

# **SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN**

(Autonomous)

Madurai - 625 002.



DEPARTMENT OF BOTANY

**Syllabus - B.Sc. Botany**

**June 2019 Onwards**

**SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A),**

**MADURAI-2.**

**DEPARTMENT OF BOTANY**

**B.Sc. SYLLABUS (Academic year 2019-2020 onwards)**

**DEPARTMENT NAME: BOTANY**

**PROFILE OF THE DEPARTMENT**

There was a humble beginning of Botany department with only Ancillary subject. It was the intention of the then Botanical faculty that a knowledge of plant science be necessarily infused in the minds of students. There by everyone understood what is what about Botany. Later on in the year 1995 this department was slightly expanded with the introduction of a specific branch of Biology particularly Botany, Environmental Biology. As this part did not satisfy the needs of students for their furthering up, the faculty members decided to introduce the full fledged subject Botany as major in the academic 2008 – 2009 which paved good avenue to the students to go in search of pastures that led to award of Bachelor degree. Considering the welfare of the students who are mostly hailing from poor back ground, decision to introduce post graduate degree course in the subject Botany in the academic year 2013 – 2014 that facilitated in the long run for a good classroom for own indigenious degree students.

**COURSES OFFERED :**

**UG COURSES : BOTANY**

**PG COURSES : BOTANY**

**ELIBGIBLITY CRITERIA : As per DCE norms**

## **VISION**

### **Vision of the Department:**

**“Marching towards perfection and excellence”**

## **MISSION**

### **Mission of the Department:**

- To provide high quality education and research relevant to local, regional and national needs.
  
- Intellectual freedom and critical research opportunities in order to become first choice students and researchers.
  
- Botanical innovations for biosphere protection and human excellence.
  
- To discover and convey scientific knowledge about the biology of plants and promote awareness and appreciation of the diverse and vibrant field of Botany

## **Programme outcomes**

### **At the end of the Programme students will be able to**

1. Gain a comprehensive understanding of Plant Diversity for nurturing nature.
2. Understand the functioning of plants at cell, tissue, gene and molecular level.
3. Identify the major groups of plants and trace them systematically.
4. Understand and appreciate, the plants as Bio resources for economic gain.
5. Appreciate the aesthetic and market value of plants.
6. Explicate the ecological interconnectedness of life on earth, *insitu* and *exsitu* conservation.
7. Acquire experimental skill, gain knowledge in modern tools, enhance analytical, statistical and biological skills in the field of Research.

## **Programme specific outcomes**

### **On completion of programme students will be able to**

1. Recall details and basic information about the various branches of Botany and understand the basic concepts
2. Perform Experiments in the lab and field.
3. Gain thorough knowledge about various primitive to highly evolved plants.
4. Create platform for higher studies in Botany.
5. Analyze importance of plants and apply in various fields. Students can generate data, Test hypothesis, make observations, collect data, analyze, interpret and evaluate the results.
6. Design solution for Health problem through medicinally important plants and Phyto chemical analysis.
7. Analyze the consequences of Environmental related problems and find a solution.

<b>SEMESTER</b>	<b>CREDITS</b>
I	20
II	24
III	16+1*
IV	24
V	23
VI	32
Total	140

\*Extension activities

SEM	PART	SUBJECT	TITLE OF THE PAPER	CODE	HRS	CDTS
<b>I</b>	I	Tamil		1A1	6	3
	II	English		2A1	6	3
	III	Major – Botany	Paper I: Algae And Bryophytes	B11	5	5
			Paper II: Fungi, Lichens And Plant Pathology	B12	5	5
	III	Ancillary	Environmental Biology-Theory  Paper -1 Introduction To Ecobiology  Practical Paper – I	AH1   HPA	4   3	4   -
IV		Value Education	AV1	1	-	

