT OF BOTANY**

**VISION**

- To explore and not to exploit the plant world.
- To and outreach on the patterns and processes of life with a focus on plants and their environments

**MISSION**

- Our mission is to foster an environment of excellence by attracting and supporting the outstanding students, faculty and staff needed to sustain our vision.
- We focus on the patterns and processes that enable predictive understanding of plants and their environments at local, regional, and global scales, leading to strengths in the areas of ecology, evolution, and systematics.

**PROGRAMME SPECIFIC OBJECTIVES:**

- I. Understand the scope and significance of discipline
- II. Imbibe love and curiosity towards nature through the living plants
- III. Develop a thirst to preserve the natural resources and environment
- IV. Have developed life-long learning skills and abilities.
- V. To facilitate students for taking up and shaping a successful career in Botany
- VI. To make the students aware of applications of different plants in various industries

**PROGRAMME OUTCOMES:**

- A. Students are able to know about characteristic of various plants and classification of different plant groups to understand the different taxonomic group and evolutionary
- B. Students know about different types of lower plants such as algae, ferns, Bryophyte pteridophyta that indicates the evolution in plants
- C. They learnt about economic & medicinal value of plant
- D. Students are known about different types of nutrition which are applied in growth of plants.
- E. Apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form.

## MAPPING OF PROGRAM SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES

A relation between the Program Specific Objectives and the outcomes is given in the table

PROGRAMME SPECIFIC OBJECTIVES	PROGRAMME OUTCOMES				
	A	B	C	D	E
I	2	3	2	3	2
II	2	2	3	2	1
III	1	3	2	1	2
IV	2	3	3	2	1
V	3	2	3	1	2
VI	2	3	3	2	3

**Contribution**      1: Reasonable                  2: Significant                  3: Strong

NEHRU MEMORIAL COLLEGE

(Autonomous)

ACCREDITED WITH A GRADE BY NAAC

PUTHANAMPATTI, 621007

UG Programme B.Sc., Botany

(For the candidates admitted from 2019-2020 Onwards)

Blooms taxonomy Based Assessment Pattern

Level.

K1 – Acquire; K2- Understanding; K3- Apply ; K4- Evaluate; K5 – Analyze;

Part I, II & III

Theory (External + Internal = 75+25= 100 Marks)

External					
Knowledge level	Section	Marks	Hrs	Total	Passing Marks
K1 , K2	A ( Answer all)	10x2 = 20	3	75	30
K2, K3, K4	B( Either or Pattern)	5x5 = 25			
K2,K3, K4, K5	C ( Answer 3 Out of 5)	3x10 = 30			
External					
Components		Conversion	Hrs	Total	Passing Marks
Mid Semester	75	10	3	25	10
End Semester	75	10	3		
Assignment/ Seminar	20	5	-		
Total				100	40

Lab (External+ internal = 75 +25 = 100 Marks)

External					
Knowledge level	Section	Marks	Hrs	Total	Passing Marks
K3	Part A- Major 1x20=25 marks	25	3	75	30
K4	Part B- Minor ( 1x20 = 20 marks )	20			
K5	Part -C- Spotters (5x4= 20 Marks)	20			
K6	Record	10			
Internal					
Knowledge level	Section	Marks	Hrs	Total	Passing Marks
K3, K4, K5, K6	Model Practical	25	3	25	10
				100	40

2. Part IV (Only External Exam)

External( Theory)					
Knowledge	Section	Marks	Hrs	Total	Passing Marks
K1, K2, K3	Answer 5 Out of 10 (5x 20 = Marks)	100	3	100	40

NEHRU MEMORIAL COLLEGE  
(Autonomous)  
ACCREDITED WITH A GRADE BY NAAC  
PUTHANAMPATTI, TRICHY DT.  
SYLLABUS REVISION 2019-2020 ONWARDS

Department : Botany  
Academic Programme offered : B. Sc., Botany  
Year of Implementation : 2019-2020 On wards

OBE Elements for B.Sc., Botany Programme.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

The graduate will be able to:

PEO 1 Graduates of the program will develop a strong and competent knowledge in basic Plant science required for critical learning and research.

PEO 2 Graduate students will develop diversified basic professional skills through various laboratory technical training, communication and presentation skills.

PEO 3 They will possess an ability to identify, formulate, and solve Plant problems to contribute to service efforts to community in both the professional and private realm.

PEO 4 - Students familiar in classical botany related topics of course such as levels of plant organization, Taxonomy, anatomy, embryology, physiology, ecology for successful career.

PEO 5 Gradates will integrate related topics from separate parts of the course such as, Techniques, Cell biology, Biochemistry, genetics, Basic biotechnology, molecular biology,

PEO 6: To motivate the student in self-employment through bio-fertilizer preparation.

### **PROGRAMME OUTCOME (PO)**

PO 1 Fundamental and core knowledge & understanding of plant sciences

PO 2 Relevant knowledge of core concepts, principles, themes, terminology, and classification systems in the terrestrial biology disciplines covered in botany

PO 3 Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.

PO 4 Scientific explanation for the unity and diversity of life on earth using copious examples

PO 5 Quantitative, qualitative analysis and interpretation of biological data.

PO 6 An ability to function effectively on teams and individually to accomplish a common goal

### **Program-Specific Outcomes (PSOs)**

PSO 1: Achieve knowledge of pure and applied botany.

PSO 2 Ability to use knowledge imbibed for solving biological problems locally and globally.

PSO 3. Inculcate strong fundamentals on modern and classical aspects of Botany.

PSO4. Build life skills in Edible mushroom cultivation, Biofertilizer production, Greenhouse maintenance and Seed technology through value-added courses.

PSO 5. Create platform for higher studies in Botany.

PSO 6. Facilitate students to take-up successful career in Botany.

**NEHRU MEMORIAL COLLEGE (AUTONOMOUS), PUTHANAMPATTI – 621 007,  
TRICHY –Dt.  
B.Sc., BOTANY PROGRAMME – COURSE STRUCTURE UNDER CBCS-2019-2020  
ONWARDS**

Sem	Course	Sub code	Course Title	Hrs/ week	Credits	Exam hours	Marks		Total
							Int.	Ext.	
I	LC – I		Cheyyl (Ikkala ilakkiyam), Sirukathai, Payan Murai Tamizh, Tamizh ilakkia varalaru	6	3	3	25	75	100
	ELC – I		English for communicative competence	6	3	3	25	75	100
	CC-I		Plant Diversity I (Algae, Fungi, Lichens and Bryophytes)	6	5	3	25	75	100
	CC-II		Practical - I (Plant Diversity I & II)*	3	-	*	-	-	-
	AC –I		Zoology- Animal Structure and function	4	4	3	25	75	100
	AC –II		Zoology Practical*	3	-	*	-	-	-
	VE		Value Education	2	2	3	25	75	100
			<b>Total</b>	<b>30</b>	<b>17</b>		<b>-</b>	<b>-</b>	<b>500</b>
II	LC – II		Cheyyl (Pakthi, idaikkala ilakkiyam), Tamizh Semmozhi varalaru, Mozhipeyarppriyal, Tamilzh Ilakkiya varalaru	6	3	3	25	75	100
	ELC- II		English for Proficiency	6	3	3	25	75	100
	CC-II		Practical-I (Plant Diversity -I & II)*	3	4	3	40	60	100
	CC-III		Plant Diversity- II (Pteridophytes, Gymnosperms and Paleobotany)	4	4	3	25	75	100
	AC -II		Zoology Practical*	3	4	3	40	60	100
	AC- III		Zoology- Economic Entomology and Vermitechnology	4	4	3	25	75	100
	EVS		Environmental Science	2	2	3	25	75	100
	SKBC		Skill Based Course - I	2	2	3	25	75	100
			<b>Total</b>	<b>30</b>	<b>26</b>		<b>-</b>	<b>-</b>	<b>800</b>



III	LC -III	Cheyyl (Kappiyangal), Puthinam, Tamizh ilakkia varalaru	6	3	3	25	75	100
	ELC-III	English for Employability	6	3	3	25	75	100
	CC -IV	Microbiology and Plant Pathology	5	5	3	25	75	100
	CC -V	Practical -II (Microbiology and Plant Pathology & Cytology and Genetics)*	3	-	*	-	-	-
	AC -IV	Chemistry- I	5	4	3	25	75	100
	AC - V	Chemistry Practical*	3	-	*	-	-	-
	SKBC-II	Skill Based Course -II	2	2	3	25	75	100
	GS-	Gender Studies	0	1	3	-	100	100
		<b>Total</b>	<b>30</b>	<b>18</b>		-	-	<b>600</b>
IV	LC- IV	Cheyyl (Pazhantamizh illakkiyam), Nandakam, Tamizh ilakkia varalaru, Katturai Varaiviyal	6	3	3	25	75	100
	ELC- IV	English for wisdom and experience	6	3	3	25	75	100
	CC -V	Practical -II (Microbiology and Plant Pathology & Cytology and Genetics)*	3	4	3	40	60	100
	CC- VI	Cytology and Genetics	5	5	3	25	75	100
	AC - V	Chemistry Practical*	3	4	3	40	60	100
	AC -VI	Chemistry -II	5	4	3	25	75	100
	NMEC - I	Candidate has to choose any one of the course offered by the Department/ Other Departments	2	2	3	25	75	100
	SSC	Soft Skills Course	0	2		-	100	100
		<b>Total</b>	<b>30</b>	<b>27</b>		-	-	<b>800</b>

V	CC- VII		Plant Anatomy and Embryology	6	5	3	25	75	100
	CC – VIII		Plant Systematics and Economic Botany	6	5	3	25	75	100
	CC – IX		Biochemistry and Biophysics	5	4	3	25	75	100
	CC – X		Practical –III (Plant Anatomy and Embryology & Plant Systematic and Economic Botany & Biochemistry and Biophysics)	6	5	3	40	60	100
	EC-I		Candidate has to choose any one of the course from GROUP-I	5	5	3	25	75	100
	NMEC - II		Candidate has to choose any one of the course offered by the Department/ Other Departments	2	2	3	25	75	100
			<b>Total</b>	<b>30</b>	<b>26</b>		-	-	<b>600</b>
VI	CC – XI		Plant Physiology	6	5	3	25	75	100
	CC- XII		Plant Biotechnology	6	5	3	25	75	100
	CC – XIII		Practical –IV (Plant Physiology & Plant biotechnology)	6	5	3	40	60	100
	EC - II		Candidate has to choose any one of the course from GROUP-II	6	5	3	25	75	100
	EC –III		Candidate has to choose any one of the course from GROUP-III	6	5	3	25	75	100
	EA-		EA-Extension Activities	-	1		-	-	-
			<b>Total</b>	<b>30</b>	<b>26</b>			-	<b>500</b>
			<b>Over all Total</b>	<b>180</b>	<b>140</b>		-	-	<b>38000</b>
<b>SELF STUDY COURSES</b>									
			Comprehensive course	0	4	3	-	100	100
	SKBC - III		SKBC - III	0	2	3	-	100	100
			<b>Over all Total (including self study)</b>	<b>180</b>	<b>146</b>				<b>4000</b>

\* Examination will be conducted at the end of even semester

**GROUP-I Elective Course -I (SEMESTER-V)**

Sub Code	Title of the course	Inst. Hrs /Week	Credits	Marks		
				Int	ext	Total
	Horticulture and Plant Breeding	5	5	25	75	100
	Medicinal Botany	5	5	25	75	100

**GROUP-II Elective Course-II (SEMESTER-VI)**

Sub Code	Title of the course	Inst. Hrs /Week	Credits	Marks		
				Int	ext	Total
	Plant Ecology and Phytogeography	6	5	25	75	100
	Floriculture	6	5	25	75	100

**GROUP-III Elective Course-III (SEMESTER-VI)**

Sub Code	Title of the course	Inst. Hrs /Week	Credits	Marks		
				Int	ext	Total
	Bioinformatics and Biostatistics	6	5	25	75	100
	Seed science Technology	6	5	25	75	100

**NMEC-I (SEMESTER-IV)**

Sub Code	Title of the course	Inst. Hrs /Week	Credits	Marks		
				Int	ext	Total
	Horticulture	2	2	25	75	100
	Food science and Nutrition	2	2	25	75	100

**NMEC-II (SEMESTER-V)**

Sub Code	Title of the course	Inst. Hrs /Week	Credits	Marks		
				Int	ext	Total
	Edible Mushroom Cultivation	2	2	25	75	100
	Green House Technology	2	2	25	75	100

**SKILL BASED COURSE (SKBC)**

SEM	Sub Code	Title of the course	Inst. Hrs /Week	Credits	Marks		
					Int	ext	Total
II		Biofertilizers and Organic Farming	2	2	25	75	100
III		Mushroom Technology	2	2	25	75	100
VI		Nursery and Gardening	0	2	-	100	100

**COURSE DETAILS**

Types of course	Number of course	Inst. Hrs/Week	Credits
Core course	13	73	61
Language	8	48	24
Allied	6	30	24
Elective	3	17	15
Non Major Elective	2	4	4
Skill Based ( SKBC)	3	4	6
Environmental science	1	2	2
Value education	1	2	2
Soft skill	1	0	2
Comprehensive	1	0	4
Gender studies	1	0	1
Extension Activity	0	0	1
<b>Total</b>	<b>40</b>	<b>180</b>	<b>146</b>

**Part 1 Tamil - Proposed Course Structure under CBCS**  
(For the candidate admitted from the academic year 2019-2020 onwards)

Semester	Course	Course Title	Ins. Hrs/Week	Credits	Exam hrs	Int. Marks	Ext. Marks	Total
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Course Code & Title	PLANT DIVERSITY –I (ALGAE, FUNGI, LICHENS AND BRYOPHYTES)			Credit	Hours
Class	I B.Sc., Botany	SEMESTER - I	5	6	
Cognitive Level	K – 1 (Acquire) K – 2 (Understanding) K – 3 (Apply) K – 4 (Evaluate) K – 5 (Analyze)				
Course Objectives	<ol style="list-style-type: none"> <li>To study the structure and reproduction of certain selected algae, fungi and bryophytes</li> <li>To comprehend their importance in the plant diversity</li> <li>To learn about the Cryptogamic plants.</li> <li>Familiar in Lichen and their economic importance</li> <li>To understand the diversity, complexity and the economic value of lower plants.</li> </ol>				

I	Language course 1 (LC 1)	செய்யுள் (இக்காலம்), சிறுகதை, பயன்முறைத் தமிழ், தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
II	Language course 2 (LC 2)	செய்யுள் ( இடைக்காலம் ), உரைநடை, தமிழ்ச் செம்மொழி வரலாறு, மொழிபெயர்ப்பியல், தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
III	Language course 3 (LC 3)	செய்யுள் (காப்பியங்கள்), கட்டுரை இலக்கியம், புதினம் ,	6	3	3	25	75	100

		தமிழ் இலக்கிய வரலாறு						
IV	Language course 4 (LC4)	செய்யுள் (பழந்தமிழ் இலக்கியம்) நாடகம், தமிழ் இலக்கிய வரலாறு, கட்டுரை வரைவியல்	6	3	3	25	75	100
		<b>Total</b>	<b>24</b>	<b>12</b>				<b>400</b>

இளநிலைப் பட்டப் படிப்பு (கலையியல், அறிவியல், வணிகவியல் மற்றும் வணிக மேலாண்மையியல்)

### முதலாமாண்டு : முதற்பருவம்

#### பகுதி 1 தமிழ் - தாள் 1

செய்யுள் (இக்காலம்), சிறுகதை, பயன்முறைத் தமிழ், தமிழ் இலக்கிய வரலாறு

#### பாட நோக்கம் (Course Objectives)

தன்னம்பிக்கை, பொறுப்புணர்வு, சமுதாய அக்கறை, மனித உறவுகளைப் போற்றுதல், சுற்றுச்சூழல் விழிப்புணர்வு, உலக அமைதி, அற உணர்ச்சி, தாய்மொழிப் பற்று முதலான இன்றைய இளம் தலைமுறையினருக்குத் தேவையான அடிப்படைப் பண்புகளைக் கற்பித்தல். இக்காலப் படைப்பிலக்கிய வகைமைகளை, படைப்பிலக்கியச் சூழல்களை, படைப்பாளர்களை அறிமுகம் செய்தல்.

பிழையின்றித் தமிழ் எழுதத் தேவையான அடிப்படைகளைக் கற்கச் செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

#### அலகு - 1

1.

பாரதியார் பாடல்கள் - புதுமைப்பெண் பா.எண்கள் 3,4,5,7,8

2. பாரதிதாசன் பாடல்கள் - எந்நாளோ

3. பெருஞ்சித்திரனார் - தமிழ் நெஞ்சம்

4. தமிழ் ஒளி – மழைக் காலம்
5. முருகுசுந்தரம் – சமுதாய தர்மம்
6. பொன்னடியான் – உள்ளம் உயர்....
7. முடியரசன் – மொழியுணர்ச்சி
8. முத்துலிங்கம் – எது தேசியம்
9. தமிழேந்தி – தொண்டின் பழம்
10. தாரா பாரதி – வெறுங்கை என்பது
11. இன்குலாப் – கவலையும் கண்ணீரும் நம்முடன் இருக்கட்டும்
12. நா.காமராசன் - காகிதப்பூக்கள்
13. ஈரோடு தமிழன்பன் – இப்போது நினைந்து
14. தேவதேவன் – நுனிக்கொம்பர் நாரைகள்
15. காசி ஆனந்தன் – தமிழ் மண் வளம்

## அலகு – 2

1. அப்துல் ரகுமான் - ஆறாத அறிவு
2. தணிகைச்செல்வன் - சுகம் எங்கே
3. மீரா - உழவன்
4. மு.மேத்தா – கண்ணீரின் கதை
5. சிற்பி - தம்பி உனக்காக
6. வைரமுத்து – கூடு
7. அறிவுமதி - வலி 8.
- பழநிபாரதி – கண்ணில் தெரியுது வானம், இரத்தத்தின் நிறம் பச்சை
9. பிச்சினிக்காடு இளங்கோ – பகல் நீ, தஸ்லிமா நஸ்ரின் 10.
- இளம்பிறை – மகளிர் நாள் வாழ்த்துகள், ஆசைகள்

11. சக்தி ஜோதி - நிலவென்று சொல்லாதே, பெண்
12. பாவலர் வையவன் - முறிந்த சிறகு, பாதை மறந்த போதை
13. தாமரை - என்னையும் அழைத்துப் போ, ஒரு கதவும் கொஞ்சம்  
கள்ளிப்பாலும்
14. ந.வீ.விசயபாரதி - தன்னம்பிக்கைத் தாமரைகள், புன்னகை மந்திரம்,  
அன்புள்ள அம்மா
15. அ.வெண்ணிலா - ஆதியில் சொற்கள் இருந்தன

**அலகு : 3**

சிறுகதை - சிறுகதை மலர்

**அலகு : 4**

பயன்முறைத் தமிழ்

பிழைகளும், திருத்தங்களும் - வலிமிகுதல், வலி மிகாமை,  
மயங்கொலி எழுத்துகளின் வேறுபாடுகள் - தமிழில் பிறமொழிச் சொற்கள்

**அலகு : 5**

தமிழ் இலக்கிய வரலாறு - இக்காலம்

**கற்றல் விளைவுகள் (Course Outcome)**

மாணவர்கள் வாழ்வியல் கூறுகளை அறிந்துகொள்வதோடு, நற்பண்புகளை  
வளர்த்துக்கொள்வர்.

இன்றைய இலக்கியப் படைப்புச் சூழலை அறிந்து கொள்வதால்

படைப்பிலக்கியவாதிகளாகும் ஆற்றல் பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

தாய்மொழியில் திறன் பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.



## பாட நூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. சிறுகதை மலர் - பிரமி பதிப்பகம், திருச்சி-21.
3. பயன்பாட்டுத் தமிழ் (இலக்கணக் கையேடு), தமிழ் நாதன் பதிப்பகம், சென்னை - 110.
4. தமிழ் இலக்கிய வரலாறு,  
முனைவர் கோ.பாக்கியவதி, முனைவர் க.சுந்தரபாண்டியன்,  
பிரமி பதிப்பகம், திருச்சி-21.

### B.A/B.SC/B.COM/ BCA/BBA PART II ENGLISH COURSE PATTERN (FROM 2019-2020)

Sem.	Course	Course Title	Hrs / Week	Credits	MAX.MARKS		
					Int.	Ext.	Total
I	Core Course I	English For Communication I	6	3	25	75	100
	Core Course II	English For Communication II	6	3	25	75	100
	Core Course III	English For Communication III	6	3	25	75	100
	Core Course IV	English For Communication IV	6	3	25	75	100
			TOTAL	24	12	200	300

### Programme Educational objectives (PEO)

Programme Educational Objectives are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. PEO's are measured 4-5 years after graduation. The PEO is measured through employer satisfaction survey (yearly), alumni survey and placement records.