SEM	PART	SUBJECT	TITLE OF THE PAPER	CODE	HRS	CDTS
II	I	Tamil		1A2	6	3
	II	English		2A2	6	3
	III	Major – Botany	Paper III	B21	5	5
			Pteridophytes, Gymnosperms And Paleobotany			
	III	Ancillary	Paper IV:	B22	5	5
Plant Anatomy And Embryology Of Angiosperms						
III	Ancillary	Environmental Biology ( Theory )	AH2	4	3	
		Paper -II Energy Resources Practical Paper – I	HPA	3	3	
IV		Value Education	AV1	1	2	



SEM	PART	SUBJECT	TITLE OF THE PAPER	CODE	HRS	CDTS
III	I	Tamil		1A3	6	3
	II	English		2A3	6	3
	III	Major – Botany	Paper V: Cell Biology, Genetics And Evolution	B31	4	4
			Practical Paper I	PB1	4	-
	III	Ancillary	Chemistry - Paper I (Theory )	AC1	4	4
			Ancillary Practical Paper – I	CPA	3	-
	IV	Skill-Based	Paper I: Horticulture	SB31	2	2
Paper II: Medicinal Botany			SB42	1	-	
V	Extension Activities	NSS/ NCC			1	

SEM	PART	SUBJECT	TITLE OF THE PAPER	CODE	HRS	CDTS
IV	I	Tamil		1A4	6	3
	II	English		2A4	6	3
	III	Major – Botany	Paper VI: Biological Techniques And Biostatistics	B41	4	4
			Practical Paper I	PB1	4	4
	III	Ancillary	Chemistry Paper II (Theory ) Chemistry Practical Paper –I	AC2 CPA	4 3	3 3
IV	Skill-Based	Paper II: Medicinal Botany	SB42	1	2	
		Paper III: Organic Farming	SB43	2	2	

SEM	PART	SUBJECT	TITLE OF THE PAPER	CODE	HRS	CDTS
V	III	Major Elective	Paper I: Forestry And Economic Botany	EB51	5	5
			Paper II: Industrial Microbiology	EB62	3	-
	III	Major – Botany	Paper VII: Taxonomy Of Angiosperms	B51	5	5
			Paper VIII: Plant Physiology	B52	5	5
			Paper IX: Biochemistry And Biophysics	B53	4	4
	III		Practical Paper –I I	PB2	3	-
IV	Non – Major Elective	Paper I: Horticulture	NMB1	2	2	
IV	Skill-Based	Paper IV: General Knowledge	SGK4	2	2	
		Paper V: Tissue Culture	SB65	1	-	

SEM	PART	SUBJECT	TITLE OF THE PAPER	CODE	HRS	CDTS
VI	III	Major Related Elective	Paper II: Industrial Microbiology	EB62	3	5
			Paper III: Biodiversity	EB63	5	5
	III	Major – Botany	Paper X: Microbiology	B61	5	5
			Paper XI: Bio Technology, Nanotechnology And Bioinformatics	B62	5	5
	III		Practical Paper –I I	PB2	5	4
	IV	Non – Major Elective	Paper II: Mushroom Cultivation	NMB2	2	2
IV	Skill-Based	Paper V: Tissue Culture	SB65	1	2	
		Paper VI: Mushroom Cultivation	SB66	2	2	
			Environmental Studies	ENS6	2	2

**B.SC., BOTANY – THEORY CORE PAPERS**

<b>S.NO</b>	<b>SEM</b>	<b>SUBJECT CODE</b>	<b>NAME OF THE SUBJECT</b>	<b>HRS/ WEEK</b>	<b>CREDIT</b>	<b>HRS/ SEM</b>
1	I	B11	Algae and Bryophytes	5	5	75
2	I	B12	Fungi, Lichen and Plant Pathology	5	5	75
3	II	B21	Pteridophytes, Gymnosperms and Paleobotany	5	5	75
4	II	B22	Plant Anatomy and Embryology of Angiosperms.	5	5	75
5	III	B31	Cell Biology, Genetics and Evolution	4	4	75
6	IV	B41	Biological techniques and Biostatistics	4	4	75
7	V	B51	Taxonomy of Angiosperms	5	5	75
8	V	B52	Plant Physiology	5	5	75
9	V	B53	Biochemistry and Biophysics	4	4	75
10	VI	B61	Microbiology	5	5	75
11	VI	B62	Biotechnology, Nanotechnology and Bioinformatics	5	5	75

**B.SC., BOTANY**  
**Major Theory - Scheme of Examination**  
**From 2019 onwards**

Year	Sem No	Paper No	Subject	Duration of Exam	Passing Minimum 40%		
					Int	Ext	Total
I	I	I	Algae and Bryophytes	3	25	75	100
I	I	II	Fungi, Lichen and Plant Pathology	3	25	75	100
I	II	III	Pteridophytes, Gymnosperms and Paleobotany	3	25	75	100
I	II	IV	Plant Anatomy and Embryology of Angiosperms	3	25	75	100
II	III	V	Cell Biology, Genetics and Evolution	3	25	75	100
II	IV	VI	Biological Techniques and Biostatistics	3	25	75	100
III	V	VII	Taxonomy of Angiosperms	3	25	75	100
III	V	VIII	Plant Physiology	3	25	75	100
III	V	IX	Biochemistry and Biophysics	3	25	75	100
III	VI	X	Microbiology	3	25	75	100
III	VI	XI	Biotechnology, Nanotechnology and Bioinformatics	3	25	75	100

### MAJOR RELATED ELECTIVE PAPERS

S.No	Semester	Subject Code	Subject	Hrs/week	Credit
1	V	EB51	Paper I: Forestry and Economic Botany	5	5
2	V & VI	EB62	Paper II: Industrial Microbiology	6	5
3	VI	EB63	Paper III: Biodiversity	5	5
4			Paper IV: Environmental related health hazards		
5			Paper V : Molecular Biology and recombinant DNA Technology		
6			Paper VI : Environmental Biotechnology		

### SKILL BASED PAPERS

<b>S.No</b>	<b>Semester</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Hours/week</b>	<b>Credit</b>
1	III	SB31	Paper I: Horticulture	2	2
2	III & IV	SB42	Paper II: Medicinal Botany	2	2
3	IV	SB43	Paper III: Organic farming	2	2
4	V	SGK4	Paper IV: General Knowledge	2	2
5	V & VI	SB65	Paper V: Tissue culture	2	2
6	VI	SB66	Paper VI: Mushroom cultivation	2	2



### NON MAJOR ELECTIVE PAPERS

<b>S.No</b>	<b>Semester</b>	<b>Subject Code</b>	<b>Subject</b>	<b>Hours/week</b>	<b>Credit</b>
1	V	NMB1	Paper I: Horticulture	2	2
2	VI	NMB2	Paper II: Mushroom cultivation	2	2

**Programme : B.Sc.Botany**

**Part III: Core Paper I**

**Semester : I**

**Hours: 5 hrs/week 75 hrs/semester**

**Sub. Code : B11**

**Credits : 5**

**TITLE OF THE PAPER: ALGAE AND BRYOPHYTES**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	5	3	-	1	1

**PREAMBLE:** As the first course opening up the learning in Botany, this paper sets the tone for discourses in plant sciences by offering an introduction to the plant way of life. Serving as curtain raiser, it focuses on the early autotrophic algae and introduces the structural variations, reproductive processes and life cycle changes seen in representative forms of different groups of algae.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> spot, collect, identify algal forms, and recognize the ways of utilizing the algal resources for their vocation and livelihood	1	15
<b>UNIT 2 CO2:</b> compare the similarities and contrast differences between the chosen groups and eventually be able to build logic for understanding and appreciating plant evolution	2	15
<b>UNIT 3 CO3:</b> to understand habitat characteristics of marine algal forms and enable their collection and characterization describing structure, functions and adaptations	3	15
<b>UNIT 4 CO4:</b> to track the continuum of plant life from aquatic environs to land that ecological adaptations and structural transitions are tracked in this less emphatic but functionally conspicuous and competent floral elements	4	12
<b>UNIT 5 CO5:</b> gain confidence to make explorations on their own to locate, collect and develop an idea to ecologically define and economically use these important life forms among cryptogams	5	18

**SYLLABUS**

**Unit I:**

**Algae:** Introduction to Algae, General characters of algae. An overview of F.E. Fritsch Classification (1965), Habit and Habitats of fresh water and marine algae, algal pigments, life cycle patterns and Economic importance of algae.