PEO 1: Learners will participate in critical conversations and prepare, organize, and deliver their work to the public

PEO 2: They will appreciate the literary works.

PEO 3: The Graduates will attain phonological and morphological aspects of English.

PEO 4: Learners can express a thorough command of English and its linguistic structures.

### Program Outcome (PO)

**The POs are narrower statements that describe what the students are expected to know and be able to do by the time of graduation. POs are based on relevance.**

PO 1 Become knowledgeable in the subject of English for Communication and apply the principles of the same to the needs of the Employer/Institution/Enterprise/Society.

PO 2: Gain Analytical skills in the field/area of English for Communication.

PO 3: Understand and appreciate professional ethics, community living and Nation Building initiatives.

PO 4: Develop language learning skills like Listening, Speaking, Reading and Writing.

PO 5: Making the Learners to realize their own Identity.

### PROGRAMME SPECIFIC OUTCOME (PSO)

**PSOs are Statement that describe what the graduates of a specific educational Programme should be able to**

PSO1: Design solution to overcome Communication Problems.

PSO 2: Apply Ethical Principles and Commit to Professional Ethics and Responsibilities.

PSO 3: Recognize the need of Extensive Reading Skills.

PSO 4: function as a team and an individual member amicably with other co-workers.

PSO 5: Use English effectively in formal and informal situations.

PSO 6: Develop vocabulary and communicative skills.

Course Code & Title	<b>ENGLISH FOR COMMUNICATION - I</b>		
Class	<u>I YEAR</u>	Semester	<u>I</u>
Cognitive Level	<b>K – 1 Acquire</b> <b>K – 2 Understand</b> <b>K – 3 Apply</b> <b>K – 4 Evaluate</b> <b>K – 5 Analyze</b>		
Course Objectives	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• <b>To expose students to effective communication in the form of prose</b></li> <li>• <b>To make the learners aware of social issues</b></li> </ul>		

	<ul style="list-style-type: none"> <li>• <b>To help them to know great personalities</b></li> <li>• <b>To make them aware of dangers from human carelessness</b></li> <li>• <b>To help them realize the need for honesty</b></li> </ul>	
<b>UNIT</b>	<b>Content</b>	<b>No. of Hours</b>
I	1.Spoken English and Broken English: G.B.Shaw 2. Give us a Role Model : Dr. A.P. J. Abdul Kalam	
II	Water-The Elixir of Life : Sir C. V. Raman No Guarantee Please No Longer : A Newspaper Article	
III	I have a Dream : Martin Luther King Jr. The Gettysburg Address : Abraham Lincoln	
IV	Mosquitoes : Article Polluting the World :Article	
V	A Little Incident : Lu Hsun Jimmy Valentine : O. Henry	
	<b>GRAMMAR:</b> 1. Articles 2. Preposition 3. Adjective 4. Adverb	
Reference	Lessons will be edited and compiled.	
Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO 1: communicate effectively</p> <p>CO 2: aware of social issues</p> <p>CO 3: know great personalities.</p> <p>CO 4: aware of dangers from human carelessness.</p> <p>CO 5: know the need for honesty</p>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	S	M	M	M	S	S	M	M	S
CO2	S	M	M	M	M	S	M	S	M	M	M
CO3	S	M	S	M	M	M	S	S	M	M	S

<b>CO4</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>

Strongly Correlating(S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

## SEMESTER-I

UNIT	CONTENT	No. of Hours
I	Distribution of Algae with reference to their habitat- General classification of Algae based on Fritsch (1935) system. General characters of Blue-green algae and Green algae. Occurrence, structure, heterocyst and its function, reproduction and life cycle of <i>Nostoc</i> . Occurrence, external and internal structure, reproduction and life cycle of <i>Caulerpa</i> and <i>Oedogonium</i>	15
II	General characters of Brown algae and Red algae. External and internal structure, reproduction and life cycle of <i>Padina</i> , <i>Sargassum</i> and <i>Gracilaria</i> . Economic importance of Algae.	15
III	General classification of Fungi based on Alexopoulos (1979) system. General characters of Oomycetes, Zygomycetes, Ascomycetes and Basidiomycetes. Structure, reproduction and life cycle of <i>Saprolegnia</i> , <i>Rhizopus</i> , <i>Aspergillus</i> and <i>Agaricus</i>	15
IV	General characters of Deuteromycetes. Occurrence, vegetative structure, Asexual reproduction of <i>Fusarium</i> . Economic importance of Fungi. Lichens: Morphology and Types – crustose, foliose, and fruticose. Fungal and Algal components, symbiosis, vegetative reproduction: Fragmentation, Isidia and Soredia, sexual reproduction, Apothecium, Lichen as pollution indicators. Economic importance of Lichens.	15
V	General classification of Bryophytes based on Rothmaler (1951). Occurrence, External and Internal structure of Gametophyte, Sporophyte, Reproduction and Life cycle of <i>Marchantia</i> and <i>Polytrichum</i> . Economic importance of Bryophytes	15
<b>Text Book</b>	<ol style="list-style-type: none"> <li>1. Stephenson, S.L. 2010. The Kingdom fungi: The Biology of Mushroom, Molds and Lichens, Timber Press Inc., UK.</li> <li>2. Lynda Ed. West. 2010. Algae, Cambridge University Press, UK.</li> <li>3. Vashishta, B.R. 1988. Bryophyta, 6th Edition, S. Chand and company, (Pvt.) Ltd., New Delhi.</li> <li>4. Kumar, H.D. 1990. Introductory Phycology, Affiliated East West Press (P) Ltd., New Delhi.</li> <li>5. Rashid, A. 1998. An introduction to Bryophyta, Vikas Publishing House (P) Ltd., New Delhi.</li> </ol>	

<b>Reference</b>	<p>1. West, G.S. 2010. Algae vol. I. Myxophyceae, Peridinieae, Bacillariaceae, Chlorophyceae, Cambridge Botanical hand book series, UK.</p> <p>2. Tuba, Z., N.G., Sleck and L.R. Stark. 2011. Bryophyte, Cambridge University Press, UK.</p> <p>3. Dube, H.C. 2009. Introduction to Fungi, Vikas publishing pvt. Ltd., New Delhi.</p> <p>4. Paracer, S and V.Ahmadjian. 2002. Symbiosis, Oxford University Press, Chennai.</p>
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Recognize the lower group of plants.</li> <li>2. Explain the diversity and complexity of plant kingdom</li> <li>3. Realize the significance of lower group of plants.</li> <li>4. Understand the importance of algae</li> <li>5. Familiar in importance of bryophytes</li> </ol>

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	M	S	M	S	M	S	S	M
CO2	M	M	M	S	M	M	S	M	S	S	M	S
CO3	S	S	M	S	M	S	M	S	S	M	M	S
CO4	M	M	S	M	S	M	S	S	S	M	S	M
CO5	M	S	M	S	S	M	M	S	M	M	M	S

Strongly correlating (S) - 3Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>PRACTICAL-I: PLANT DIVERSITY- I &amp; II</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>B.Sc., Botany</b>	<b>SEMESTER – I &amp; II</b>	<b>4</b>	<b>3</b>
<b>Cognitive Level</b>	K –1(Acquire) K – 2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. Microscopic observation and identification of algae, fungi, bryophytes, lichens, pteridophytes and gymnosperm</li> <li>2. Observation of crop plants infected by the pathogens included in the syllabus and study of symptoms, causative agents and etiology.</li> <li>3. Trained students to prepare micropreparation and showing the stages of mitosis (Onion root tips) and showing permanent slides/photographs of mitosis and meiosis</li> <li>4 Trained the students in taking anatomical sectioning of specimen.</li> <li>5. Trained the students to differentiate lower plants to identify both morphological and anatomical</li> </ol>			

	<b>CONTENT</b>	<b>No. of Hours</b>
	<p><b>Plant Diversity-I</b></p> <ol style="list-style-type: none"> <li>1. Cyanophyceae- Identification of <i>Nostoc</i> from fresh water samples and Study of filament structure.</li> <li>2. Chlorophyceae- Study of Morphological and anatomical features of <i>Caulerpa</i></li> <li>3. Chlorophyceae- Study of <i>Oedogonium</i> filament and reproductive cells using permanent slides</li> <li>4. Phaeophyceae- <i>Padina</i> - Study of Morphology and anatomy of macroscopic gametophytic thallus, gametangium and tetrasporophytic thallus.</li> <li>5. Phaeophyceae- <i>Sargassum</i> -Morphology and anatomy of macroscopic thallus</li> <li>6. Rhodophyceae – <i>Gracilaria</i>- gametophyte, sporophyte and cystocarp</li> <li>7. Oomycetes- Study of <i>Saprolegnia</i> reproductive structure using permanent slides</li> <li>8. Zygomycetes- Micropreparation and Study of <i>Rhizopus</i> sporangiophore</li> <li>9. Ascomycetes- Micropreparation and Study of <i>Aspergillus</i> conidiophore</li> <li>10. Basidiomycetes- Study of Morphological and anatomical features of <i>Agaricus</i>.</li> </ol>	

	<p>11. Deuteromycetes- Micropreparation and study of, <i>Fusarium</i> conidia.</p> <p>12. Foliose and Fruticose Lichens- Study of Morphology of <i>Parmelia</i> and <i>Usnea</i>; L.S. of Lichen Apothecium.</p> <p>13. Hepaticopsida- Study of external and internal structure of <i>Marchantia</i> thallus.</p> <p>14. Bryopsida- Study of external and internal structure of <i>Polytrichum</i> gametophyte.</p>	
	<p><b><u>Plant Diversity II</u></b></p> <p>Study of morphology and reproductive structures of the following types:</p> <p>1. <i>Lycopodium</i> 2. <i>Selaginella</i> 3. <i>Equisetum</i> 4. <i>Pteridium</i> 5. <i>Marsilea</i> 6. <i>Pinus</i></p> <p>Study of internal organization of the following using permanent slides</p> <p>7. <i>Psilotum</i> 8. <i>Cycas</i> Leaf C.S 9. <i>Gnetum</i> 10) Study of Fossil types. 11. <i>Rhynia</i> stem 12. <i>Lepidodendron</i></p>	
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Create and manipulate table of information Familiarize with the external and internal structure of lower group organism</li> <li>2. Learn the microscopic technique</li> <li>3. Learn the survey techniques for evaluating the values of medicinal plants</li> <li>4. Know about the cellular drawing</li> <li>5. Gain knowledge on plant pathological diseases</li> </ol>	



## SEMESTER - II

<b>Course Code &amp; Title</b>	<b>PLANT DIVERSITY-II (PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)</b>	<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>I B.COM CA</b>	<b>SEMESTER - II</b>	<b>4</b>
<b>Cognitive Level</b>	K –1(Acquire) K – 2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)		
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To understand the classification of Pteridophytes and Gymnosperms</li> <li>2. To identify the various forms of Pteridophytes</li> <li>3. To differentiate various members of Gymnosperms</li> <li>4. Familiar in the importance of gymnosperm</li> <li>5. To understand the usage of fossils to study past plant.</li> </ol>		
<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>	
<b>I</b>	General characters of Pteridophytes. Smith classification of pteridophytes. General characteristic features of Psilopsida. <i>Psilotum</i> – habitat, distribution, external structure, internal structure and reproduction. General characteristic features of Lycopsidea. <i>Lycopodium</i> - external structure, internal structure, reproduction and stele types. <i>Selaginella</i> - external structure, internal structure, reproduction, heterospory and seed habit.	15	
<b>II</b>	General characteristic features of Sphenopsida. <i>Equisetum</i> – habitat, distribution, external structure, internal structure and reproduction. General characteristic features of Pteropsida. <i>Pteridium</i> - habitat, distribution, external structure, internal structure and reproduction. <i>Marsilea</i> - Habitat, distribution, external structure, internal structure and reproduction. Economic importance of Pteridophytes.	15	
<b>III</b>	General characteristic features Gymnosperms. Classification of Gymnosperms by Sporne. General characteristic features of Cycadopsida. <i>Cycas</i> - Habitat, distribution, external structure, internal structure and reproduction. General characteristic features of Coniferopsida. <i>Pinus</i> – habitat, distribution, external structure, internal structure and reproduction.	10	
<b>IV</b>	General characteristic features of Gnetopsida. <i>Gnetum</i> – habitat, distribution, external structure, internal structure and reproduction. Economic importance of Gymnosperms	10	

V	Paleobotany – Fossils & fossilization types of fossils (compression, impression, petrification, coal balls). Geological time scale. Structure and reproduction of <i>Rhynia</i> and <i>Lepidodendron</i> .	10
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<b>Text Book</b>	<ol style="list-style-type: none"> <li>1. Parihar, N.S. 1965. An Introduction to Embryophyta, Vol. I., Central Book Depot, Allahabad.</li> <li>2. Sporne, K.R. 1974. Morphology of Gymnosperms, B.I. Publications, Chennai.</li> <li>3. Sundararajan, S. Introduction to Pteridophyta. New Age International Publishers, New Delhi, India, 2007.</li> <li>4. Vashista, P.C. Botany for Degree Students Gymnosperms (2ndEdn.,) S. Chand &amp; Co., New Delhi, India, 2006</li> <li>5. Vashista, P.C. Botany for Degree Students - Pteridophyta. S. Chand and Co., New Delhi, India, 2008.</li> <li>6. Pandey, B.P. 2001. College Botany, Vol.II, S.Chand and Co., New Delhi.</li> <li>7. Arnold, C.A. An Introduction to Paleobotany. McGraw Hill Book Co., New York, 1947</li> </ol>
<b>Reference</b>	<ol style="list-style-type: none"> <li>1. Alan Reid Smith. 1981. Pteridophytes, California Academy of Sciences. California.</li> <li>2. Reddy, S.M. and S.J. Chary. 2003. Gymnosperms, New age international (p) Ltd. Publisher. New Delhi.</li> <li>3. Biswas, C. and Johri, B.M. (2004). The Gymnosperms. Narosa Publishing House, New Delhi.</li> <li>4. Johri , RM, Lata S , Tyagi K (2005). A text book of Gymnosperms, Dominate pub and Distributer, New Delhi.</li> <li>5. R. A. Spiler and B.A. Thomas, 1986. Systematics &amp; Taxonomic approaches in Paleobotany, Clarendon Press,UK.</li> </ol>
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Distinguish the first vascular plants and first flowering plants</li> <li>2. Describe their diversity and complexity</li> <li>3. Realize their significance of gymnosperm</li> <li>4. Familiar in economic importance of Gymnosperms</li> <li>5. To know the significance of fossils and geological time scale</li> </ol>

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	M	S	M	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	S	S	S	S	S
CO3	S	S	M	M	M	S	S	S	S	M	M	S
CO4	M	S	S	M	S	M	S	S	S	M	S	M
CO5	S	S	S	S	S	M	S	M	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

# NEHRU MEMORIAL COLLEGE (AUTONOMOUS) PUTHANAMPATTI

(Nationally Accredited with 'A' Grade by NAAC)

## ALLIED ZOOLOGY – SELF FINANCED COURSES

SEMESTER –I;AC I: ALLIED ZOOLOGY

### PAPER – I: **Animal Structure and Function**

(For B.Sc., Botany students)

(For the candidates admitted from the academic year 2019 – 2020 onwards)

Part III	
SEMESTER – I	ALLIED COURSE – I
Instruction Hours: 5/week (Total 75 hours)	Internal: 25
Credits: 4	External: 75
Subject code:	Total: 100

#### Course objectives:

- To make the students understand the basic characteristics and diverse forms of invertebrate and vertebrate animals.
- To give a comprehensive idea of Developmental Biology, Animal Physiology and Cell biology.

UNIT	CONTENT	TEACHING HOURS
UNIT-I	<b>Invertebrata:</b> Salient features of nine major invertebrate phyla. <b>Detailed study:</b> Earthworm and Cockroach – digestive system, nervous system and reproductive system.	15 hrs
UNIT- II	<b>Chordata:</b> Salient features of vertebrates upto five classes. <b>Detailed study:</b> Fish and Rat – digestive system, nervous system and reproductive system.	15 hrs
UNIT-III	<b>Developmental Biology:</b> Structure of Human sperm and ova. Fertilization – Physiochemical aspects. Blastulation and Gastrulation in frog. Development of Eye in Frog.	15 hrs
UNIT-IV	<b>Physiology:</b> Food and digestion. Respiration – Gas exchange. Excretion – structure of kidney (Rabbit) – physiology of urine formation.	15 hrs
UNIT-V	<b>Cell Biology:</b> Animal cell structure – Cell organelles - Endoplasmic reticulum – Golgi bodies – Lysosome - Mitochondria.	15 hrs

#### Course outcomes:

- Students may get the knowledge of invertebrates and vertebrates internal organs and their detailed study.
- To know the structure and function of reproductive cells.
- To get information about digestion and excretion mechanism.
- To know the cell structure and their function in a proper way. These basic information would help for their competitive exams and further research.

### **TEXT BOOKS:**

1. Arumugam, N. 2017. Text book of Invertebrates and Chordates. Saras Publication. Nagercoil.
2. Arumugam, N. 2017. Embryology. Saras Publication. Nagercoil.
3. Arumugam, N. 2017. Cell biology. Saras Publication. Nagercoil.
4. Barnes R. D. 1982. Invertebrates Zoology (6th edn). Toppan International Co.,
5. Borradile, L.A. 1955. The Invertebrata (2nd edn). Cambridge University Press.
6. Gardinar, M. S. 1972. Biology of the invertebrates, Mc Graw Hill Book Co., New York.
7. Darnell, Lodish and Baltimore. 2000. Molecular Cell Biology, Scientific American Publishing Inc.
8. Nelson, K.S. 1997. Animal physiology. Cambridge University press. Oxford.

### **REFERENCE BOOKS:**

1. Verma, Tyagi and Agarwal. 1997. Animal Physiology, Chand and Co. Delhi.
2. Rastogi, S.C. 2001. Essentials of Animal Physiology (III Ed.), New Age International Publication, New Delhi.
3. Herkat, P.C. and Mathur, P.N. 1976. Text book of Animal physiology. S. Chand and Co. Pvt. Ltd., New Delhi.
4. Pradeep V. Jabde. 2005. Text of general Physiology. Discovery Publishing House, New Delhi.

# NEHRU MEMORIAL COLLEGE (AUTONOMOUS) PUTHANAMPATTI

(Nationally Accredited with 'A' Grade by NAAC)

## ALLIED ZOOLOGY – SELF FINANCED COURSES

SEMESTER – II : AC III: ALLIED ZOOLOGY

### PAPER –II: **Economic Zoology**

(For B.Sc., Botany students)

(For the candidates admitted from the academic year 2019 – 2020 onwards)

Part III	
SEMESTER – II	ALLIED COURSE – I
Instruction Hours: 4/week (Total 60 hours)	Internal: 25
Credits: 4	External: 75
Subject Code:	Total: 100

#### Course objectives:

- To know the economic importance of insects and their harmful impact on plants with control measures.
- To give a comprehensive idea of Aquaculture, Vermiculture, Apiculture and Sericulture.

UNIT	CONTENT	TEACHING HOURS
UNIT-I	<b>Economic Entomology:</b> Pest: Definition and types. Biology and life cycle of pests that affect agricultural crop plants and their management measures: paddy (Stemborer), groundnut (Red hairy caterpillar), sugarcane (Shoot borer), cotton (Aphids).	14 hrs
UNIT- II	<b>Aquaculture:</b> Basic fish culture – Definition and scope– Semi Intensive, Intensive and Extensive fishculture. Pond culture, Pen and cage culture and Running water culture. Major species for freshwater fishculture, Types of ponds. Physico- chemical conditions of fish pond.	12 hrs
UNIT-III	<b>Apiculture:</b> Species of honey bees – Life cycle of honey bee ( <i>Apis dorsata</i> ) – types of bee hives – placing of bee hives – extraction of honey – Nutritive and medicinal values of honey.	10 hrs
UNIT-IV	<b>Sericulture:</b> Species of silk worms – Life cycle of silk worm ( <i>Bombyx mori</i> ) – cultivation of mulberry plants – rearing of silk worm – quality of cocoons.	10 hrs
UNIT-V	<b>Vermiculture:</b> Species of earthworms used for vermiculture– Life cycle of vermicomposting species of <i>Lampita marutii</i> – Materials used for the production of vermicompost – plants and animal wastes. Methods of preparation of vermicompost. Advantages of vermicompost.	14 hrs

#### Course outcomes:

- To find out the life cycle of different pest and their management aspects.
- The fish culture would help the students to arrange self employment opportunity for their future life.
- The apiculture, and sericulture and Vermiculture techniques give the students an idea of improving their skill base developments and improve their self confident.

#### **TEXT BOOKS:**

1. Tembhare, D.B. 1997. Modern Entomology. Himalaya Publishing House. Mumbai. (Unit I, II, III, IV).
2. Seethalakshmy, M and R. Santhi. 2012. Saras Publication. Nagercoil. (Unit V).

#### **REFERENCE BOOKS:**

1. Ravindranathan, K.R. 2005. A text book of Economic Zoology. Dominant publisher and distributors (P) Ltd. New Delhi.
2. David, B.V and R. Kumaraswami. 2000. Elements of Economic Entomology, Popular Book Depot, Chennai.
3. Shukla, G.S and Upadhya, V.B. 2005. Economic zoology. Rastogi publications.
4. Ahsan, J and Sinha, S.P. A hand book on economic zoology. S. Chand and co.
5. Ullal, S.R and Narasimhanna, M.N. Central silk board, Govt of India, Bombai.

# NEHRU MEMORIAL COLLEGE (AUTONOMOUS) PUTHANAMPATTI

(Nationally Accredited with 'A' Grade by NAAC)

## ALLIED ZOOLOGY – SELF FINANCED COURSES

SEMESTER – I & II

### **PRACTICAL: Animal Structure and Function & Economic Zoology**

(For B.Sc., Botany students)

(For the candidates admitted from the academic year 2019 – 2020 onwards)

Part III	
SEMESTER – I and II	ALLIED COURSE – I
Instruction Hours: 3 + 3/week (Total 45+45 hours)	Internal: 40
Credits: 4	External: 60
Subject Code:	Total : 100

#### Course objective:

- To impart training on the technique of dissecting the invertebrate/vertebrate animals and to understand the various systems present in the body.
- To train the students to discriminate the various external body parts of invertebrates. To observe the preserved invertebrate animals (wet and dry) and to study their characteristic features of insects.

#### I. Dissections and Experiments:

1. Earthworm: Digestive system and Nervous system.
2. Cockroach: Digestive system and Nervous system.
3. Qualitative test for carbohydrate, protein and fat.
4. Qualitative test for sugar, albumins and urea in Urine.
5. Estimation of salinity and oxygen of the given samples.

#### II. Minor Practical

1. Earthworm: Body setae (mounting).
2. Honey bee: Mouth Parts (mounting).
3. Honey bee sting (mounting).
4. Shark: Placoid scale (mounting).
5. Determination of pH of water samples (pH paper method).
6. Honey adulteration test.

#### III. Spotters: Semester I

1.	Paramecium	11.	Starfish
2.	Sycon	12.	Amphioxus
3.	Obelia colony	13.	Cobra
4.	Planaria	14.	Kingfisher
5.	Tape worm	15.	Bat
6.	Ascaris	16.	Frog-Blastula
7.	Nereis	17.	Frog-Gastrula
8.	Leech	18.	Clinical thermometer
9.	Limulus	19.	Sphygmomanometer
10.	Sepia	20.	Nephron



### **Spotters: Semester II**

1	Bee hive	6	Groundnut: Red hairy caterpillar
2	Honey comb	7	Sugarcane: Shoot borer
3	Cocoons	8	Cotton: Aphids
4	Silk thread	9	<i>Catla catla</i>
5	Rice: Stemborer	10	<i>Labeo rohita</i>

### **IV. Record Submission:**

#### **Course outcomes:**

- To find out the life cycle of different pest and their management aspects.
- The fish culture would help the students to arrange self employment opportunity for their future life.
- The apiculture, and sericulture and Vermiculture techniques give the students an idea of improving their skill base developments and improve their self confident.

#### **PRACTICAL MANUALS:**

1. Poddar, T., Mukhopadhyaya, S., Das, S.K. 2015. An advanced laboratory Manual of Zoology.
2. Lal, S.S. 2011. Practical Zoology Invertebrate, 10th edition, publ. Rastogi Publication, Meerut, 512 pp.
3. Verma, P. S. (2015): A Manual of Practical Zoology Invertebrates. S. Chand & Company Pvt. Ltd. Ram Nagar, New Delhi-110055.
4. Amsath, A. 2009. Practical manual in zoology. M.M.A Publications, Pattukkottai.
5. Gunasekaran, P. 2008. Laboratory Manual in Microbiology, New Age International (P) Ltd. Publishers, New Delhi.

#### **REFERENCE BOOKS:**

1. Kotpal, R.L. 2011: Modern Text Book of Zoology Invertebrates Rastogi Publication, Meerut. 883 pp.
2. Parker, T.J. and Haswell, W.A. 1897: A Textbook of Zoology. Publ. Macmillan And Co. Ltd. Vol I and II.
3. Rastogi V. B. (2015): Invertebrate Zoology. Publisher- Kedar Nath Ram Nath.
4. Yadav, V., Yadav, P. Varshney, V. K., Varshney, V. C. 2015. Text Book of Practical Zoology-I. Publisher- Kedar Nath Ram Nath Merrut.
5. Jordan, E.L., Verma, P.S. 2009. Invertebrate Zoology publ. S.Chand and Co. New Delhi, 1127 pp.
6. Edward, R and Barnes, R 1994. Invertebrate Zoology, 6th edition, Saunders College Publishing, Harcourt Brace And Co., Orlando, Florida, 1100pgs.

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## BLUE PRINT OF THEORY QUESTION PAPER

### External = 75 Marks (Autonomous question pattern)

Section A : 10 Questions x 2 Marks = 20 Marks (Two Questions from each unit) Answer all the questions. Define each question in four or six sentences.	20
Section B: 05 Questions x 5 Marks = 25 Marks (Either or type and one set of questions from each unit) Answer all the questions in 500 -700 words, draw diagram if necessary.	25
Section C: 03 Questions x 10 Marks = 30 Marks (Answer any THREE out of 5 questions and one question from each unit will be asked) – write the answer in 1500 words, draw diagram if necessary.	30
Total	<b>75</b>

### Internal = 25 marks

- Assignment I (from first 2½ units) }  
Assignment II (from remaining 2½ units) } = 05 Marks  
\*Mid Semester Exam (from first 2½ units) = 10 Marks  
\*End Semester Exam (from remaining 2½ units) = 10 Marks  
\* Question must be prepared same that of Autonomous exam pattern.

## BLUE PRINT OF PRACTICAL QUESTION PAPER

### External = 60 marks

1. Major Dissection or Experiment = 15 marks.
  2. Minor practical = 10 marks
  3. Mounting = 10 marks
  4. Spotters: (5x4=20) = 20 marks
  5. Record = 05 marks
- 60 marks(External)  
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### Internal = 40 marks

(A model practical examination must be conducted for 60 marks and that should be converted to 40 marks and submitted to the office of the Controller of Examinations along with answer scripts).  
Question must be prepared same that of Autonomous exam pattern.

இளநிலைப் பட்டப் படிப்பு (கலையியல், அறிவியல், வணிகவியல் மற்றும் வணிக மேலாண்மையியல்)

Semester	Course	Course Title	Ins. Hrs/Week	Credits	Exam hrs	Int. Marks	Ext. Marks	Total
I	Value Education ( VE )	வாழ்வியல் கல்வியும் மனித உரிமைகளும் (Value Education and Human Rights)	2	1	3	-	100	100

**முதலாமாண்டு : முதற்பருவம்**

**வாழ்வியல் கல்வியும் மனித உரிமைகளும்  
(Value Education and Human Rights)**

**பாட நோக்கம் (Course Objectives)**

தனித்திறன் மேம்பாடு, தன்னம்பிக்கை, நாட்டுப்பற்று, சமுதாயப் பொறுப்புணர்வு, மனித உறவுகளைப் போற்றும் பண்பு, அறச்சிந்தனை முதலான இன்றைய இளம் தலைமுறையினருக்குத் தேவையான அடிப்படை வாழ்வியல் பண்புகளைக் கற்பித்தல்.

கவலை, சினம், பொறாமை, சோம்பல் முதலான தீமை தரும் பண்புகளை விலக்கச் செய்தல். உடல்நலத்தில் அக்கறை கொள்ளச் செய்தல்.

மனித உரிமைகளை அறியச் செய்தல்.

**அலகு :1**

வாழ்வியல் கல்வி : திறன் மேம்பாடும் உயர் பண்புகளும்

கல்வி, வாழ்வியல் கல்வியின் நோக்கம் - வாழ்வியல் கல்வியின் பரிணாம வளர்ச்சி - வாழ்வியல் கல்வியின் கூறுகள் - சுய முன்னேற்றம் - திறன் மேம்பாடு - உயர்பண்புகள் - தன்மதிப்பீடும் சுயபரிசோதனையும் - பாலினச் சமத்துவத்தை உளமாரப் பின்பற்றுதல் - மாற்றுத் திறனாளிகள், மனவளம் குன்றியோர்,

வயதில் பெரியவர்கள், அனுபவசாலிகள், சான்றோர்கள், குடும்ப உறுப்பினர்கள், அருகில் வசிப்பவர்கள், சுற்றத்தார், உடன் பணியாற்றுவோர் இவர்களுக்கு மதிப்பளித்தல் - நற்பண்புகளும் நடத்தை உருவாக்கமும் - உண்மை - ஆக்கத்திறன் - தியாகம் - நேர்மை - கட்டுப்பாடு - உதவி செய்யும் மனப்பான்மை - சகிப்புத்தன்மை - அறிவியல் கண்ணோட்டம்

## அலகு : 2

தேசிய, உலக முன்னேற்றத்திற்கான வாழ்வியல் கல்வி

தேசம், சர்வ தேசங்கள் குறித்த எண்ணங்கள் - நமது நாடு - அரசமைப்பு - மக்களாட்சித் தத்துவம் - சமதர்மம் - மதச்சார்பின்மை - சமத்துவம் - சமூக நீதி, தனியுரிமை - சுதந்திரமும் சகோதரத்துவமும் சமூகப் பண்புகள் - இரக்கம் மற்றும் நேர்மை, சுயகட்டுப்பாடு, உலகளாவிய சகோதரத்துவம் - தொழில் சார்பண்புகள் - அறிவு வேட்கை - தொழிலில் நேர்மை - முறைமை - காலந்தவறாமையும் நம்பிக்கையும் - மதம் சார்ந்த பண்புகள் - சகிப்புத்தன்மை, மெய்யறிவு, நன்னடத்தை - அழகியல் பண்புகள் - இலக்கியம், நுண்கலைகள் ஆகியவற்றைப் பயில்தல், சுவைத்தல், மனதாரப் பாராட்டுதல் மதித்தல், பாதுகாத்தல், தேசிய ஒருமைப்பாடும் சர்வதேசப் புரிதலும்.

## அலகு : 3

அறப்பண்புகள் மற்றும் வாழ்வியலில் உலகளாவிய பெருவளர்ச்சிகள் ஏற்படுத்தும் தாக்கங்கள்

அறிவியல் வளர்ச்சியின் தாக்கங்கள் - பண்பண்பாட்டு முரண்பாடுகளின் தாக்கங்கள் - பொருளியல் சிந்தனைகள் - மக்கள் தொடர்புச் சாதனங்கள் - இளமை உணர்ச்சி வேக நடத்தையின் நவீன அறைகூவல்கள் - இல்லறமும் நல்லுணர்வும் - ஒப்பீடும் போட்டி இடுதலும் - நேர்மறை, எதிர்மறை எண்ணங்கள் - அகந்தை - சினம் - சுயநலம் - அறைகூவல்கள்

## அலகு : 4

உடல், உள்ள நலமும்

நோய் தீர்க்கும் செயல்பாடுகளும் உணவுப் பழக்கமும் உணவு முறைகளும் - பொருந்தும் உணவுகள் - பொருந்தா உணவுகள் - மனக் கட்டுப்பாடு - மனத்திண்மை - எளிய உடற்பயிற்சி - தியானம் - மனம், ஆன்மா சார்ந்த விளைவுகள் - யோகா - நோக்கங்கள் - வகைகள் - முறைகள் - ஆசனங்கள் - ஆசைகளை ஒழுங்குபடுத்துதல் - கவலை நீக்குதல் - சினம் தணிதல் - நெடுநீர், மறதி, சோம்பல் தவிர்த்தல் - தூக்கம் முறைப்படுத்துதல் - தூக்கம், இழப்புகளை எதிர்கொள்ளல் - புகை, மது முதலானவைகளின் தீங்கு உணர்தல்- வாழ்த்துகளின் பயன்கள்

குறிப்பு : இந்த அலகு உடற்பயிற்சி : தியானம் - யோகா செய்முறைப் பயற்சிகளுடன் கூடியது.

## அலகு : 5

மனித உரிமை, மனித உரிமைக் கருத்துகள்

தேசிய மற்றும் பன்னாட்டுக் கண்ணோட்டங்கள் - மனித உரிமையின் பரிணாமம் - மனித உரிமையின் பரந்த வகைப்பாடுகள் வாழ்தற்கான உரிமை, சுதந்திரம், கண்ணியத்துடன் வாழ்வதற்கான உரிமைகள் - கலாச்சாரம் மற்றும் கல்விக்கான உரிமைகள் - பொருளாதார உரிமைகள் - அரசியல் உரிமைகள் - சமூக உரிமைகள் - பெண்கள் மற்றும் குழந்தைகளின் மனித உரிமை - சமூகப் பழக்கங்களும் அரசியலமைப்புப் பாதுகாப்புகளும்.

## கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் வாழ்வியல் கூறுகளை அறிந்துகொள்வதோடு நற்பண்புகளை வளர்த்துக்கொள்வர். தீமை தரும் பண்புகளை அறிந்து அவற்றிலிருந்து தம்மைக் காத்துக்கொள்வர்.

உடல்நலத்தில் அக்கறை கொள்வர்.  
மனித உரிமைகளை அறிந்து கொள்வர்.

**பாடநூல்**

வாழ்வியல் கல்வியும் மனித உரிமைகளும்,  
தமிழ்த்துறை வெளியீடு,  
நேரு நினைவுக் கல்லூரி, புத்தனாம்பட்டி.

## முதலாமாண்டு : இரண்டாம் பருவம்

### பகுதி 1 தமிழ் - தாள் 2

செய்யுள் ( இடைக்காலம் ), உரைநடை, தமிழ்ச் செம்மொழி வரலாறு,  
மொழிபெயர்ப்பியல், தமிழ் இலக்கிய வரலாறு

#### பாட நோக்கம் (Course Objectives)

பக்தி இலக்கியம், சிற்றிலக்கியங்களை அறிமுகம் செய்தல்.

இக்காலத் தமிழ் உரைநடையை அறிமுகம் செய்தல்.

தமிழ்ச் செம்மொழி வரலாற்றைக் கற்கச் செய்தல்.

ஆங்கிலச் சொற்களுக்கு இணையான தமிழ்ச்சொற்களைப் பயன்பாட்டு முறையில் அறியச்செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

#### அலகு - 1 இடைக்கால இலக்கியங்கள்

1. தேவாரம் - திருநாவுக்கரசர் தேவாரம்

திருவையாற்றுப் பதிகம் - 3 பாடல்கள்

1. ஏருமதிக் கண்ணி யானை . . . . . (பா.எண் -5)

2. விரும்பு மதிக் கண்ணி யானை .. . . . . (பா.எண் -8)

3. திங்கள் மதிக் கண்ணி யானை . . . . . (பா.எண் -10)

தனித்திருத் தாண்டகம் - 4 பாடல்கள்

1. முடிகொண்டார் முளையிளவெண் . . . . . (பா.எண் -3)

2. பொக்கணமும் புலித்தோலும் . . . . . (பா.எண் -4)

3. அணிதில்லை அம்பலமா . . . . . (பா.எண் -7)

4. கடையொன்றிற் கங்கையையுந் . . . . . (பா.எண் -10)

## 2.திருவாசகம் - திருப்பூ வல்லி - 3 பாடல்கள்

1. எந்தை யெந்தாய் சுற்றம் . . . . . (பா.எண் -276)
2. தேனாடு கொன்றை . . . . . (பா.எண் -279)
3. வானவன் மாலயன் . . . . . (பா.எண் 286)

## திருச்சதகம் - 4 பாடல்கள்

1. மெய்தான் அரும்பி . . . . . (பா.எண் -5)
2. நாடகத்தா லுன்னடியார் . . . . . (பா.எண் -15)
3. ஆமாறுன் திருவடிக்கே . . . . . (பா.எண் -18)
4. வானாது மண்ணாது . . . . . (பா.எண் -19)

## 3.திருமந்திரம் - 10 பாடல்கள்

1. நான் பெற்ற இன்பம் பெறுக . . . . . (பா.எண் -85)
2. அன்பும் சிவமும் இரண்டென்ப . . . . . (பா.எண் -270)
3. என்பே விறகா இறைச்சி . . . . . (பா.எண் -272)
4. நிற்கின்ற போதே . . . . . (பா.எண் -292)
5. கல்லாத மூடரைக் காணவும் . . . . . (பா.எண் -317)
6. உள்ளத்தின் உள்ளே . . . . . (பா.எண் -509)
7. உள்ளம் பெருங்கோயில் . . . . . (பா.எண் -823)
8. உடம்பினை யானிருந்து . . . . . (பா.எண் -725)
9. ஒன்றே குலம் ஒருவனே தேவனும் . . . . . (பா.எண் -2103)
10. அறிவுக்கு அழிவில்லை . . . . . (பா.எண் 2358)



#### 4.நாலாயிரத் திவ்ய பிரபந்தம் - 10 பாடல்கள்

குலசேகர ஆழ்வார் - பெருமாள் திருமொழி - நான்காம் திருமொழி

திருவேங்கடத்தில் இருத்தலும் போதியது எனல்

1. ஊனேறு செல்வத்து பா.எண் 677
2. ஆனாத செல்வத்து பா.எண் 678
3. ஒண்பவள வேலை பா.எண் 680
4. மின்னனைய நுண்ணியர் பா. எண் 682
5. வான்ஆளும் மாமதிபோல் பா.எண் 683

வித்துவக்கோட்டு அம்மாணை வேண்டி நின்றல்

1. தருதுயரம் தடாயேல் பா.எண் 688
2. கண்டார் பா.எண் 689
3. மீன் நோக்கும் பா.எண் 690
4. வாளால் அறுத்து பா.எண் 691
5. வெங்களத்தின் பா.எண் 692

5.இயேசு காவியம் - மலைப்பொழிவு

6.தீன் குறள் - இரு அதிகாரங்கள் - நல்லிணக்கம், வரன் தட்சணை

7. கலிங்கத்துப் பரணி - களம் பாடியது - 10 பாடல்கள்

1. தேவாசுரம், இராமாயணம் . . . . . (பா.எண் -473)
2. உடலின் மேல் பல காயம் . . . . . (பா.எண் -476)
3. நெடுங்குதிரை மிசைக் கலணை . . . . . (பா.எண் -477)
4. விருந்தினமும் வறியவரும் . . . . . (பா.எண் -478)
5. மா மழைபோல் பொழிகின்ற . . . . . (பா.எண் -480)
6. தன் கணவருடன் தாமும் .. . . . . (பா.எண் -482)

7. வாய் மடித்துக் கிடந்ததலை . . . . . (பா.எண் -483)
8. பொரு தடக்கை வாள் எங்கே . . . . . (பா.எண் -485)
9. ஆடல் துரங்கம் பிடித்து . . . . . (பா.எண் -486)
10. சாதுரங்கத் தலைவனைப் போர்க் களத்தில் . . . (பா.எண்-502)

**8. குற்றாலக் குறவஞ்சி - குறத்தி கூறும் நாட்டு வளம் - 5 பாடல்கள்**

1. சூழ மேதி இலங்குந் துறையில் . . . . . (பா.எண் -3)
2. தக்க பூமிக்கு முன்புள்ள நாடு . . . . . (பா.எண் -5)
3. அஞ்சுநூறு மகம்கொண்ட நாடு . . . . . (பா.எண் -6)
4. மாதம் மூன்றும் மழையுள்ள நாடு . . . . . (பா.எண் -7)
5. நீங்கக் காண்பது சேர்ந்தவர் பாவம் . . . . . (பா.எண் -8)

**9. தமிழ் விடுதாது - 110 -120 கண்ணிகள்**

**அலகு : 2**

**உரைநடை - காற்றின் கையெழுத்து - பழநிபாரதி**

**அலகு - 3**

**தமிழ்ச் செம்மொழி வரலாறு**

செம்மொழி விளக்கம் - செம்மொழி வரலாறு - உலகச் செம்மொழிகள் - இந்தியச் செம்மொழிகள் - செம்மொழிக்கான தகுதிகள் அல்லது செம்மொழிப் பண்புகள் - தமிழ்ச் செம்மொழி நூல்கள்.