**Unit II:**

General characteristics, a detailed study on the structure and reproduction of Cyanophyceae - Oscillatoria, Chlorophyceae-Chlamydomonas, Volvox and Oedogonium (Development of reproductive organs need not be studied)

**Unit III:**

General characteristics, a detailed study on the structure and reproduction of Bacillariophyceae - Diatoms, Phaeophyceae- Sargassum and Rhodophyceae -Polysiphonia (Development of reproductive organs need not be studied)

**Unit IV:**

**Bryophytes:** General characteristics of Bryophytes, Classification of Bryophytes by Rothmaler (1951), Bryophytes as amphibians of plant kingdom. A short account on Economic importance of Bryophytes.

**Unit V:**

A detailed study on the structure, reproduction and life cycle of the following genera-Riccia, Anthoceros and Funaria. (Development of reproductive organs need not be studied).

**References:**

1. Kumar H.D and Singh H.N., 1988, *Text Book of Algae*, East West press.
2. Sharma O.P., 1986, *Text Book of Algae*, Tata Mc Graw Hill Publications.
3. Rashid. A., 1998, *An Introduction of Bryophytes*, Vikas Publishing house, New Delhi.
4. Pandey. B.P., 1982, *A Text Book of Botany Bryophyta*, S.Chand and Company.
5. Pandey B.P., 2005, *College Botany Vol I*, S.Chand Company

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : 15 hours per semester			
	Introduction to Algae, General characters of algae	4 hours	Chalk–talk techniques to familiarize terms, definitions and key words used
	An overview of F.E. Fritsch Classification (1965, algal pigments	3 hours	Use of OHP and power point presentation to introduce the selected scheme of classification for holistic coverage
	Habit and Habitats of	3 hours	Slide shows and guided

	fresh water and marine algae		personalized observations of museum mounts
	Life cycle patterns of algae	3 hours	Animated Power Point Presentation
	Economic importance of algae	2 hours	Through survey of algal produce and products of agricultural and industrial significance made with algal input
UNIT II: 15 hours per semester			
	General characteristics, a detailed study on the structure and reproduction of Cyanophyceae - Oscillatoria	3 hours	Backed by microscopic investigations of live specimen intricacies explained through Slide show & ICT tools
	General characteristics, a detailed study on the structure and reproduction of Chlorophyceae- Chlamydomonas	4 hours	Charts, AV aids and animated projections Explanation using PPT
	A detailed study on the structure and reproduction of Volvox	4 hours	Charts, AV aids and animated projections Explanation using PPT
	A detailed study on the structure and reproduction of Oedogonium	4 hours	Charts, AV aids and animated projections Explanation using PPT
UNIT III: 15 hours per semester			
	General characteristics, a detailed study on the structure and reproduction of Bacillariophyceae - Diatoms	5 hours	Charts, AV aids and animated projections Explanation using PPT
	General characteristics, a detailed study on the structure and reproduction of	5 hours	Charts, AV aids and animated projections Explanation using