**அலகு - 4**

**மொழிபெயர்ப்பியல் - ஒரு மடல்(கடிதம்) , ஒரு பத்தி**  
ஆங்கிலத்திலிருந்து தமிழில் மொழிபெயர்த்தல்.

## அலகு - 5

தமிழ் இலக்கிய வரலாறு - இடைக்காலம்

### கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் ஆன்மீகச் சிந்தனையுடன் கூடிய நற்பண்புகளை வளர்த்துக்கொள்வர்.

இடைக்கால இலக்கியப் படைப்புச் சூழலை அறிந்து கொள்வதால் இலக்கிய வரலாற்று அறிவு பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

தாய்மொழியில் திறன் பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

### பாட நூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. தமிழ்ச் சொம்மொழி வரலாறு, முனைவர் மு.சாதிக்கபாட்சா, இராஜா பப்ளிகேசன், திருச்சி-23.
3. மொழிபெயர்ப்புகள் (கடிதங்களும் பத்திகளும்) மகிழினி பதிப்பகம், சென்னை- 106.
4. தமிழ் இலக்கிய வரலாறு -பிரமி பதிப்பகம், திருச்சி-21.
5. காற்றின் கையெழுத்து, பழநிபாரதி, தமிழ்நாதன் பதிப்பகம், சென்னை.

Course Code & Title	ENGLISH FOR COMMUNICATION – II		
Class	<u>I YEAR</u>	Semester	<u>II</u>
Cognitive Level	<b>K – 1 Acquire</b> <b>K – 2 Understand</b> <b>K – 3 Apply</b> <b>K – 4 Evaluate</b> <b>K – 5 Analyze</b>		
Course Objectives	<b>The Course aims</b> <b>To expose students to the wisdom of great men</b> <b>To familiarize students with the danger of modern food and entertainment</b> <b>To make them realize to treat all equally</b> <b>To make them know to use science carefully</b> <b>To make them understand the need to help others</b>		
UNIT	Content	No. of Hours	
I	It is Personality that matters : Swami Vivekananda Pele		
II	Fun Food Keep Television at Arm's length		
III	Women not the weaker sex : M.K. Gandhi A Tree Speaks : C. Rajagopalachary		
IV	The Despair of the Ganges : A. Damodharan The Fukushima- Nuclear Disaster :		
V	The Verger : William Somerset Maugham The Selfish Giant : Oscar Wilde		
Reference	Lessons will be edited and compiled.		
Course Outcomes	On completion of the course, students should be able to CO 1: Know the wisdom of great men. CO 2: know the dangers in modern life. CO 3: accept to treat all equally CO 4:realize the need to use science carefully. CO 5: understand the need to help others.		

**Mapping of COs with PSOs & POs:**

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	M	M	M	S	M	S	M	M	M
CO2	S	M	S	M	M	M	S	S	M	M	S
CO3	S	M	M	M	M	S	M	S	M	M	M
CO4	S	M	S	M	M	M	S	S	M	M	S
CO5	S	M	M	M	M	S	M	S	M	M	M

- Strongly Correlating(S) - 3 marks  
Moderately Correlating (M) - 2 marks  
Weakly Correlating (W) - 1 mark  
No Correlation (N) - 0 mark

## SEMESTER - II

Course Code & Title	BIOFERTILIZERS AND ORGANIC FARMING		Credit	Hours
Class	I B.Sc., Botany	SEMESTER - II	2	2
Cognitive Level	K –1(Acquire) K – 2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
Course Objectives	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To develop the skill on the biofertilizer production by using various microorganisms</li> <li>2. To learn the plant protection methods and organic farming systems,</li> <li>3. To study productivity, profitability, sustainability, quality and input-use-efficiencies of different crops</li> <li>4. To study the application of AM</li> <li>5. Train the students in vermicompost preparation</li> </ol>			
UNIT	CONTENT			No. of Hours
I	Introduction: General account about the microbes used as biofertilizer – <i>Rhizobium</i> – isolation, identification, mass multiplication, and carrier based inoculants.			14
II	Bacterial Biofertilizers: <i>Azospirillum</i> , isolation and mass multiplication and characteristic features of <i>Azotobacter</i> - <i>Azospirillum</i> and <i>pseudomonas</i>			12
III	Blugreen algal biofertilizer: Cyanobacteria (blue green algae), <i>Azolla</i> and <i>Anabaena</i> association, nitrogen fixation- symbiotic and free living factors affecting growth, blue green algae and <i>Azolla</i> in rice cultivation.			12
IV	Mycorrhizae biofertilizer: Mycorrhizae – Ecto and endomycorrhizae – isolation, mass multilplication and application of AM fungi – growth response and yield of AM fungi			12
V	Organic farming: Organic farming – Green manure types- organic manure, compost and vermicompost and its method of preparation.			10

<b>Text Book</b>	<p>1. Lampin N. 1990. Organic Farming. Press Books, Ipswitch, UK. 4. Palaniappan SP &amp; Anandurai K. 1999. Organic Farming – Theory and Practice. Scientific Publications</p> <p>2. Dubey, R.C., 2005 A Text book of Biotechnology S.Chand &amp; Co, New Delhi.</p> <p>3. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.</p> <p>4. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.</p> <p>5. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.</p> <p>6. Subha Rao, N.S. 2000, Soil Microbiology, Oxford &amp; IBH Publishers, New Delhi.</p>
<b>Reference</b>	<p>1. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta Prakashan, Nadiad.</p> <p>2. Bavec, F. and Bavec, M. (2007). Organic Production and Use of Alternative Crops. CRC Press, Boca Raton, FL.</p> <p>3. Joshi, M., Setty, T.K.P. and Prabhakarasetty (2006). Sustainability through Organic farming. 1st Edition. Kalyani Publishers, Ludhiana, India.</p>
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Isolate, identify and mass multiply biofertilizers</li> <li>2. Explain the benefits of organic farming</li> <li>3. Learn the characteristics, identification, cultural methods and maintenance of Azospirillum, Azotobacter, Azolla and Anabaena.</li> <li>4. Understand the application of AM</li> <li>5. Familiar in vermicompost making</li> </ol>

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
<b>CO1</b>	S	S	M	M	S	S	S	S	M	S	S	M
<b>CO2</b>	S	M	S	S	M	M	S	S	S	S	S	S
<b>CO3</b>	S	S	M	S	M	M	S	S	S	M	M	S
<b>CO4</b>	S	S	S	M	S	M	S	M	S	M	S	M
<b>CO5</b>	S	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks  
Moderately correlating (M) - 2marks  
Weakly correlating (W) - 1mark  
No Correlating (N) - 0 mark

## இரண்டாமாண்டு : மூன்றாம் பருவம்

### பகுதி 1 தமிழ் - தாள் 3

செய்யுள் (காப்பியங்கள்), கட்டுரை இலக்கியம், புதினம்,  
தமிழ் இலக்கிய வரலாறு

#### பாட நோக்கம் (Course Objectives)

பண்டைத் தமிழரின் அரசியல் நேர்மை, குடிமக்களின் உரிமை, குடிமக்களின் பொறுப்புணர்வு, அறச்சிந்தனைகளை அறியச்செய்தல்.

நேர்மை, பிறருக்கு உதவும் பண்பு, நன்னெறிகளைப் பின்பற்றுதல் முதலான வாழ்வியல் பண்புகளை வளர்த்தல்.

வாழ்வின் எல்லா நிலைகளிலும் திறம்படச் செயலாற்றக் கற்றுத்தருதல். .  
பெண்களை மதிக்கச் செய்தல், சொல்லாடல் திறன் வளர்த்துக்கொள்ள உதவுதல். மிகச்

சிறந்த தமிழ் உரைநடைகளை அறிமுகம் செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

#### அலகு - 1

1. சிலப்பதிகாரம் : வழக்குரை காதை
2. மணிமேகலை : சிறைக்கோட்டத்தை அறக்கோட்டம் ஆக்கிய காதை 3.  
கம்பராமாயணம் - வாலி வதைப் படலம் - 106 பாடல்கள்

#### அலகு - 2

1. வில்லிபாரதம் : கன்னபருவம் - பதினேழாம் போர்ச்சருக்கம்-104பா-ள்
2. சீறாப் புராணம் : மானுக்குப் பிணைநின்ற படலம் - 30 பாடல்கள்
3. தேம்பாவணி - வளன் சனித்த படலம் - 30 பாடல்கள்
4. இராவண காவியம் : இலங்கைக் காண்டம்-அரசியற்படலம் -40 பா-ள்



**அலகு : 3** கட்டுரை இலக்கியம் - 'கட்டுரை இலக்கியம்' , பிரமி பதிப்பகம் .

**அலகு : 4** புதினம் - வேரில் பழுத்த பலா, சு.சமுத்திரம்

**அலகு : 5**

தமிழ் இலக்கிய வரலாறு - காப்பிய காலம்

**கற்றல் விளைவுகள் (Course Out Come)**

மாணவர்கள் நேர்மைப் பண்பு, துணிவுடைமை, சமுதாய அக்கறை உள்ளவர்களாக வளம்பெறுவர்.

இல்லற வாழ்வில் பெண்களை மதித்தல் வேண்டும் என்ற உணர்வு பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

நல்ல தமிழ் உரைநடையில் பயிற்சி பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

**பாடநூல்கள்**

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. கட்டுரை இலக்கியம் - பிரமி பதிப்பகம், திருச்சி-21.
3. வேரில் பழுத்த பலா, சு.சமுத்திரம் என்.சி.பி.எச்.வெளியீடு, சென்னை.

தமிழ் இலக்கிய வரலாறு – பிரமி பதிப்பகம், திருச்சி-21.

Course Code & Title	ENGLISH FOR COMMUNICATION III		
Class	<u>II YEAR</u>	Semester	<u>III</u>
Cognitive Level	<b>K – 1 Acquire</b> <b>K – 2 Understand</b> <b>K – 3 Apply</b> <b>K – 4 Evaluate</b> <b>K – 5 Analyze</b>		
Course Objectives	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• <b>To expose students to vocabulary</b></li> <li>• <b>To familiarize students with different levels of meaning.</b></li> <li>• <b>To help them to think logically</b></li> <li>• <b>To read and analyze a passage</b></li> <li>• <b>To make them competent to face an interview</b></li> </ul>		
UNIT	Content	No. of Hours	
I	1. Synonyms : 100 2. Antonyms : 100 3. Words that Confuse : 50 4. Single Word Substitution : 100		
II	5. Phrasal verbs : 50 6. Idioms : 50		
III	7. Errors and How to avoid them :100 8. Spotting Errors :100 9. Jumbled Sentences :25		
IV	10. Reading Comprehension : 15 11. Dialogue Writing : 20		
V	12. Letter Writing (Application, Business& Complaints): 15 13. Report Writing : 10 14. Interview Skills 15. Group Discussion		
Reference	Lessons will be edited and compiled.		
Course	On completion of the course, students should be able to  CO 1: use words correctly.		

Outcomes	CO 2: understand different levels of meaning. CO 3: think logically. CO 4: analyze a passage. CO 5: face an interview successfully
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**Mapping of COs with PSOs & POs:**

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	S	M	M	M	S	S	M	M	S
CO2	S	M	M	M	M	S	M	S	M	M	M
CO3	S	M	S	M	M	M	S	S	M	M	S
CO4	S	M	M	M	M	S	M	S	M	M	M
CO5	S	M	S	M	M	M	S	S	M	M	S

Strongly Correlating(S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

## SEMESTER – III

<b>Course Code &amp; Title</b>	<b>MICROBIOLOGY AND PLANT PATHOLOGY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>II B.Sc., Botany</b>	<b>SEMESTER - III</b>	<b>5</b>	<b>5</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<p><b>The course aims to</b></p> <ol style="list-style-type: none"> <li>1. To understand the classification, nutrition and growth of microbes.</li> <li>2. To study the methods of bacterial growth</li> <li>3. To know the basic practices in microbial culture production.</li> <li>4. To study the component,</li> <li>5. To study the component, causes, and control measures of plant diseases</li> </ol>			

UNIT	CONTENT	No. of Hours
I	Microbiology –Definition - History of microbiology –scope of microbiology- types of microorganisms: General characteristics of Bacteria, virus- ultra structure of bacteria and Virus.	15
II	Classification of Bacteria (Bergeys) Nutritional types of bacteria, Growth curve, methods of measurement of bacterial growth, Factors affecting growth.	15
III	Sterilization techniques. Types of Culture media, Pure culture techniques – spread plate, pour plate and streak plate; staining techniques – simple staining, Differential staining- Preservation of Microbial cultures.	15
IV	Introduction to plant pathology - Classification of plant diseases. General symptoms of plant disease- modes of infection and dissemination –defence mechanisms in plants (enzymes and toxins) . Plant disease forecasting- –plant disease management- plant quarantine, chemical and biological control	15

V	Symptomatology study of the following diseases, symptom manifestation and disease control measures a) Fungal disease: Tikka disease of Ground nut and Red rot of sugarcane b) Bacterial disease: leaf blight of paddy and citrus canker. c) Viral disease: TMV and Bunchy Top of Banana d) Mycoplasma disease: Brinjal little Leaf disease	15
Text books	<ol style="list-style-type: none"> <li>1. Kalaichelvan, P.T.2008. Microbiology and Biotechnology-a lab Manual. Lab Man Series, MJP Publishers</li> <li>2. Ananthanarayanan, R. and C.K. Jayaram Paniker. 1996. Text book of Microbiology. Orient Longman, Hyderabad.</li> <li>3. Aneja, K.R. 1996. Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom Cultivation. Vishwa Prakashan (New Age International (p) Ltd.) New Delhi.</li> <li>4. Pandey, B.P 1997. Plant pathology. S.Chand and Co. Ltd., New Delhi.</li> <li>5. Mehrothra, R.S. 1980. Plant pathology, Tata McGraw Hill Publishing Company Ltd., New Delhi.</li> </ol>	
References	<ol style="list-style-type: none"> <li>1. 1. Pelczar, M.J., E.C.S. Chan and N.R Krieg. 2010. Microbiology-Concepts and applications, Tata McGraw-Hill Publishing Company, New Delhi.</li> <li>2. 2. Prescott, L.M., J.P. Harley, and D.A .Klein. 2002. Microbiology, McGraw -Hill Publishing Company, New Delhi.</li> <li>3. 3. Bhatia, A.L. 2005. Handbook of Microbiology, Pointer Publishers, Jaipur.</li> <li>4. 4. Ingram, J.L. and C.A. Ingram. 2004. Introduction to Microbiology, Thomson Books, UK</li> <li>5. 5. Agrios, G.N.2006. Plant pathology, Fifth edition, Academic Press, New York.</li> <li>6. 6. Singh, R.S. 2009. Plant Diseases, Oxford &amp; IBH Publishing Co.Pvt. Ltd., New Delhi.</li> </ol>	
Course Outcomes	<p>On completion of the course, students should be able to</p> <ol style="list-style-type: none"> <li>1. Explain the classification, nutrition and growth of microbes.</li> <li>2. Perform the basic techniques in microbial culture production</li> <li>3. Identify the plant diseases and try to practice the control measures for such diseases</li> <li>4. Gain knowledge on Host parasite interaction process</li> <li>5. Gain Knowledge in plant diseases.</li> </ol>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	M	M	S	M	S	S	M	S	S	M	S
CO4	S	S	S	M	S	M	S	S	S	M	S	M
CO5	M	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

SEMSTER - III

<b>Course Code &amp; Title</b>	<b>PRACTICAL-II: MICROBIOLOGY AND PLANT PATHOLOGY &amp; CYTOLOGY AND GENETICS</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>II B. Sc., Botany</b>	<b>SEMESTER – III &amp; IV</b>	<b>4</b>	<b>3</b>
<b>Cognitive Level</b>	K –1(Acquire) K – 2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to:</b> <ol style="list-style-type: none"> <li>1. Demonstrate safe practices in a microbiology laboratory.</li> <li>2. Explain and correctly demonstrate use of the scientific method</li> <li>3. Encourage students to perfect the practical skills necessary for the laboratory analysis of bacteria.</li> <li>4. practical skills on medium preparation</li> <li>5. Train the students in Problem solving in genetics.</li> </ol>			

	CONTENT	
	<p><b><u>Microbiology and Plant Pathology:</u></b></p> <ol style="list-style-type: none"> <li>1. Isolation and enumeration of microorganism from the soil</li> <li>2. Media preparation – NA, Selective media enriched media. Pure culture techniques( Pour and spread)</li> <li>3. Motility of bacteria by hanging drop method.</li> <li>4. Staining: Simple staining and differential staining: lacto phenol cotton blue.</li> <li>5. Study of the following diseased plant materials: a) Mildew and brown rust b) Red rot and leaf spot of Ground nut c) Citrud canker d) bunchy top of banana e) Brinjal Little leaf</li> <li>6. Demonstration of the isolation of pathogen from diseased material.</li> </ol>	

	<p><b><u>Cytology and genetics</u></b></p> <ol style="list-style-type: none"> <li>1. Cell division: Mitosis &amp; Meiosis – Onion root tip squash</li> <li>2. Study of cell inclusions – Starch grain from banana, rice and potato</li> <li>3. Study of cell inclusions - Cystolith (Ficus leaf).</li> <li>4. Monohybrid cross and Test cross.</li> <li>5. Dihybrid cross and incomplete dominance.</li> <li>6. Interaction of genes: 9:7 and 9:3:4.</li> <li>7. Interaction of genes: 12:3:1 and 15:1.1</li> </ol>	
Course Outcomes	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Be able to identify appropriate laboratory procedures for the detection and identification of organisms</li> <li>2. Basic laboratory skills for the detection and identification of organisms Work effectively as an individual or part of a team</li> <li>3. Familiar in to identify the various stages during cell division</li> <li>4. Skilled in problem solving in genetics</li> <li>5. Students can identify the disease</li> </ol>	

**apping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	M	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	M	S	S	S	S	S	M	S	M
CO5	S	S	M	S	S	S	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark



### SEMESTER – III

<b>Course Code &amp; Title</b>	<b>MUSHROOM TECHNOLOGY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>II B.Sc., Botany</b>	<b>SEMESTER - III</b>	<b>2</b>	<b>2</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<p><b>The course aims to</b></p> <ol style="list-style-type: none"> <li>1. To acquire the basic knowledge and develop suitable skills involved in mushroom cultivation.</li> <li>2. To realize the nutritive and medicinal value of mushrooms.</li> <li>3. To study the common cultivation methods for mushrooms.</li> <li>4. Provide knowledge on disease in mushroom</li> <li>5. Learn about disease management in mushroom.</li> </ol>			

UNIT	CONTENT	No. of Hours
<b>I</b>	Mushrooms-Introduction- types of mushrooms- Edible and medicinal mushrooms. Morphology and internal structure of mushrooms. Factors affecting for mushroom cultivation and importance of mushrooms.	10
<b>II</b>	Mushroom cultivation- spawn production- compost and substrate preparation, methods of spawning. Isolation and pure culture technology- maintenance of pure culture	10

<b>III</b>	Storage: Short-term storage and Long term Storage (canning, pickels, papads), drying, storage in salt solutions. Nutritive value of muhshroom - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fiber content - Vitamins.	10
<b>IV</b>	Mushroom Cultivation- Farm design & lay out - harvesting of Button Mushroom and Oyster mushroom, value added products of mushroom and its marketing.	10
<b>V</b>	Disease of Mushrooms – Bacterial diseases and Fungal diseases, Insect & Pest and its control measures.	10
<b>Text books</b>	1. Nita Bahl. 1996, Hand Book on Mushrooms. Oxford and IBH Publishing Company Ltd., New Delhi. 2. Kapoor, J.N. 1989. Mushroom Cultivation, ICAR, New Delhi. 3. Aneja, K.R.1993. Experiments in Microbiology, Plant pathology, Tissue culture and mushroom cultivation, Wishwa Prakashan, New Age International (P) Ltd., New Delhi.	
<b>References</b>	1. Chang,S. and Miles, P.G. 2004. Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact, CRC Press online. 2. Reeti singh U.C. Singh, modern mushroom cultivation, Agrobios publications, India, 2005.	
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> 1. Cultivate mushroom cultivation. 2. Explain the nutritive and medicinal value of mushrooms. 3. Depict the common cultivation methods for mushrooms. 4. Provide knowledge on layout for mushroom cultivation 5. Through knowledge on diseases in mushroom.	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	M	S	S	M	S	S	M
CO2	S	S	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	M	S	S	S	M	S	M	M	S
CO4	S	S	S	M	S	M	S	S	S	M	S	M
CO5	S	S	S	M	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

## இரண்டாமாண்டு : நான்காம் பருவம்

### பகுதி 1 தமிழ் - தாள் 4

செய்யுள் (பழந்தமிழ் இலக்கியம்) நாடகம், தமிழ் இலக்கிய வரலாறு,  
கட்டுரை வரைவியல்

#### பாட நோக்கம் (Course Objectives)

பழந்தமிழரின் வாழ்வியல் அறம், வாழ்வியல் நுட்பங்கள், அக வாழ்வுச் சிந்தனைகளை அறியச்செய்தல்.

தனித் திறன்களை மேம்படுத்திக் கொள்ள உதவுதல்.

கடமை உணர்ச்சி, பெரியோரை மதித்தல் முதலான உயர்பண்புகளை வளர்த்தல்.

தமிழர்தம் இயற்கை வளம், செல்வ வளம், இலக்கிய வளங்களை அறிமுகம் செய்தல்.

நிகழ்கால வாழ்வியல் சிக்கல்களில் தெளிவுபெறச் செய்தல், சமுதாய அக்கறை கொள்ளச்செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதியைக் கற்பித்தல்.

#### அலகு - 1

##### 1. குறுந்தொகை - 10 பாடல்கள்

குறிஞ்சி

1. நிலத்தினும் பெரிதே . . . . . (பா.எண் -3)
2. வேரல் வேலி . . . . . (பா.எண் -18)
3. யாயும் ஞாயும் . . . . . (பா.எண் -40)
4. இடிக்கும் கேளிர் . . . . . (பா.எண் -58)

நெய்தல்

1. அணிற்பல் அன்ன . . . . . (பா.எண் -49)
2. ஞாயிறு பட்ட அகல்வாய் . . . . . (பா.எண் -92)
3. கடும்புனல் தொடுத்த . . . . . (பா.எண் -103)

#### மருதம்

1. தச்சன் செய்த சிறுமா . . . . . (பா.எண் -61)
2. நன்நலம் தொலைய . . . . . (பா.எண் -100)
3. வேம்பின் பைங்காய் . . . . . (பா.எண் -205)

#### 2. நற்றிணை – 5 பாடல்கள்

1. நின்ற சொல்லர் ,... . . . . (குறிஞ்சி) . (பா.எண் -1)
2. விளம்பழம் கமழும் . . . . . (பாலை) . (பா.எண் -12)
3. தடமருப்பு எருமை . . . . . (மருதம்) . (பா.எண் 120)
4. விளையாடு ஆயமொடு . . . . . (நெய்தல்) . (பா.எண் -172)
5. அம்ம வாழி தோழி . . . . . (முல்லை) . (பா.எண் -289)

#### 3. கலித்தொகை - 5 பாடல்கள்

1. பாலைக் கலி - வயக்குறு மண்டிலம் . . . . . (பா.எண் 24)
2. குறிஞ்சிக் கலி - பாடுகம் வா வாழி தோழி . . . . . (பா.எண் 05)
3. மருதக்கலி - ஈண்டு, நீர்மிசைத் தோன்றி . . . . . (பா.எண் 24)
4. முல்லைக் கலி - தனி பெறு தண் புலத்துத் . . . . . (பா.எண் 1)
5. நெய்தற் கலி - மா மலர் முண்டகம் . . . . . (பா.எண் 16)

#### 4. ஐங்குறுநூறு - 10 பாடல்கள்

### வேழப்பத்து

1. மனைநடு வயலை வேழம் . . . . (பா.எண் 11)
2. பரியுடை நன்மான் . . . . (பா.எண் 13)
3. ஓங்குபூ வேழத்துத் . . . . (பா.எண் 16)
4. இருஞ்சாய் அன்ன . . . . . (பா.எண் 18)
5. நெகிழ்பு ஓடும் வளை . . . . (பா.எண் 20)

### அன்னாய் வாழிப் பத்து

1. அன்னாய் வாழி! வேண்டு அன்னை! நம் படப்பை (பா.எண் 203)
2. அன்னாய் வாழி! வேண்டு அன்னை! அஃதெவன்கொல்?.. (பா. 204)
3. அன்னாய் வாழி! வேண்டு அன்னை! எந்தோழி (பா.எண் 206)
4. அன்னாய் வாழி! வேண்டு அன்னை! நன்றும் (பா.எண் 208)
5. அன்னாய் வாழி! வேண்டு அன்னை! கானவர் (பா.எண் 208)

### 5. புறநானூறு - 5 பாடல்கள்

1. இரும்பனை வெண்தோடு. . . (பா.எண் 54)
2. உண்டாலம்ம இவ்வுலகம்... (பா.எண் 14)
3. யாண்டு பலவாக . . . (பா.எண் 191)
4. யாதும் ஊரே... (பாடல் எண் 192)
5. செய்குவம் கொல்லோ நல்வினை... (பா.எண் 214)

### 6. பத்துப்பாட்டு - பட்டினப்பாலை முழுவதும்

## அலகு - 2

### 1. திருக்குறள் - 3 அதிகாரங்கள்

1. மடியின்மை
2. இடுக்கண் அழியாமை
3. சொல்வன்மை

### 2. நாலடியார் - 12 பாடல்கள்

பொறையுடைமை

1. காதலர் சொல்லுங் . . . . (பா.எண் 73)
2. அறிவதறிந்தடங்கி . . . . (பா.எண் 74)
3. இன்னா செயினும் . . . . . (பா.எண் 76)
4. தான்கெடினும் தக்கார் . . . (பா.எண் 80)

தீவினையச்சம்

1. அக்கே போல் அங்கை . . . (பா.எண் 123)
2. நெருப்பழல் சேர்ந்தக் கால் . . . (பா.எண் 124)
3. பெரியவர் கேண்மை . . . (பா.எண் 125)
4. யாஅர் ஒருவர் . . . . (பா.எண் 127)

பெரியாரைப் பிழையாமை

1. பொறுப்பரென் . . . (பா.எண் 161)
2. அவமதிப்பும் ஆன்ற . . . (பா.எண் 163)
3. நளிகடல் தண்சேர்ப்ப . . . . (பா.எண் 166)
4. பெரியார் பெருமை . . . . (பா.எண் 170)

### 3.பழமொழி - 12 பாடல்கள்

அறிவுடைமை

1. அறிவின் மாண்பு . . . . (பா.எண் 27)
2. அறிவினர் மாண்பு(பா.எண் 28)
3. அறிவுடையாருடன் அறிவுடையார் சேர்தல் (பா.எண் 30)
4. அறிவிலாரை அறிவுடையார் புகவிடாமை(பா.எண் 31)

இன்னா செய்யாமை

1. முற்பகல் செய்யின் பிற்பகல் விளையும்(பா.எண்- 47)
2. நலியப் பெற்ற எளியர் அழுத கண்ணீர்(பா.எண் 48)
3. மதிப்பு மிக்கவரை அழிக்க முயலுதல்(பா.எண்-49)
4. நலிந்தாரை நலியாமை(பா.எண் 50)

சான்றோர் இயல்பு

1. சான்றோர் பெருமை(பா.எண் 70)
2. வறுமையினும் நின்ற நிலையில் வழுவாமை(பா.எண் 71)
3. பீடிலாவிடத்தும் பெருந்தகைமையில் வழுவாமை(பா.எண் 72)
4. இடருற்ற விடத்தும் மதிப்பிற் குறையாமை(பா.எண் 73)

### 4.இன்னா நாற்பது – 5 பாடல்கள்

1. அறமனத்தர் கூறும் கடுமொழி . . . . . (பா.எண் 6)
2. உண்ணாது வைக்கும் பெரும் பொருள் . . . (பா.எண் 16)
3. குலத்துப் பிறந்தவன் கல்லாமை யின்னா . . . (பா.எண் 19)
4. யானையின் மன்னரைக் கண்டால் . . . (பா.எண் 22)
5. பிறன் மனையாள் பின்னோக்கும் பேதைமை யின்னா . . . (பா.எண் 38)



## 5. இனியவை நாற்பது – 5 பாடல்கள்

1. பிச்சை புக்காயினும் கற்றல் . . . . (பா.எண் 1)
2. மானமழிந்தபின் வாழாமை முன்னினதே . . . (பா.எண் 13)
3. குழவிதளர் நடை காண்டல் இனிதே . . . (பா.எண் 14)
4. வருவா யறிந்து வழங்கல் . . . (பா.எண் 22)
5. பத்து கொடுத்தும் பதியிருந்து . . . . . (பா.எண் 40)

அலகு : 3

நாடகம் - பிசிராந்தையார் - பாரதிதாசன்

அலகு : 4

கட்டுரை வரைவியல் - பொதுக்கட்டுரைகள்

அலகு : 5

தமிழ் இலக்கிய வரலாறு – சங்க காலம், சங்கம் மருவிய காலம்

## கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் வாழ்வியல் நுட்பங்களில் வல்லமை பெறுவர்.

சமுதாய அக்கறை உள்ளவர்களாக மனவளம் பெறுவர்.

சமுதாய, பொருளியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

## பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. பிசிராந்தையார் - பாரதிதாசன், தமிழ் நாதன் பதிப்பகம், சென்னை – 110

3. பொதுக்கட்டுரைகள், மகிழினி பதிப்பகம், சென்னை- 106.

4. தமிழ் இலக்கிய வரலாறு,  
பிரமி பதிப்பகம், திருச்சி-21.

Course Code & Title	ENGLISH FOR COMMUNICATION IV		
Class	<u>II YEAR</u>	Semester	<u>IV</u>
Cognitive Level	<b>K – 1 Acquire</b> <b>K – 2 Understand</b> <b>K – 3 Apply</b> <b>K – 4 Evaluate</b> <b>K – 5 Analyze</b>		
Course Objectives	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• <b>To make the students to live meaningfully</b></li> <li>• <b>To Familiarize students with various great personalities</b></li> <li>• <b>To understand qualities like freedom</b></li> <li>• <b>To know human values like patriotism and universal brotherhood</b></li> <li>• <b>To realize the value of comradeship</b></li> </ul>		
UNIT	Content	No. of Hours	
I	A Poison Tree : William Blake King Bruce and the Spider : Eliza Cook The Character of a Happy Life : Henry Wotton		
II	Ulysses : Lord Alfred Tennyson Money Madness : D. H. Lawrence I vow to thee my Country		
III	The Ocean : Lord Byron The Unknown Citizen : W. H. Auden Night of the Scorpion : Nissim Ezekiel		
IV	The Rising of the Moon : Lady Gregory The Little Man : John Galsworthy The Path Finder : Herman Ould		
V	A Tale of two cities : Charles Dickens		
Reference	Lessons will be edited and compiled.		
Course Outcomes	On completion of the course, students should be able to CO 1: live meaningfully. CO 2: know great qualities like leadership. CO 3: understand qualities like freedom and parenthood CO 4: live as a group in unity CO5: realize the value of comradeship		

**Mapping of COs with PSOs & POs:**

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	M	M	M	S	M	S	M	M	M
CO2	S	M	S	M	M	M	S	S	M	M	S
CO3	S	M	M	M	M	S	M	S	M	M	M
CO4	S	M	S	M	M	M	S	S	M	M	S
CO5	S	M	M	M	M	S	M	S	M	M	M

Strongly Correlating(S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

## SEMESTER – IV

<b>Course Code &amp; Title</b>	<b>CYTOLOGY AND GENETICS</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>II B.Sc., Botany</b>	<b>SEMESTER - IV</b>	<b>5</b>	<b>5</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<p><b>The course aims to</b></p> <ol style="list-style-type: none"> <li>1. Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells,</li> <li>2. Provide knowledge on macromolecules, membranes, and organelles</li> <li>3. To learn about basic concepts of Mendelian genetics.</li> <li>4. Students will learn the basic principles of inheritance at the molecular, cellular and organismal levels.</li> <li>5. To understand the molecular basis of genetics ( including topics replication, transcription, translation and mutation)</li> </ol>			

UNIT	CONTENT	No. of Hours
I	Introduction to plant cell- Ultrastructure and cell wall Structure, chemistry and functions of plasma membrane (fluid-mosaic model only) Structure and functions of nucleus, mitochondria, chloroplast, endoplasmic reticulum, ribosome and Gogi complexes. Cell division – Stages of mitosis and meiosis and their significances.	15

II	Nucleic acids – Nucleic acids – Structure and types of DNA and RNA (Watson and crick models) Structure and functions of chromosomes, Special type of Chromosomes - Polytene and B chromosomes.	15
III	Mendelian Genetics – Monohybrid, Dihybrid Crosses – Mendel's Laws – Test and Back Crosses, Lethal Genes and Incomplete dominance – Co dominance. Interaction of genes – Dominant (12:3:1) and Recessive (9:3:4) Epistasis.	15
IV	Linkage, crossing over and Mapping of Chromosomal genes, Two point, Three point crosses. Extra chromosomal inheritance in Plants – Male sterility in Maize, Sex determination in plants. Polygenic inheritance – Ear length of maize, Multiple allele-ABO blood groups	15
V	Central Dogma-DNA - RNA as genetic Material – Griffith's Experiment, Replication- Types of RNA , RNA polymerases , ribosomes, rRNA tRNA Transcription & Translation– Genetic code	15
Text books	<ol style="list-style-type: none"> <li>1. Sundararajan, S., (2000) Cytology, Anmol Publication (P) Ltd., New Delhi.</li> <li>2. Verma, P.S., Cytology, S. Chand &amp; Co., Calcutta.</li> <li>3. Ajoy Paul., 2011. Text Book of Cell and Molecular Biology-. Books and Allied (P) Ltd, Kolkata. Third Edition.</li> <li>4. Aminul Islam., 2011. A Text Book of Cell Biology-. Books and Allied (P) Ltd, Kolkata. First edition.</li> <li>5. Agarwal, V.K. (2000): Simplified Course in Genetics (B.Sc.Zoology), S.Chand&amp; Co., NewDelhi.</li> <li>6. Gardner, E.J. and Shusted, D.P. (1984): Principles of Genetics (7<sup>th</sup> Edn.,) John Wiley&amp;sons, N.Y., Chichester, Brisbane, Toronto, Singapore.</li> <li>7. Gupta, P.K. (2000): Genetics, Rastogi Publishers, Meerut, India.</li> <li>8. Jain, H.K. (1999): Genetics-Principles, Concepts &amp; Implications Oxford &amp; IBH Publishing Co., (P) Ltd., NewDelhi.</li> </ol>	
References	<ol style="list-style-type: none"> <li>1. Sandhya Mitra (1994): Genetics-A Blue Print of Life, Tata McGraw Hill Publishing Co., Ltd., NewDelhi.</li> <li>2. Sarin, C. (1994): Genetics, Tata McGraw Hill Publishing Co., Ltd., NewDelhi.</li> </ol>	

	<p>3. Sinott, E.W., L.C.Dunn and J.Dobshansky (1958): Principles of Genetics (5<sup>th</sup> Edn.) McGraw Hill publishing Co., N.Y., Toronto, London.</p> <p>4. Winter, P.C., Hickey,G.I &amp; Fletcher,H.L. (1999): Instant Notes in Genetics, Viva Books (P) Ltd., NewDelhi, Mumbai, Chennai</p> <p>5. De Robertis, E.D.P &amp; De Robertis, E.M.F (1980) Cell and molecular biology, Holt Saunders International Editions, Philadelphia, Tokyo.</p> <p>6. Rastogi, S.C. (1992) Cell biology, Tata McCraw Hill Publishing Co., Ltd., New Delhi.</p>	
Course Outcomes	<p>On completion of the course, students should be able to</p> <ol style="list-style-type: none"> <li>1. To explain the structure of Cell components and their functions.</li> <li>2. To have knowledge of the nature and function of genes, processes of inheritance .</li> <li>3. To describe linkage, crossing over and mutations.</li> <li>4. Gained knowledge on linkage techniques.</li> <li>5. Through knowledge with DNA and RNA</li> </ol>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	S	M	S	S	S	M	S	S	M
CO2	S	S	S	S	M	S	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	M	S	M	S	S	M	S	S	M
CO5	S	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

## SEMESTER – IV

<b>Course Code &amp; Title</b>	<b>HORTICULTURE</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>II B.Sc., Botany</b>	<b>SEMESTER - IV</b>	<b>2</b>	<b>2</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<p><b>The course aims to</b></p> <ol style="list-style-type: none"> <li>1. This course is designed to provide knowledge on various techniques in horticulture and Gardening</li> <li>2. Identify and describe the function of the vegetative plant parts</li> <li>3. Explain the importance of horticulture and demonstrate the ability to use</li> <li>4. Provide knowledge on various irrigation types</li> <li>5. Confers information on flower arrangement.</li> </ol>			

UNIT	CONTENT	No. of Hours
I	Introduction to Horticulture – Scope and importance, Divisions of horticulture. Layout and planning of Kitchen garden.	10
II	Vegetative propagation methods: Cuttage- stem cutting, and leaf cutting; Layerage- Simple, Compound, and Air layering; Graftage- Approach and Whip grafting; Bud grafting- Budding- T budding and batch budding.	10
III	Cultivation methods of following plants 1. Mango 2. Banana 3. Rose 4. Jasmine with reference to soil climate, planting, irrigation and harvesting.	10



IV	Irrigation-Types of Irrigation (Flood, Drip and sprinkler) Designing and preparation of -Hedges, Rockery, Topiary and Lawn making.	10
V	Flower arrangement. Cut flowers and their economic importance. Indoor gardening – Hanging basket, Bottle garden and Bonsai.	10
Text books	<ol style="list-style-type: none"> <li>1. Kumar.N, 1990 - Introduction to Horticulture, Rohini Agency, Nagercoil</li> <li>2. Kumar.N (1977): Introduction to Horticulture, Rajalakshmi Publications, Nagercoil, India.</li> <li>3. Chadha, K.L. 2001, Handbook of Horticulture, ICAR, New Delhi.</li> <li>4. Christopher, E.P. 2001. Introductory Horticulture, Biotech Books, New Delhi</li> </ol>	
References	<ol style="list-style-type: none"> <li>1. Bose, T.K.&amp; Mukherjee, D (1972): Gardening in India, Oxford &amp; 1BH Publishing Co., Kolkatta, Mumbai, NewDelhi.</li> <li>2. Edmond Senn.&amp; Arews and Halfacre(1987): Fundamentals of Horticulture, TataMcGraw Hill book Co., Ltd. NewDelhi.</li> <li>3. Pratibha, P. Trivedi (1987): Home gardening, ICAR Publication, NewDelhi.</li> <li>4. Randhawa (1997): Ornamental Horticulture in India, Today &amp; Tomorrow Publishers, NewDelhi.</li> <li>5. Bhattacharjee.S.K. 2006. Amenity Horticulture, Biotechnology and Post harvest technology. Pointer publishers. Jaipur</li> <li>6. Chandra, R. and M. Mishra. 2003. Micropropagation of horticultural crops. International Book Distributing Co., Lucknow.</li> <li>7. Chattopadhyaya, P.K.2001. A text book on Pomology (Fundamentals of fruit growing) Kalyani Publication, New Delhi</li> </ol>	
Course Outcomes	<p>On completion of the course, students should be able to</p> <ol style="list-style-type: none"> <li>1. Demonstrate knowledge and understanding in Current applications of horticultural principles practices in propagation,</li> <li>2. Familiar in pest management, production, maintenance, and business practices.</li> <li>3. Apply horticultural principles to the successful growth a</li> <li>4. Provide knowledge on production of horticultural plants.</li> <li>5. Demonstrate the knowledge, skills and attributes to be successful contributing members of the horticulture profession.</li> </ol>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	M	S	M	S	S	S	M	S	M
CO5	S	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

## SEMESTER – IV

<b>Course Code &amp; Title</b>	<b>Food science and Nutrition</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>II B.Sc., Botany</b>	<b>SEMESTER - IV</b>	<b>2</b>	<b>2</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To have a broad outline of the methodology of food science</li> <li>2. To enable students to apply scientific methods independently</li> <li>3. To understand the nature of unit operations in the food industry.</li> <li>4. Provide knowledge on preservation of food</li> <li>5. Provide knowledge on concept of extension.</li> </ol>			

UNIT	CONTENT	No. of Hours
<b>I</b>	Food pyramid, functions, classification, conservation of nutrients, cooking methods, meal planning for different age & income groups, food adulteration of food safety and Weaning foods – meaning, importance and preparation.	12
<b>II</b>	Nutrition – Definition of nutrients, components, requirements, metabolism – carbohydrate, protein and fat, Normal and therapeutic nutrition, nutritional deficiency.	12
<b>III</b>	Art in food service - Design, selection, structural and decorative, design and their application in food service institutions. a) Colour - Colour schemes. b) Flower arrangements - Types and styles c) Table service - Styles - Indian, Western and oriental.	12