	Phaeophyceae- Sargassum		PPT
	General characteristics, a detailed study on the structure and reproduction of Rhodophyceae – Polysiphonia	5 hours	Charts, AV aids and short films on ocean life and life cycle changes in red algae Animated projections Explanation using PPT
UNIT IV: 12 hours per semester			
	General characteristics of Bryophytes	4 hours	Black Board Use to familiarize and internalize terms and key words Use of OHP to present schemes of classification
	Classification of Bryophytes by Rothmaler (1951)	3 hours	Use of OHP and power point presentation to introduce the selected scheme of classification for holistic coverage
	Bryophytes as amphibians of plant kingdom	3 hours	Animated presentation of life cycle, Slide show on Diversity
	A short account on Economic importance of Bryophytes	2 hours	Collection of appropriate material and produce to sensitize students on their use
UNIT V: 18 hours per semester			
	A detailed study on the structure, reproduction and life cycle of Riccia	5 hours	Explanation using museum mounts, Study through free hand sections
	A detailed study on the structure, reproduction and life cycle of Anthoceros	6 hours	Display and description through charts and museum mounts
	A detailed study on the structure, reproduction and life cycle of Funaria	7 hours	Explanation using museum mounts, Study through free hand sections

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	4	3	4	4	4	3	4	4	3	4	4	3	3	4	3.64
CO2	4	3	4	3	2	4	3	4	3	4	4	3	3	3	3.36
CO3	4	3	3	4	3	4	3	3	3	4	3	3	3	4	3.36
CO4	4	3	4	4	3	4	3	4	3	4	4	4	4	4	3.71
CO5	4	3	4	3	3	4	3	4	3	4	4	3	3	4	3.5
Mean Overall Score														3.51	

Result: The Score for this Course is 3.51 (High Relationship)

Course Designer: Dr.G.Grace Lydial Pushpalatha

Programme : B.Sc.Botany

Part III: Core Paper II

Semester :I

Hours: 5 hrs/week 75 hrs/semester

Sub. Code : B12

Credits : 5

**TITLE OF THE PAPER: – Fungi, Lichens and Plant Pathology**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	5	2	-		3

**PREAMBLE:**

- To enable the students to study the structure and organisation of thallophytes.
- To acquire the basic knowledge on the cell structure and classification.
- To develop curiosity in the life cycle patterns of lower groups.
- To enable the students to understand the basic concepts of classification.
- To enable the students to understand and appreciate the plant groups for its importance in industry.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> understands the industrial uses of fungi in day to day life.	1	15
<b>UNIT 2 CO2:</b> Learns the characteristic feature and habitat of fungal groups	2	15
<b>UNIT 3 CO3:</b> understands and compares the lifecycle patterns of different fungal groups.	3	15
<b>UNIT 4 CO4:</b> Enable the students to know the organization of lichen thallus, the ecological benefits and uses of it.	4	15
<b>UNIT 5 CO5:</b> Recognizes the causal organism and symptoms of some common plant diseases.	5	15

**SYLLABUS**

**Unit I:**

General Characteristics of fungi . Outline Classification of Fungi proposed by Alexopoulos and Mims, 1979 . Economic importance of fungi

**Unit II:**

A study on the occurrence, structure and reproduction and life cycle of the following Myxomyetes - Physarum; Oomycetes – Albugo; Zygomycetes – Mucor; Ascomycetes – Peziza (Development of Reproductive organs need not be studied)

**Unit III:**

A study on the occurrence, structure, reproduction and Life cycle of the following Basidiomycetes – Puccinia; Deutromycetes - Fusarium, (Development of Reproductive organs need not be studied)

**Unit IV:**

General Characteristics of Lichens, Types of lichens, Phycobiont , mycobiont , Thallus organization,

vegetative reproduction-fragmentation, Isidia, Soredia. Sexual reproduction- Apothecium. Structure & reproduction of Usnea. Economic importance of Lichens with reference to medicine and food. Lichen as pollution indicators.

**UnitV:**

Classification of plant diseases based on host and pathogen. Symptoms of plant diseases – chlorosis, necrosis, vein clearing, phyllody, canker. Study of the following diseases with reference to causal organism, symptoms, epidemiology and control measures. Fungal disease: Early leaf spot of groundnut (Tikka), Bacterial disease: citrus canker, Phytoplasmal disease: little leaf of Brinjal, Viral disease: TMV.