<b>IV</b>	Preservation of Food – Milk Based; Millet Based preparation of canned food; Fermented Food; Colouring and preservative agents and its disadvantage.	12
<b>V</b>	Concept of Extension – Principles and scope; Science and technology, health promotion, environmental sanitation; programme planning for women and children and transaction, ICDS programme and role of different functionaries.	12
<b>Text books</b>	1. Potter, N.N. Food Science 5th edition. CBS publishers and distributors, New Delhi. 1996. 2. Kroger, M and Shapiro, R. Changing food technology. (Vol. 1-3) Technomic publishing Co. Inc, USA. 1987. 3. Raj, G.D. Encyclopaedia of Food Science. (Vol 1-3). Anmol publications Pvt. Ltd, New Delhi. 1997.	
<b>References</b>	1. Kumar, A and Meenakshi, N. Marketing management. Vikas publishing house Pvt. Ltd. 2006. 2. Srilakshmi, B. Nutrition Science, New age International (P) Ltd publishers, New Delhi. 2006.	
<b>Course Outcomes</b>	On completion of the course, students should be able to <ol style="list-style-type: none"> <li>1. Recognize the main world food problems and their root causes</li> <li>2. Describe food components, with emphasis on proteins, carbohydrates and lipids</li> <li>3. Describe food sensory, and discuss the main food quality attributes as perceived by the senses</li> <li>4. Describe the principal causes of food deterioration; relate to practical examples</li> <li>5. Through knowledge on concept of extension.</li> </ol>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
<b>CO1</b>	S	S	S	M	S	M	S	S	M	S	S	M
<b>CO2</b>	S	M	S	S	M	M	S	M	S	S	S	S
<b>CO3</b>	S	S	M	S	M	S	S	M	S	M	M	S
<b>CO4</b>	S	S	S	S	S	M	S	S	S	M	S	M
<b>CO5</b>	S	M	S	S	S	M	S	S	S	S	S	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

SEMESTER – V

<b>Course Code &amp; Title</b>	<b>PLANT ANATOMY AND EMBRYOLOGY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc., Botany</b>	<b>SEMESTER - V</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K – 1(Acquire) K – 2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To know about the internal structure and organization of the various parts of the plants stem, root and leaves</li> <li>2. To impart knowledge about internal structure of plants and plant reproductive organs</li> <li>3. Study about plant embryo and its development</li> <li>4. Students have the ability to correlate between the embryological structure</li> <li>5. Provide knowledge on polyembryony</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Meristematic tissues: characters and types –functions of apical meristems- root apex and shoot apex . Theories of meristems- Tunica corpus theory. Structure and function of simple and permanent tissue.	15
<b>II</b>	Primary structure of dicot monocot stem and root . Normal secondary growth in dicot stem and root. Anomalous secondary growth in <i>Boerhaavia</i> and <i>Dracaena</i> stems. Structure of dorsiventral and isobilateral leaf. Nodal anatomy.	15

III	Structure and development of microsporangium and megasporangium – male gametophyte and female gametophyte. Types of ovule.	15
IV	Fertilization- major events -syngamy-double fertilization and their significance. Endosperm – types (Nuclear, cellular, helobial) and ruminant endosperm. Functions of endosperms.	15
V	Polyembryony-Types , causes and practical applications Apomixis-Vegetative reproduction and Agamospermy. Parthenocarpy and practical applications.	15
Text books	<ol style="list-style-type: none"> <li>1. Pijushroy, (2010).Plant Anatomy, New central Book Agency, Pvt Lit, New Delhi</li> <li>2. Cutter, E.G (1969) Plant Anatomy, Part 1 Addison – Wesley Publishing Co.,</li> <li>3. Eames, A.J. and MacDaniels, L.H (1972) Introduction to plant Anatomy.</li> <li>4. Fahn. A. (1974) Plant Anatomy, Pergaman Press, New York.</li> <li>5. Tayal M.S (1979) Plant Anatomy, Rastogi Publications, New Delhi.</li> <li>6. Bhojwani, S.S. &amp; Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.</li> </ol>	
References	<ol style="list-style-type: none"> <li>1. Davis C.L. 1965. Systematic Embryology of Angiosperms. John Wiley, New York</li> <li>2. Eames M.S 1960. Morphology of Angiosperms Mc Graw Hill New York.</li> <li>3. Johri BD 1984 (ed.) Embryology of Angiosperms Springer - Verlag, Berlin.</li> </ol>	

Course Outcomes	<p>On completion of the course, students should be able to</p> <ol style="list-style-type: none"> <li>1. To make connections between plant anatomy and the other major disciplines of biology</li> <li>2. To identify and compare structural differences among different taxa of vascular plants.</li> <li>3. Embryology gives information to student about the development of embryo to mature seed and original plants.</li> <li>4. Through with fertilization in plants</li> <li>5. Gained knowledge on polyembryony</li> </ol>	
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**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	M	S	M	S	S	S	M	S	M
CO5	S	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

## SEMESTER - V

<b>Course Code &amp; Title</b>	<b>PLANT SYSTEMATICS AND ECONOMIC BOTANY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - V</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. Name, classify, and diagnose several of the major families of flowering plants.</li> <li>2. Learn how to collect (including properly recording field data), identify, and process Plants for herbarium specimens.</li> <li>3. To know principles and rules of plant nomenclature.</li> <li>4. Provide knowledge on economic importance of plants</li> <li>5. Study the morphological characters of plants</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Morphology – Modifications of tap root and fibrous root system – Modification of stem – aerial and underground stem – Modification of leaf; Inflorescence types – Racemose, Cymose, mixed and special types. Fruits – simple, aggregate and multiple fruits.	13
<b>II</b>	Scope and importance of Taxonomy- principles of ICBN- Author citation - Type concept- Effective and valid publications. Herbarium techniques. Types of classifications- artificial (Bentham & Hooker), Natural and phylogenetic (Linnaeus) Engler and Prantal – merits and demerits.	15
<b>III</b>	Brief study of the following families with special features and economic importance of Apocyanaceae - Annonaceae –Rutaceae – Anacardiaceae- Ceasalpinaceae – Cucurbitaceae- Convolvulaceae	16

IV	Brief study of the following families with special features and economic importance Rubiaceae- Asclepiadaceae- Solanaceae- Euphorbiaceae- Liliaceae- Orchidaceae -Poaceae	16																		
V	<p>Brief study of the following economic products with special reference to the Botanical name, family, morphology of useful part and the uses of the following commercial products.</p> <table border="0"> <tr> <td>1. Cereals</td> <td>–</td> <td>Wheat.</td> </tr> <tr> <td>2. Pulses</td> <td>–</td> <td>Soya beans.</td> </tr> <tr> <td>3. Fruits</td> <td>–</td> <td>Apple</td> </tr> <tr> <td>4. Spices &amp; Condiments</td> <td>–</td> <td>Garlic.</td> </tr> <tr> <td>5. Essential Oils</td> <td>–</td> <td>Olive oil</td> </tr> <tr> <td>6. Beverages</td> <td>–</td> <td>Coffee</td> </tr> </table>	1. Cereals	–	Wheat.	2. Pulses	–	Soya beans.	3. Fruits	–	Apple	4. Spices & Condiments	–	Garlic.	5. Essential Oils	–	Olive oil	6. Beverages	–	Coffee	15
1. Cereals	–	Wheat.																		
2. Pulses	–	Soya beans.																		
3. Fruits	–	Apple																		
4. Spices & Condiments	–	Garlic.																		
5. Essential Oils	–	Olive oil																		
6. Beverages	–	Coffee																		
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A.</li> <li>2. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford &amp; IBH Pvt. Ltd., New Delhi. 3 rd edition.</li> <li>3. Singh G. 2010. Plant Systematics: An Integrated Approach (3rded.). Science Publishers. USA.</li> <li>4. Vashishta P.C. 1974. Taxonomy of Angiosperms. S.Chand &amp; Co. Ltd., New Delhi</li> <li>5. Kochhar, S.L. Economic Botany in the Tropics, Macmillan India. Ltd, New Delhi.</li> <li>6. Verma,V. Text Book of Economic Botany.</li> <li>7. Pandey, B.P.1980. Economic Botany. S.Chand &amp; Co. Ltd. New Delhi</li> </ol>																			

<b>References</b>	<ol style="list-style-type: none"> <li>1. Gupta, R.K. 1992. Text book of systematic Botany. Atma Rain &amp; Sons.</li> <li>2. Heslop Harrison, New concept in flowering plant Taxonomy.</li> <li>3. Jeffrey,C. 1982. An Introduction of plant taxonomy, Allied publishers private limited.</li> <li>4. Jones, B.S. Plant systematics, Mc Graw Hill publications. New Delhi</li> <li>5. Lawrence G.H.M.1955. In Introduction to plant taxonomy. Central Book Depot, Allahabad.</li> <li>6. Rendle, A.B. 930. The Classification of flowering plants,Vol.I and II cup vikasstudents Edn.</li> <li>7. Hill. A.W. 1951 Economic Botany, McGraw Hill publishing house. New Delhi</li> </ol>
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<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Plant classification gives information about plant to classify in different families.</li> <li>2. Understand the environments and basic concept of taxonomy, ecology.</li> <li>3. Herbarium techniques give knowledge to help the identification of plants.</li> <li>4. Gained knowledge economic importance of plants.</li> <li>5. Utilization of plants to enable the student about utility in life.</li> </ol>
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**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	S	M	S	M
CO2	S	S	S	S	M	M	S	M	S	S	S	S
CO3	S	S	S	M	M	S	S	S	S	M	M	S
CO4	S	M	S	M	S	S	S	S	S	M	S	M
CO5	S	S	M	S	S	M	S	S	M	S	S	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>BIOCHEMISTRY AND BIOPHYSICS</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - V</b>	<b>4</b>	<b>5</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To gain the knowledge of basic chemical of biomolecules of cell.</li> <li>2. To impart knowledge of principle, methodology and application of various techniques &amp; instrumentation.</li> <li>3. Makes use of physical concepts and techniques to address problems in biology</li> <li>4. Give knowledge on microtome.</li> <li>5. Provide knowledge on colorimeter.</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Atomic structure of elements. Bonding: Covalent and non-covalent bonds - Hydrogen bond, Van der Waal's forces. Structure and properties of water, Acids and Bases - pH and Buffer system	15
<b>II</b>	Carbohydrates: classification, chemical structure and properties of Mono - Disaccharides –Polysaccharides. Biological function of carbohydrates. Lipids - structure of simple lipid and compound lipid (phospholipids and glycolipids), fatty acids- saturated and unsaturated fatty acids	15
<b>III</b>	Amino acids: Basic structure, properties and function, Essential and standard amino acids. Proteins: structure-peptide bond -solubility and composition. Enzymes: Nomenclature, classification -mechanism of enzyme action, enzyme kinetics, factors affecting enzyme action.	15
<b>IV</b>	Basic principles of microscopes – Light, Compound microscope and Electron microscopes. Haemocytometer. Micro technique –Whole mount, Smears, Squash, sections. Microtomy: Fixation, Dehydration, Infiltration, Embedding, Sectioning. Microtome's – Types- Principles and operating mechanisms of Rotary Microtome. Staining techniques - Preparation of following stains: Safranin, lactophenol cotton blue, Acetocarmine, Methylene blue and Crystal violet.	15
<b>V</b>	Working, Principle and Application of Colorimeter and Spectrophotometer. Basic principles of pH meter and its measurement. Centrifuge: principles, components, mechanism and application. Chromatography: Paper, Column, Gel filtration, Thin layer. Electrophoresis – Agarose gel electrophoresis and Polyacrylamide	15

	gel electrophoresis	
<b>Text Book</b>	<ol style="list-style-type: none"> <li>1. Rastogi , S.C ( 2003). Outlines of Biochemistry , CBS Publishers &amp; Distributors , New Delhi</li> <li>2. Stryer, L., (1988). Biochemistry, WH Freeman &amp; Co., NY.</li> <li>3. Jain J.L. et al.,(2008). Fundamentals of Biochemistry, Chand ,New Delhi</li> <li>4. Conn E.E, Stumpf , Bruening G, Doi RH.( 2005) . Outlines of Biochemistry 5/Ed, Wiley &amp; Sons Pvt . ltd.</li> <li>5. Satyanaryana U, Chakrapaani U, (2006). Biochemistry, Books and Allied (P)Ltd.</li> </ol>	
<b>References</b>	<ol style="list-style-type: none"> <li>1. Apps et al., (1992). Biochemistry, ELBS.</li> <li>2. Caret et al., (1993). Inorganic, Organic and Biological Chemistry, WMC Brown Pub. USA.</li> <li>3. Nelson D.L, Cox M.M.(2005). Lehninger Principle of Biochemistry, W.H. freeman and Company, New York</li> <li>4. Zuley G.L., (1998). Biochemistry, Wm. C .Brown Publishers USA.</li> <li>5. Steven Ruzin, (2005). Plant Microtechnique and Microscopy. Oxford university press, London</li> <li>6. Patki L.R, Bhalchandra B.L, Jeevaji I.H.(1987). An introduction to Microtechnique, S.Chand and company (Pvt)ltd, New Delhi</li> <li>7. Marimuthu R. (2011) Microscopy and Microtechnique. MJP publishers Chennai.</li> <li>8. Wilson K, Walker, J. (1994 ). Principle and techniques of practical biochemistry, 4th ed) Cambridge university press, Cambridge</li> <li>9. Palanivelu P (2013). Analytical Biochemistry and Separation techniques , 20th century publications , Palkalai nage , Madurai</li> <li>10. Johansen, DA (1940). Plant Microtechnique, TATA McGraw Hill Book Co., Ins., New Delhi.</li> <li>11. Peter Gray (1964). Hand book of Basic Microtechnique. McGraw hill publication , New York</li> <li>12. Cooper.TG (1991). The Tools of Bio - chemistry, John Wiley &amp; sons, London</li> <li>13. Dey P.M. and Harborne, JB (2000). Plant Biochemistry Harcourt Asia Pvt. Ltd.</li> <li>14. Plummer DT (2003). An introduction to practical Biochemistry. 3rd Edn. Tata McGraw Hill publishing Company Ltd. New Delhi</li> </ol>	
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Learn the Biochemical nature of cell.</li> <li>2. Know the chemical nature of biomolecules.</li> <li>3. Describe the structure and general features of enzymes</li> <li>4. Apply the concept of enzyme activity and enzyme inhibition</li> <li>5. Trained them on electrophoresis operation.</li> </ol>	

<b>Course Code &amp; Title</b>	Practical – III - Plant Anatomy, Embryology, Plant Systematic And Economic Botany & Biochemistry and biophysics.		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>II B. Sc., Botany</b>	<b>SEMESTER – V</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K – 2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to:</b> <ol style="list-style-type: none"> <li>1. To familiarize in plant anatomical sectioning</li> <li>2. Name, classify, and diagnose several of the major families of flowering plants.</li> <li>3. Learn how to collect (including properly recording field data), identify, and process Plants for herbarium specimens</li> <li>4. Identify the various types of embryo</li> <li>5. Aconites with estimation of phytoconstituents</li> </ol>			

	<b>CONTENT</b>	
	<b><u>Plant Anatomy</u></b> <ol style="list-style-type: none"> <li>1. Micropreparation of stem, root and leaf of dicot and monocot</li> <li>2. Micropreparation of <i>Boerhavia</i> and <i>Dracaena</i></li> <li>3. Nodal anatomy (<i>Uni-Justicea</i>, <i>Tri-Azhadirechta</i> and <i>Multi-Aralea</i>).</li> <li>4. Observation of permanent slides related with meristem- simple and complex tissues.</li> </ol>	
	<b><u>Embryology</u></b> <ol style="list-style-type: none"> <li>1. T.S. of anther – <i>Datura</i></li> <li>2. Ovule types</li> <li>3. Embryo sac structure of L.S.</li> <li>4. Isolation of Dicot embryo (<i>Tridax</i> )</li> </ol>	
	<b><u>Plant systematics and Economic Botany</u></b> <ol style="list-style-type: none"> <li>1. Dissect out the floral parts of plants coming under the families prescribed in the theory syllabus. Write descriptions in technical terms, Draw diagrams of vegetative and floral parts. Draw floral diagram and write floral formula.</li> <li>2. Field study to a floristic rich area is must for a period of three days only under supervision to observe and collect the plants in their natural habitats,</li> <li>3. Submit minimum of twenty herbarium Plants with a proper field</li> </ol>	

	<p>note book with correct identification for external valuation</p> <p>4. Identify the economic products related to theory syllabus and write Botanical name, family and uses.</p>	
	<p><b><u>Biochemistry and Biophysics</u></b></p> <ol style="list-style-type: none"> <li>1. Colorimetric estimation of starch in plant tissues</li> <li>2. Colorimetric estimation of sugar in plant tissues</li> <li>3. Colorimetric estimation of proteins</li> <li>4. Measurement of pH</li> <li>5. Preparation of acetate buffer</li> <li>6. Separation of dyes by paper chromatography</li> </ol> <p>Spotters:</p> <ol style="list-style-type: none"> <li>a. Instruments: Electrodes of pH meter, pH meter, Colorimeter, Centrifuge and Chromatogram</li> <li>b. Structure of monosaccharides, disaccharides and polysaccharides prescribed in the syllabus</li> <li>c. Models and charts: Absorption spectrum of chlorophyll a and chlorophyll b, Fluorescence, Phosphorescence, Lock and key model &amp; induced fit model of enzyme action</li> </ol> <p>To maintain a record book.</p>	
Course Outcomes	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Familiar in plant systematics</li> <li>2. Students can differentiate the anatomical structures of plant cells</li> <li>3. They can identify the plants and the importance of it.</li> <li>4. They can do biochemical estimations in plant samples.</li> <li>5. Trained them operating instruments used in Biochemistry.</li> </ol>	



**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	M	M
CO2	S	S	M	S	M	M	S	M	S	S	S	S
CO3	S	M	S	M	M	S	S	S	S	M	S	S
CO4	S	S	S	M	S	M	S	S	S	S	S	M
CO5	S	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>HORTICULTURE AND PLANT BREEDING</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - V</b>	<b>5</b>	<b>5</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. This course is designed to provide knowledge on various techniques in horticulture and Gardening</li> <li>2. Identify and describe the function of the vegetative plant parts</li> <li>3. Explain the importance of horticulture and demonstrate the ability to use</li> <li>4. Provide knowledge on plant breeding.</li> <li>5. Provide knowledge on polyploidy.</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Horticulture: Scope and importance – Divisions of Horticulture – Fertilizers- Organic inorganic and Biofertilizers- Methods of irrigation system. Pest and Disease management.	
<b>II</b>	Plant propagation methods - cutting, layering, grafting, budding, stock and scion relationship, micropropagation - uses of plant growth regulators in horticulture.	
<b>III</b>	Gardening– Lawn making - Kitchen garden, Indoor garden, outdoor garden Hanging pots, baskets and Bonsai –commercial cultivation of flowers – roses and jasmines.	
<b>IV</b>	Basic principles of plant breeding-selection of characters – pollination techniques – methods of selection of superior traits-bulk and pedigree methods of selection.	
<b>V</b>	Back crossing-in breeding depression and heterosis- Induced polyploidy in plant breeding, role of auto and allopolyploidy - Paraxsexual hybridization.	

<b>Text Book</b>	<ol style="list-style-type: none"> <li>1. Bose, T.K.&amp; Mukherjee, D (1972): Gardening in India, Oxford &amp; IBH Publishing Co., Kolkatta, Mumbai, NewDelhi.</li> <li>2. Edmond Senn.&amp; Arews and Halfacre(1987): Fundamentals of Horticulture, TataMcGraw Hill book Co., Ltd. NewDelhi.</li> <li>3. Kumar.N (1977): Introduction to Horticulture, Rajalakshmi Publications, Nagercoil, India.</li> <li>4. Pratibha, P. Trivedi (1987): Home gardening, ICAR Publication, NewDelhi.</li> <li>5. Randhawa (1997): Ornamental Horticulture in India, Today &amp; Tomorrow Publishers, NewDelhi.</li> <li>6. Bhattacharjee.S.K. 2006. Amenity Horticulture, Biotechnology and Post harvest technology. Pointer publishers. Jaipur</li> <li>7. Chadha, K.L. 2001, Handbook of Horticulture, ICAR, New Delhi.</li> <li>8. Chandra, R. and M. Mishra. 2003. Micropropagation of horticultural crops. International Book Distributing Co., Lucknow.</li> <li>9. Chattopadhyaya, P.K.2001. A text book on Pomology (Fundamentals of fruit growing) Kalyani Publication, New Delhi</li> <li>10. Christopher, E.P. 2001. Introductory Horticulture, Biotech Books, New Delhi</li> </ol>
<b>References</b>	<ol style="list-style-type: none"> <li>1. Chaudhary, R.C. (1991): Introduction to Plant Breeding, Oxford IBH Publishing Co.,(P) Ltd., NewDelhi.</li> <li>2. Chopra. V.L. (1998): Plant Breeding-Theory and Practice (2<sup>nd</sup> edn.) Oxford IBH Publishing Co.,(P) Ltd., NewDelhi.</li> <li>3. Hayes, H.K., Immer, F.R.&amp; Smith, D.C.(1967): Methods of Plant Breeding, Reinholt Publications, N.Y.</li> <li>4. Singh, B.D. (1999): Plant Breeding-Principles and Methods, Kalyani Publishers.</li> </ol>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. The breadth and depth of the profession of horticulture</li> <li>2. Basic horticultural science terminology</li> <li>3. Understand the developments in plant breeding</li> <li>4. Understand the concepts of molecular breeding.</li> <li>5. Through knowledge on crossing techniques.</li> </ol>
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**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	S	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	S	M	S	M	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S	M	S
CO4	S	S	S	M	S	S	S	S	S	M	S	M
CO5	S	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>MEDICINAL BOTANY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - V</b>	<b>5</b>	<b>5</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To gain knowledge about medicinal plant, traditional value, medicinal value of plants</li> <li>2. Possess knowledge of traditional herbal system</li> <li>3. To know the integrate knowledge of raw material and formulation.</li> <li>4. Know the chemical constitution of plants.</li> <li>5. Provide knowledge on herbal formulation</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Introduction to Herbal Medicines: Herbal medicines. Definition of medical terms. Pharmacognosy- role of medicinal plants in Indian traditional medicine; cultivation - harvesting - processing - storage and utilization of medicinal plants.	15
<b>II</b>	Pharmacognosy and Medicinal uses of Herbs: Medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry (Amla) and Ashoka.	15
<b>III</b>	Pharmacognosy: Phytochemical screening tests for secondary metabolites: alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds (one example for each). Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation. Biological testing of herbal drugs.	15
<b>IV</b>	Phytochemistry of medicinal herbs: Phytochemistry–preparation of crude extracts: active principles and methods of their testing - identification and utilization of the medicinal herbs; <i>Catharanthus roseus</i> (cardiotonic), <i>Withania somnifera</i> (drugs acting on nervous	15

	system) and <i>Centella asiatica</i> (memory booster).	
V	Common medicinal preparation: decoction, ointment, tincture, surnas. Brief account on Traditional Knowledge Digital dictionary (TKDL). Guidelines of WHO on standard herbal medicine.	15
<b>Text Book</b>	1. Anne Green 2000. Principles of Ayurveda. Thomsons, London. 2. Arber A. 2000. Herbal plants and Drugs: Their Origin and Evolution. Mangal Deep Publications. Jaipur. 3. Chopra R.N., Nayar S.L. and Chopra I.C. 1956. Glossary of Indian medicinal plants. C.S.I.R. New Delhi. 4. Evans W.C. 1989. Trease and Evans Pharmacognosy (13thed.). Baillière Tindall. London.	
<b>References</b>	1. Khare C.P. 2007. Indian Medicinal Plants An Illustrated Dictionary. Springer Science+ Business Media, LLC. 2. Kokate C.K., Purohit A.P. and Gokhale S.B. 1999. Pharmacognosy. Nirali Prakashan. Pune. 3. Miller L. and Miller B. 1998. Ayurveda and Aromatherapy: The Earth Essential Guide to Ancient Wisdom and Modern Healing. Lotus Press. USA. 4. Sivarajan V.V. and Indra B. 1994. Ayurvedic drugs and their plant source. Oxford IBH - publishing Co. New Delhi..	

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. We able to demonstrate basic skills in herbal identification</li> <li>2. Demonstrate harvesting and processing of plant materials</li> <li>3. Be competent in the basic business skills necessary to build and maintain an herbal practice</li> <li>4. Be able to collaborate with other healthcare providers in partnership</li> <li>5. Skilled in medicinal preparation.</li> </ol>
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**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	S	M	S	S	M	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	M	M	S
CO4	S	S	S	M	S	M	S	S	S	M	S	M
CO5	S	S	S	S	S	M	S	S	S	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>EDIBLE MUSHROOM CULTIVATION</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - V</b>	<b>2</b>	<b>2</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To acquire the basic knowledge and develop suitable skills involved in mushroom cultivation.</li> <li>2. Provide knowledge on climatic condition for mushroom cultivation.</li> <li>3. To realize the nutritive and medicinal value of mushrooms.</li> <li>4. Make them familiar in spawn production</li> <li>5. To study the common cultivation methods for mushrooms.</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Introduction: Mushroom - importance, history of cultivation, habitat, collection, morphology and identification of edible and poisonous mushrooms.	10
<b>II</b>	Mushroom growing: Climatic condition - Choice of growing systems –, trays, material, growing in polythene bags, mushroom house, composting, pasteurization.	10
<b>III</b>	Spawn production: Strains, containers, quantity of spawn to be used, spawn cultivation, casing.	10
<b>IV</b>	Crop management: Air temperature, humidity, ventilation, air-bed ratio, watering, disposal of used compost, cropping period, insects and pests, insecticides and their use.	10
<b>V</b>	Cultivation of button, paddy straw and oyster mushrooms. Post harvesting methods- value added products of edible mushroom.	10



<b>Text Book</b>	<ol style="list-style-type: none"> <li>1. Pandey, R.K. and S.K. Ghosh. (1996): A Hand Book on Mushroom cultivation, EMKAY Publication, New Delhi.</li> <li>2. Chang,S. and Miles, P.G. 2004. Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact, CRC Press online.</li> </ol>
<b>References</b>	<ol style="list-style-type: none"> <li>1. Atkins, F.C. (1972): Mushroom growing today. Faber and Faber Ltd., London.</li> <li>2. Harmander singh, B (1983): Mushroom growing in India, Sterling publishers Pvt. Ltd. New Delhi.</li> <li>3. Purkayastha, R.P. and Chandra, A (1985): Manual of Indian edible mushrooms. Today &amp; Tomorrows printers and publishers, New Delhi</li> <li>4. Surcek,K (1988): An illustrated book of mushrooms and fungi; The octopus publishing groups, London.</li> <li>5. Reeti singh U.C. Singh, modern mushroom cultivation, Agrobios publications, India, 2005.</li> </ol>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. To highlight the potential of these studies to become an entrepreneur</li> <li>2. Knows the most important kinds of substrata for mushroom cultivation, belonging to the wastes of agricultural</li> <li>3. To prepare media for the mushroom cultivation from these wastes; -</li> <li>4. Can work with autoclaves; - can prepare microbiological media;</li> <li>5. Familiar in mushroom cultivation.</li> </ol>
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**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	S	S	S	S	M	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	M	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	M	S	S	S	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

Course Code & Title	GREEN HOUSE TECHNOLOGY		Credit	Hours
Class	III B.Sc Botany	SEMESTER - V	2	2
Cognitive Level	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
Course Objectives	<b>The course aims to</b> 1. To enable students for pursuing respectable career through Self-Employment, Executive Employment, Entrepreneurship. 2. Professional Career in the field of service sectors such as High –Tech Farming, Marketing. 3. To develop inter-twining competence in the field of Agriculture, Floriculture industries. To develop abilities in farming business. 4. Give knowledge on green house construction 5. Provide information on various disease and control measures.			

UNIT	CONTENT	No. of Hours
I	Planning and designing - Planning and Designing o Site selection, Structures and Glazing o Planning and Designing: Introduction, Basics of greenhouse design ; Bench Design Types of Green House based on shape utility construction o covering material	10
II	Structure and construction - Location, frame work for various types of green house, covering material, construction of typical glass house/poly house/ net house, construction of pipe framed greenhouse, Construction of floors and Layout,	10
III	Green House Environment- Heating : Sources of heat Cooling: Types of cooling Environmental control: Air temperature, sunlight, Carbondioxide, Relative humidity, Wind and Rain,	10
IV	Green House Media and Nutrition- Preparation of soil for planting Plant nutrition: Fertilizers, Hydroponics, Nutrient deficiencies and toxicities, Carbon dioxide Water quality Water sanitation Irrigation Methods of irrigation, irrigation.	10
Text Book	1 Prasad S and Kumar U 2003. Greenhouse management of horticultural crops. 2. Bose, T.K. 1999. Floriculture and Landscaping. Naya Prakash, Kolkata. 3. Bose, T.K. and Som, T. K. 1986. Vegetable Crops in India. Naya Prakash, Kolkata.	

	<p>4. Bose, T.K. and Yadav, L.P. 1992. Commercial Flowers. Naya Prakash, Kolkata.</p> <p>5. Randhawa, G.S. and Mukhopadhyaya, A. 1994. Floriculture in India. Allied Publishers Pvt.Ltd. New Delhi</p>
<b>References</b>	<p>1. Thompson, I.C.C. and Kelley, W.C. 1957. Vegetables. Tata McGraw-Hill, Publishing Co.Ltd. Mumbai.</p> <p>2. Prasad S and Kumar U 2003. Commercial Floriculture. Agrobios.</p> <p>3. Prasad S and Kumar U 2003. Greenhouse management of horticultural crops. 2nd ed. Agrobios.</p> <p>4. Principles of drip irrigation system, Dr. M.S. Mane, B.L.Ayare, Dr. S.S.Magar., New Delhi</p> <p>5. Principles of sprinkler irrigation, Dr. M.S. Mane, Dr.B.L.Ayare. Jain Bros., New Delhi</p>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. At the end of the course students should know identify the types and structures of existing greenhouse.</li> <li>2. Learned about how to construct green house</li> <li>3. In addition, students will learn the different systems for climate control in greenhouse and their management, cooling and heating systems.</li> <li>4. Finally, students will be familiar with the techniques of light management</li> <li>5. Students trained on disease and pest management.</li> </ol>
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**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	M	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	M	S	S	M	S	S	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

## SEMESTER - VI

<b>Course Code &amp; Title</b>	<b>PLANT PHYSIOLOGY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - VI</b>	<b>6</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To understand the various physical forces involved in the absorption of water and minerals</li> <li>2. To acquire knowledge on the various metabolic pathways by which plants prepare Their food</li> <li>3. To learn about the mechanism of oxidation of food and utilization of energy in plants</li> <li>4. To study the physiological aspects of flowering</li> <li>5. To study the plant movements.</li> </ol>			

UNIT	CONTENT	No. of Hours
I	Absorption of water – imbibition, diffusion, osmosis, plasmolysis. Mechanism of water absorption – active and passive. Ascent of sap – path of ascent of sap, mechanism of ascent of sap. Transpiration -Types-stomatal, cuticular and lenticular. Mechanism of stomatal movement,. Factors affecting transpiration. Guttation	15
II	Mineral nutrition – Macro (N,P,K &Mg) and micro( Bo,Cu &Zn) its physiological role and its deficiency symptoms. Hydroponics, and Aeroponics. Photosynthesis- Light reaction – two photosystems, cyclic and non-cyclic. Dark reaction – C3 cycle and C4 cycle- CAM- Photorespiration	15
III	Respiration – types of respiration – aerobic and anaerobic, site of respiration, respiratory substrates. Mechanism of respiration – Glycolysis, Kreb’s cycle, Electron transport and oxidative phosphorylation. Nitrogen fixation – symbiotic and asymbiotic (brief)	15
IV	Physiology of flowering – photoperiodism , Flowering hormone, Phytochrome. Vernalization. Plant growth hormones – physiological effects of auxins, gibberellins, cytokinins and ethylene.Seed dormancy – Factors affecting seed dormancy. Methods of breaking	15

	seed dormancy.	
<b>V</b>	Plant movements: Autonomic – ciliary, amoeboid, cyclosis Paratonic – phototaxis, chemotaxis, thermotaxis and thigmotaxis. Tropic movements – phototropism, geotropism, hydrotropism, thigmotropism. Movement of Curvature – nutation and nastic movement (nyctinastic, seismonastic, thigmonastic)	15
<b>Text Books</b>	1. Plant physiology –S.N. Pandey and B.K. Sinha Vikas Publishing house 1999 2. Plant physiology-Subash chandra dutta , New Age International (P) Limited,Publishers; First edition (2007) 3. Text Book of Plant Physiology – S.K.Verma S.Chand and company,New Delhi, 2003	

<b>References</b>	1. Modern Plant physiology –R.K. Sinha Narosa Publishing house New Delhi, 2004. 2. Plant Physiology –Devlin and Witham, CBS Publishers and Distributors, 1999 3. Plant Physiology – Salisbury and Ross CBS Publishers and distributors ,Delhi 1995
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <ol style="list-style-type: none"> <li>1. To understand plant physiological processes and metabolism.</li> <li>2. To explain the role of micro nutrients in plant growth and development.</li> <li>3. To relate photosynthesis with the formation of primary and secondary metabolites.</li> <li>4. To clarify the mechanism and breaking of dormancy.</li> <li>5. Familiarized on plant movements</li> </ol>

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	S
CO2	S	S	S	S	M	M	S	M	S	S	S	S
CO3	S	S	S	M	M	S	S	S	S	M	M	S
CO4	S	M	S	M	S	M	S	S	S	M	S	M
CO5	S	S	M	S	S	S	M	S	S	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark



<b>Course Code &amp; Title</b>	<b>PLANT BIOTECHNOLOGY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - VI</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. To develop the plant tissue culture skills.</li> <li>2. To develop fundamental knowledge and skills in various aspects of Genetic engineering.</li> <li>3. To exposed to the economic importance and current research paradigms in various categories of commercially cultivated plants.</li> <li>4. To skill them on applications in basic and applied research</li> <li>5. Trained them on molecular markers.</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Introduction - Scope and Concepts of plant tissue culture. Media preparation – M.S , white, Nitch and Gamborgs medium) phytohormones – Totipotency. Preparation of explants- Types of culture: callus, suspension and Meristem. Somoclonal variation. Hardeining.	15
<b>II</b>	Gene transfer in plants: -Direct ( <i>Agrobacterium</i> mediated) and indirect gene transfer methods Biolistics – Electrophoration, lipofection , Microinjection. Vector mediated gene transfer in higher plants – <i>Agrobacterium</i> mediated gene transfer – T DNA, structure of Ti Plasmid and Ri plasmid derived vector system. Synseed.	15
<b>III</b>	Plant genetic Engineering: Golden rice and Bt cotton. Transgenic crops - Disease, herbicide, pest, virus, fungal and bacterial resistance and stress tolerance ( Biotic and Abiotic).	15
<b>IV</b>	Plant as Bioreactors. Secondary metabolites, Edible vaccine, plantibodies, therapeutic proteins. Terminator seed technology- antisense RNA (flavr savr)–enhancement of shelf life of flowers and fruits.	15
<b>V</b>	Molecular marker –RFLP and RAPD in plant breeding – DNA finger printing and Bar coding of plants	15

<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Dubey, RC (2004) A text book of Biotechnology”3rd Edition , S.Chand &amp; Company Ltd, New Delhi.</li> <li>2. Gupta, PK.(2004).Elements of Biotechnology”,I st edition Rastogi publications – Meerut</li> <li>3. Purohit, SS.(2005), Biotechnology Fundamentals &amp; Applications” 3rd Edition. Mrs. Saraswathi Purohit for student Edition, India.</li> <li>4. Razdan, MK (2008) Introduction to plant tissue culture” ,2nd edition Oxford &amp; IBH publishing Co. Pvt. Ltd., New Delhi.</li> <li>5. Clark D.P. and Pazdernik N.J. 2009. Biotechnology- Applying the Genetic Revolution. Elsevier Academic Press. USA.</li> <li>6. Das H.K. 2010.Textbook of Biotechnology (4thed.). Wiley India Pvt Ltd. New Delhi.</li> <li>7. Desmond S.T. Nicholl. 2010. An Introduction to Genetic Engineering. Cambridge University Press. New Delhi.</li> </ol>	

<b>References</b>	<ol style="list-style-type: none"> <li>1. Brown TA (2006) gene cloning and DNA analysis ; Blackwell scientific publishers</li> <li>2. Prime rose SB, Twyman RM &amp; old RW (2001) .principle of gene manipulation; an Introduction to genetic engineering. 6th Ed Blackwell oxford</li> <li>3. Wilson K &amp; walker J (2008) principle and techniques of Biochemistry and molecular Biology Cambridge university Press.</li> <li>4. Smith JE(2005) Biotechnology , Cambridge university press, UK.</li> </ol>
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Concepts, tools and techniques related to in vitro propagation of plants.</li> <li>2. Different methods used for genetic transformation of plants, use of Agrobacterium as a vector for plant transformation, components of a binary vector system.</li> <li>3. Various case studies related to basic and applied research in plant sciences using transgenic technology.</li> <li>4. Learn about bioreactors and their importance.</li> <li>5. Familiar in molecular markers</li> </ol>

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	M	M	S
CO4	S	S	S	M	S	M	S	S	S	M	S	M
CO5	S	M	S	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>PRACTICAL –IV ,PLANT PHYSIOLOGY AND PLANT BIOTECHNOLOGY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>II B. Sc., Botany</b>	<b>SEMESTER – VI</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K – 2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to:</b> <ol style="list-style-type: none"> <li>1. Learn some common methods and techniques used in plant physiology</li> <li>2. Make the student familiar in practical aspects</li> <li>3. Familiar in DNA isolation</li> <li>4. Aconite with media preparation</li> <li>5. Give knowledge on microbes and their impact.</li> </ol>			

	<b>CONTENT</b>	
	<p><b><u>Plant Physiology:</u></b></p> <ol style="list-style-type: none"> <li>1. Demonstration of osmosis by potato osmoscope.</li> <li>2. Demonstration of water potential by gravimetric method.</li> <li>3. Demonstration of water potential by falling drop method.</li> <li>4. Effect of CO<sub>2</sub> concentration on photosynthesis.</li> <li>5. Determination of stomatal index.</li> <li>6. Rate of Photosynthesis – Test tube Funnel method</li> <li>7. Demo- Ganong’s Light screen</li> <li>8. Demo -Mohl’s half leaf experiment.</li> </ol>	
	<p><b><u>Plant Biotechnology</u></b></p> <ol style="list-style-type: none"> <li>1. Isolation of genomic DNA from Onion</li> <li>2. Demonstration of wine fermentation – estimation of ethanol</li> <li>3. Yeast biomass estimation by turbidity method</li> <li>4. Cell counting using haemocytometer</li> <li>5. Antibiotic disc diffusion using cultures of <i>Penicillium</i> and actinomycetes</li> <li>6. Amylase production using fungi (Plate assay)</li> <li>7. M.S. Media preparation – Demo.</li> </ol>	
Course Outcomes	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Got knowledge on mechanism of plant physiology.</li> <li>2. Understand the fundamentals of Recombinant DNA Technology.</li> <li>3. Know about the Genetic Engineering.</li> <li>4. Trained in isolation of DNA</li> <li>5. Understand the principle and basic protocols for Plant Tissue Culture.</li> </ol>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	S	S	M	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	M	S	S
CO3	S	S	M	S	S	S	S	S	S	M	M	S
CO4	S	M	S	M	S	M	S	S	M	S	S	M
CO5	S	S	S	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>PLANT ECOLOGY AND PHYTOGEOGRAPHY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - VI</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. Study about distribution and abundance of plants and their interactions among plant species.</li> <li>2. Explain the various biotic and abiotic forces acting on plants in their natural environment.</li> <li>3. Students will train on vegetation</li> <li>4. Give knowledge on pollution and control measures</li> <li>5. Determine the importance of these forces under varying conditions,</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	<b>General Ecology - Autecology, Synecology-Definition, community composition, Raunkier's biological spectrum. Plant environment-climatic, edaphic and biotic factors (Effects of grazing and browsing by animals, Effects of human activities on vegetation).</b>	15
<b>II</b>	<b>Ecosystem: Definition, structure of Ecosystem, components of ecosystem, Function of Ecosystem. Energy and its flow in Ecosystem (grassland). Food chain, Food web, Ecological pyramid.</b>	15
<b>III</b>	<b>Vegetation – Units of vegetation- formation, association, fasciations, Consociation, Migration, ecesis, Colonization methods of study of vegetation-species area curve, line transect. General trends of succession- migration, colonization. Hydrosere &amp; Xerosere. Morphological and anatomical features of plants and their correlation to the habitat factors.</b>	15

<b>IV</b>	Pollution and its control- Air Pollution: Causes of Air pollution-suspended particulate matter, Acid rain, Radiation pollution, Noise pollution, Thermal pollution-Soil Pollution: Industrial effluents, agricultural pollution, plant residues, insecticides, pesticides, fungicides, herbicides. Biological treatment of wastes and pollutants- solid waste disposal treatment of liquid waste.	15
<b>V</b>	Introduction to Phytogeography - Climate of India and its climatic zones, Botanical regions of India-Vegetation types of Tamil Nadu, Evergreen, Deciduous, shrub & Mangrove. Endemism & Endemics.	15
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Dasha, M.C. 1993. Fundamentals of ecology, Tata McGraw Hill.</li> <li>2. Kumar, H.D. 1997. General Ecology Vikas Publishing House Pvt. Ltd Delhi</li> <li>3. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. th 8 edition. 3.</li> </ol>	

<b>References</b>	<ol style="list-style-type: none"> <li>1. Garg, M.R. V.K. Bansal &amp; N.S. Tiwana. 1997. Environmental pollution and protection. Deep &amp; Deep publications, New Delhi.</li> <li>2. Krishnan Kannan. 1997. Fundamental of Environmental Pollution. S.Chand &amp; Company Ltd. Ram Nagar, New Delhi.</li> <li>3. Shukla R.S. and P.S Chandel. 2000. Plant ecology and soil science. S.Chand &amp; Company Ltd. Ram Nagar New Delhi.</li> <li>4. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A</li> <li>5. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford &amp; IBH Pvt. Ltd., New Delhi. 3rd edition.</li> </ol>
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. To understand ecological relationships between organisms and their environment.</li> <li>2. To identify diversity of life forms in an ecosystem.</li> <li>3. Try to identify different ecological units found around your habitat and prepare a list of flora and fauna of that ecological system.</li> <li>4. Familiar in impact and control measures of pollution</li> <li>5. Got knowledge on phytogeography</li> </ol>



**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	S	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	M	S	S	S	M	S	M	S	M	S	M
CO5	S	S	M	S	M	M	S	S	M	S	S	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>FLORICULTURE</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - VI</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. Gain knowledge of design principles and elements, flower/plant identification, t</li> <li>2. Construction of symmetrical floral arrangements with fresh and dried materials and basic corsage construction.</li> <li>3. Describe the carrier opportunities in industries Explain the importance of Texture in Floral Design</li> <li>4. Give knowledge on commercial floriculture.</li> <li>5. Develops skills on floral arrangements.</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Introduction: History of gardening; Importance and scope of floriculture and landscape gardening.	15
<b>II</b>	Nursery Management and Routine Garden Operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators.	15
<b>III</b>	Ornamental Plants: Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening;	15
<b>IV</b>	Commercial Floriculture: Bonsai. Garden Designs: English, Italian, French, Persian, Mughal and Japanese gardens. Factors affecting flower production; Production and packaging of cut flowers.	15

<b>V</b>	Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Liliium, Orchids). Diseases and Pests of Ornamental Plants.	15
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.</li> <li>2. Kumaresan,V. 2009. Horticulture, Saras Publication, Nagercoil. Randhawa., G.S. 1973.</li> <li>3. Bose, T.K. 1999. Floriculture and Landscaping. Naya Prakash, Kolkata.</li> <li>4. Bose, T.K. and Som, T. K. 1986. Vegetable Crops in India. Naya Prakash, Kolkata.</li> </ol>	

<b>References</b>	<ol style="list-style-type: none"> <li>1. Ornamental Horticulture in India.Today and Tomorrow Printers andPublishers, New Delhi.</li> <li>2. Vishnu Swarap. 1997. Garden flowers. National Book Trust, India.</li> <li>3. Principles of sprinkler irrigation, Dr. M.S. Mane, Dr.B.L.Ayare. Jain Bros., New Delhi</li> </ol>	
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Relate the importance of the floriculture industry</li> <li>2. Describe career opportunities in the floriculture industry</li> <li>3. Explain the techniques in grading, bunching and shipping cut flowers in preparation for market</li> <li>4. Knowledge on commercial floriculture.</li> <li>5. Trained in floral arrangements.</li> </ol>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	S	S	S	M	M	S	M	S	M	S	S
CO3	S	S	M	S	M	S	M	S	S	S	M	S
CO4	S	M	S	S	S	M	S	M	S	M	S	M
CO5	S	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>BIOINFORMATICS AND BIOSTATISTICS</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - VI</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. The course will help the students to understand the concepts of Bioinformatics.</li> <li>2. To learn the fundamentals of bioinformatics and tools available.</li> <li>3. To introduce applications of computational biology in diverse areas of biological sciences Outcome</li> <li>4. Give knowledge on biostatistics</li> <li>5. Learn Measures of dispersion</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Databases in Bioinformatics: Introduction, Biological Databases, Classification format of Biological Databases, Biological Database Retrieval System.	15
<b>II</b>	Biological Sequence Databases, alignment and phylogeny: National Center for Biotechnology Information (NCBI): Tools and Databases of NCBI, Database Retrieval Tool, Sequence Submission to NCBI, Basic local alignment search tool (BLAST), Nucleotide Database, Protein Database, Gene Expression Database. Concept of Alignment, Multiple Sequence Alignment (MSA), MSA by CLUSTALW. Methods of Phylogeny, Software for Phylogenetic Analyses.	15
<b>III</b>	Applications of Bioinformatics: Structural Bioinformatics in Drug Discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design, Microbial genome applications, Crop improvement. Biostatistics	15
<b>IV</b>	Biostatistics – Statistics data, population, samples, parameters; Representation of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median	15
<b>V</b>	Measures of dispersion: Range, mean deviation, variation, standard deviation; Chi-square test for goodness of fit.	15

<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.</li> <li>2. Khan, I.A., and Khannum, A., (1994). Fundamentals of Biostatistics, Vikas Pub., Hyderabad</li> <li>3. Sundar Rao P.S.S and Richard J(2011) introduction to Biostatistics and research methods , PHI learning private Ltd., New delhi</li> </ol>
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<b>References</b>	<ol style="list-style-type: none"> <li>1. Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. WileyBlackwell.</li> <li>2. Campbell A. M., Heyer L. J. (2006) Discovering Genomics, Proteomics and Bioinformatics. II Edition. Benjamin Cummings. Bioinformatics. II Edition. Benjamin Cummings.</li> <li>3. Zar, JH (1984). Biostatistics Analysis, Prentice Hall International, England Cliffs, New Jersey.</li> <li>4. Palanivelu P (2013). Analytical Biochemistry and Separation techniques, 20th century publications ,Palkalai nagar ,Madurai.</li> </ol>
<b>Course Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will learn necessary skills in the use of databases and online tools related to biological data.</li> <li>2. Students will learn about the handling and analysis of databases using online tools.</li> <li>3. Students will be trained in statistical concepts and principles relevant to biological data and their applications</li> <li>4. Students trained on biostatistics</li> <li>5. Students will learn about goodness of fit</li> </ol>

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	S	S	S	M	M	S	S	M	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S	M	S
CO4	S	S	S	S	S	S	S	S	S	M	S	M
CO5	S	S	M	S	S	M	S	S	M	S	S	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>SEED SCIENCE TECHNOLOGY</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - VI</b>	<b>5</b>	<b>6</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K –5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. The course is focused in training students with knowledge of seed health, seed storage, seed certification techniques and regulation</li> <li>2. To refresh the basic knowledge of seed development and structures</li> <li>3. Apprise students with its relevance to production of quality seed.</li> <li>4. Give knowledge on seed production techniques.</li> <li>5. Aconites with seed certification techniques</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Floral biology. Seed formation. Seed morphology and structural details of Dicot (Castor) and Monocot (Paddy) seeds. Roles and goals of seed technology, importance of quality seeds in agriculture, characteristics of quality seed.	15
<b>II</b>	Seed sampling – Method of sampling – Seed Purity – Seed Germination – Methods of Seed Germination using paper, Sand or soil – Standard Germination Test. Seed dormancy.	15
<b>III</b>	Seed viability – Topographical tetrazolium or T2 test embryo excision method. Seed moisture Importance – methods of moisture determination basic methods.	15
<b>IV</b>	Certified seed production of the following : Paddy, groundnut, and cotton.	15
<b>V</b>	Seed certification – objectives – fundamental concepts of seed certification – sources and classes of seed: Breeder's seed, certified seed. Seed analysis – Tagging of seedlings – field standards.	15



<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Bhojwani SS &amp; Bhatnagar SP. 1999. The Embryology of Angiosperm. Vikas Publ.</li> <li>2. Chhabra AK. 2006. Practical Manual of Floral Biology of Crop Plants.</li> <li>3. Agarwal, R.L. Seed Technology Oxford and IBH Publishing Co. Pvt. Ltd.,</li> <li>4. Bewley J.D. and Black M (Edn) 1985 – Seed Physiology of development and germination, Plenum Press, New York.</li> <li>5. Kowslowsky. Seed Biology, Vol. I, Vol. II and Vol. III. Academic Press, New York.</li> </ol>
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<b>References</b>	<ol style="list-style-type: none"> <li>1. Black M, Bewley D &amp; Halmer P. 2006. The Encyclopedia of Seeds: Science, Technology and Uses. CABI.</li> <li>2. Copeland LO &amp; McDonald MB. 2001. Principles of Seed Science and Technology. 4th Ed. Chapman &amp; Hall.</li> </ol>
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Student will have better understanding of seed physiology and vigour.</li> <li>2. The course knowledge will create trained human resource for seed industry and research organizations.</li> <li>3. Knowledge on current varieties of field crops, consultant services</li> <li>4. Knowledge on seed production</li> <li>5. To acquire knowledge on seed legislation and trading</li> </ol>

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	S	S	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	S	S	M	S	S	S	M	M	S
CO4	S	S	S	M	S	M	S	S	S	S	S	M
CO5	S	S	M	S	M	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>NURSERY AND GARDENING</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - VI</b>	<b>2</b>	<b>0</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. Develop an understanding of nursery business management (financial, marketing, personnel.</li> <li>2. Develop skills necessary to manage a wholesale nursery.</li> <li>3. Acquire knowledge regarding theory and practice of cultural and production techniques and methods.</li> <li>4. Make them familiar in gardening techniques</li> <li>5. Develop skills in storage and marketing procedures.</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.	
<b>II</b>	Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion – Seed production technology - seed testing and certification. (6 Lectures)	
<b>III</b>	Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants – green house - mist chamber, shed root, shade house and glass house. (6Lectures)	
<b>IV</b>	Gardening: definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of	

	pests and diseases and harvesting	
<b>V</b>	Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures.	
<b>Text Books</b>	1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi. 2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras. 3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.	

<b>References</b>	1. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi. 2. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi. 3. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <ol style="list-style-type: none"> <li>1. Provide the necessary technical plant science</li> <li>2. Horticultural knowledge and skills to successfully operate a small horticulture business.</li> <li>3. Prepare students for transfer to plant science / horticulture programs at institutions of higher learning</li> <li>4. Basic and advanced plant science / horticultural skills development and improvement</li> <li>5. Make the students familiar in marketing procedures.</li> </ol>

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	M	M	S	S	S	S	M	S	S	M
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	M	S	M	S	S	S	M	S	M
CO5	S	S	M	S	S	M	S	S	M	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>ALLIED BOTANY - I</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - I</b>	<b>4</b>	<b>4</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. Comprehend the morphological characters of plants</li> <li>2. Identify the various flowering plants</li> <li>3. Understand the basic structure of the plant cell.</li> <li>4. Study the internal structure of stem and root</li> <li>5. Know the concept of plant ecology</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	<b>Morphology:</b> Phyllotaxy - types, significance; Inflorescence - characteristic features, types (racemose, cymose, special types).	15
<b>II</b>	<b>Taxonomy:</b> Binomial nomenclature – Bentham & Hooker’s system of classification. Study of the following families and their economic importance. Annonaceae, Rutaceae, Papilionaceae, Caesalpinaceae, Mimosae, Rubiaceae, Apocyanaceae and Lamiaceae.	15
<b>III</b>	<b>Cytology:</b> Ultra structure of plant cell and brief outline of the following cell organelles. Cell wall, plasma membrane, endoplasmic reticulum, mitochondria, chloroplast, nucleus, cell division: mitosis and meiosis - significances. <b>Genetics:</b> Mendel’s law. Mono and dihybrid experiments. Incomplete dominance.	15

IV	<p><b>Anatomy:</b> Simple permanent tissues (parenchyma, collenchyma, sclerenchyma); complex permanent tissues (xylem, phloem). Primary structure of stem and root in dicot and monocot plants. Secondary thickening in dicot stem (normal).</p> <p><b>Embryology:</b> Structure and development of anther and male gametophyte; structure and types of ovule; development of female gametophyte - Polygonum type of embryo sac. Endosperm - types.</p>	15
V	<p><b>Ecology:</b> Plant habitat: Factors influencing plant growth (Climatic, edaphic and biotic factors).</p> <p>Morphological, anatomical and physiological adaptations of xerophytes (Nerium); mesophytes (Hibiscus) and hydrophytes (Hydrilla).</p>	15
<b>Text Books</b>	<p>1. Pandey, B.P. College Botany. S.Chand and Co. New Delhi. Vol. I.2015.</p> <p>Ganguly, A.K. General Botany. The New Book Stall. Calcutta. Vol. I and II. 1971.</p>	

<b>References</b>	<ol style="list-style-type: none"> <li>1. Rao, K.N. K. Krishnamoorthy and G.S. Rao. Ancillary Botany. S. Chand and Co. New Delhi. 1979</li> <li>2. Gunguly, A.K.,Dass &amp; Datta. New central book publishers, Calcutta.1990.</li> <li>3. Verma, V. A text book of Economic Botany. Emkay Publications, New Delhi, 1980.</li> <li>4. Mathawat, G.S., Sharma,P.D and Sahni,R.K . A text book of Botany, Ramesh Book depot, Jaipur. 1996.</li> <li>5. Pandey, B.P. Taxonomy of Angiosperms. S.Chand and Co. New Delhi. 2009.</li> </ol>
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Explain the arrangement of leaves and inflorescences in the plant kingdom.</li> <li>2. Construct floral diagram and floral formula for the selected plant species.</li> <li>3. Predict the structural and functional details of cell organelles and their properties.</li> <li>4. Demonstrate the Mendelian principles with cheker board.</li> <li>5. Illustrate the elements of conducting system in plants.</li> </ol>

<b>Course Code &amp; Title</b>	<b>ALLIED BOTANY - II</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>III B.Sc Botany</b>	<b>SEMESTER - I</b>	<b>4</b>	<b>4</b>
<b>Cognitive Level</b>	K –1(Acquire) K –2(Understanding) K – 3(Apply) K –4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	<b>The course aims to</b> <ol style="list-style-type: none"> <li>1. Understand the characters and life cycle of algae</li> <li>2. Know about the various forms of fungi, bacteria and their importance</li> <li>3. Outline the characters of bryophytes, pteridophytes and gymnosperms.</li> <li>4. Illustrate the principle and the mechanism of absorption of water by plants</li> <li>5. Explain the process of photosynthesis</li> </ol>			

<b>UNIT</b>	<b>CONTENT</b>	<b>No. of Hours</b>
<b>I</b>	<b>Thallophytes:</b> Algae: General characters, study of the structure and life history of the following genera; <i>Oscillatoria</i> , <i>Oedogonium</i> , <i>Chara</i> , <i>Polysiphonia</i> .	15
<b>II</b>	Fungi: General characters, study of the structure and life history of the following genera; <i>Penicillium</i> , <i>Yeast</i> , <i>Polyporus</i> . Elementary knowledge of bacteria (shape, structure, nutrition, reproduction and economic importance) and virus (TMV structure, transmission and life cycle).	15
<b>III</b>	<b>Bryophytes, Pteridophytes and Gymnosperms:</b> Study of the structure and reproduction of <i>Funaria</i> , Study of the structure and reproduction of <i>Lycopodium</i> , Study of the structure and reproduction of <i>Cycas</i> .	15
<b>IV</b>	<b>Plant physiology:</b> Absorption of water and salts, Role of mineral elements (Macro and micro) in plant growth, deficiency symptoms. Transpiration - mechanism and factors affecting transpiration, growth hormones: Role in agriculture.	15



<b>V</b>	Photosynthesis: Path of carbon: Light (cyclic and non cyclic photophosphorylation) and dark reactions. Respiration: Glycolysis and Krebs's cycle. Nitrogen cycle, Biological nitrogen fixation (Rhizobium)	15
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Vashishta, B.R and Sinha, A.K. Botany for Degree Students. S. Chand and Co. New Delhi. 2003.</li> <li>2. Pandey, B.P. College Botany. S. Chand and Co. New Delhi. Volume III. 2015.</li> </ol>	

<b>References</b>	<ol style="list-style-type: none"> <li>1. Rajan.S and Selvi Christy,R. Essentials of Microbiology, Anjanaa Book House, Chennai. 2016.</li> <li>2. Devlin.L and Witham,H. Plant physiology, 4<sup>th</sup> Edition, CBS Publishers, New Delhi.2014.</li> <li>3. Rao, K.N. K. Krishnamoorthy and G.S. Rao. Ancillary Botany. S. Chand and Co. New Delhi. 1979</li> <li>4. Ganguly, A.K. General Botany. The New Book Stall. Calcutta. Vol. I and II. 1971.</li> <li>5. Verma, V. A text book of Economic Botany. Emkay Publications, New Delhi, 1980.</li> </ol>	
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <ol style="list-style-type: none"> <li>1. Describe the structure and reproduction methods of algae.</li> <li>2. Demonstrate the methods of reproduction and life cycle of fungi.</li> <li>3. Classify the bacteria and viruses based on their structure.</li> <li>4. Compare and contrast the structure and methods of reproduction of Funaria, Lycopodium and Cycas.</li> <li>5. Explain the concept of absorption of water and salts.</li> </ol>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	S	S	M	S	S	S	S	M	S	S	S
CO2	S	M	S	S	M	M	S	M	S	S	S	S
CO3	S	M	S	S	M	S	S	S	S	M	M	S
CO4	S	M	S	S	S	M	S	S	S	M	S	S
CO5	S	S	M	S	S	M	S	S	S	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark

<b>Course Code &amp; Title</b>	<b>ALLIED PRACTICAL I &amp; II</b>		<b>Credit</b>	<b>Hours</b>
<b>Class</b>	<b>B.Sc., Botany</b>	<b>SEMESTER – I &amp; II</b>	<b>4</b>	<b>4</b>
<b>Cognitive Level</b>	K –1(Acquire) K – 2(Understanding) K – 3(Apply) K – 4(Evaluate) K – 5(Analyze)			
<b>Course Objectives</b>	1. Microscopic observation and identification of algae, fungi, bryophytes, lichens, pteridophytes and gymnosperm 2. Observation of crop plants infected by the pathogens included in the syllabus and study of symptoms, causative agents and etiology. 3. Trained students to prepare micropreparation and showing the stages of mitosis (Onion root tips) and showing permanent slides/photographs of mitosis and meiosis 4 Trained the students in taking anatomical sectioning of specimen. 5. Trained the students to differentiate lower plants to identify both morphological and anatomical			

	CONTENT	No. of Hours
1	<b>Description of the following families:</b> <ol style="list-style-type: none"> <li>1. Annonaceae</li> <li>2. Rutaceae</li> <li>3. Papilionaceae</li> <li>4. Caesalpinaceae</li> <li>5. Mimosae</li> <li>6. Rubiaceae</li> <li>7. Apocyanaceae and</li> <li>8. Lamiaceae</li> </ol>	
2	<b>Anatomical sectioning of the following specimens:</b> <ol style="list-style-type: none"> <li>1. Dicot stem (T.S)</li> <li>2. Monocot stem (T.S)</li> <li>3. Dicot root (T.S)</li> <li>4. Lycopodium stem (T.S)</li> <li>5. Cycas leaf let (T.S)</li> </ol>	
3.	<b>Spotters:</b> <ol style="list-style-type: none"> <li>1. Oscillatoria</li> <li>2. Oedeogonium nannandrium</li> <li>3. Polysiphonia cystocarp</li> <li>4. Polysiphonia tetrasporophyte</li> <li>5. Penicillium</li> <li>6. Polyporous basidiocarp</li> <li>7. Polyporous basidiocarp T.S</li> <li>8. Funaria antheridial head L.S</li> <li>9. Funaria archegonial head L.S</li> <li>10. Funaria Capsule L.S</li> <li>11. Cycas male cone</li> <li>12. Cycas megasporophyll</li> <li>13. Cycas ovule L.S</li> <li>14. Chloroplast</li> <li>15. Mitochondria</li> <li>16. Nucleus</li> <li>17. Endoplasmic reticulum</li> <li>18. Osmosis (Thistle funnel experiment)</li> <li>19. Photosynthesis (Test tube funnel experiment)</li> <li>20. Photosynthesis (Ganong's light screen experiment)</li> </ol>	

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <ol style="list-style-type: none"> <li>1. Create and manipulate table of information Familiarize with the external and internal structure of lower group organism</li> <li>2. Learn the microscopic technique</li> <li>3. Learn the survey techniques for evaluating the values of medicinal plants</li> <li>4. Know about the cellular drawing</li> <li>5. Gain knowledge on plant pathological diseases</li> </ol>	

**Mapping of COs with PSOs & POs:**

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
<b>CO1</b>	S	S	S	M	S	M	S	S	M	S	S	M
<b>CO2</b>	S	S	S	S	M	M	S	M	S	S	S	M
<b>CO3</b>	S	S	S	S	M	S	S	S	S	M	M	S
<b>CO4</b>	S	M	S	M	S	M	S	S	S	M	S	M
<b>CO5</b>	S	S	M	S	S	M	S	S	S	S	M	S

Strongly correlating (S) - 3 Marks

Moderately correlating (M) - 2marks

Weakly correlating (W) - 1mark

No Correlating (N) - 0 mark