**References:**

1. Alexopoulos and Mims. M. 1993, *Introductory Mycology* – Wiley Eastern Ltd. Delhi.
2. Alexopoulos C.J. Mims. C.W & Blackwell, 1996, *Introductory Mycology* 4<sup>th</sup> ed. John Wiley.
3. Gupta, J.S. 1986 – *Text book of Fungi* – Oxford and IBH Publishing Co. Pvt. Ltd.,
4. Hale, M.E. 1983 – *The Biology of Lichens 3<sup>rd</sup> Ed* Edward Arnold (Publishers) Ltd., London.
5. Singh, R.S. 2001 – *Plant Disease Management* – Oxford IBH.
6. Sundara Rajan, S. 2001 – *Introduction to Fungi*, Anmal Publications Pvt. Ltd., New Delhi.
7. Vashishta, B.R. 2000, *Mycology*, Chand & Co. New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I :			
	General characters of fungi	5 hours	Chalk–talk
	Classification of fungi (Mims, 1979)	5 hours	Lecture , AV aids
	Economic importance of fungi	5 hours	Lecture
UNIT II:			
	Structure and life cycle of Myxomycetes-physarum, Oomycetes- Albugo	5 hours	chalk - talk AV aids
	Structure and life cycle of Zygomycetes- Mucor	5 hours	PPT, Lecture
	Structure and life cycle of Ascomycetes- Peziza	5 hours	chalk - talk PPT
UNIT III:			
	Structure and life cycle of Basidiomycetes- Puccinia	8 hours	Chalk- talk , AV aids.



	Structure and life cycle of Deuteromycetes- Fusarium	7 hours	Lecture AV aids.
<b>UNIT IV:</b>			
	General characters of lichens- types of lichens Thallus organization, vegetative reproduction	5 hours	Chalk- talk AV aids
	Sexual reproduction- Apothecium, structure and reproduction of Usnea	5 hours	Lecture AV aids
	Economic importance of lichens, as pollution indicators	5 hours	Lecture
<b>UNIT V:</b>			
	Classification of plant diseases, symptoms of plant diseases- chlorosis,necrosis,vein- clearing,phyllody	8 hours	Lecture  PPT
	Study of plant diseases- Tikka disease, Citrus canker	4 hours	Chalk talk Specimen (infected leaf)
	Little leaf of Brinjal, TMV	3 hours	Chalk talk, AV aids.

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	4	3	3	3	4	4	3	3	4	3	3	3	4	3.4
CO2	3	4	3	3	2	4	3	3	4	4	3	4	3	3	3.3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	4	3	3.2
CO4	4	3	3	4	3	4	3	4	3	4	4	3	4	3	3.5
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3.3
Mean Overall score														3.34	

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: I.Sobhakumari

**Programme : B.Sc, Botany**

**Part III: Core**

**Semester : II**

**Hours : 5 P/W 75Hrs P/S**

**Sub. Code : B21**

**Credits :5**

**TITLE OF THE PAPER: Pteridophytes ,Gymnosperms and Paleobotany**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	5	2	1	-	2	
<b>PREAMBLE:</b> 1.Knowledge on cryptogams and phanerogams and primary information about fossil record is a prerequisite. 2.It provides a thorough knowledge about the diversity, structural organization and reproduction of Pteridophytes and Gymnosperms. 3.It also makes the students aware of the preserved vestiges of plant life of the geological past						
<b>COURSE OUTCOME</b>					Unit	Hrs P/S
At the end of the Semester, the Students will be able to						
<b>Unit 1 Co1:</b> Understand the characteristics of Pteridophytes and their classification. Assess the evolutionary features in Pteridophytes					1	15
<b>Unit 2 Co2:</b> Understand the economic importance of the Pteridophyte					2	15
<b>Unit 3 Co3:</b> Understand the morphological diversity of Pteridophytes.					3	15
<b>Unit 4 Co4:</b> Understand the characteristics of Gymnosperms and their classification					4	15
<b>Unit 5 Co5:</b> students are aware of the preserved vestiges of plant life of the geological past					5	15
<b>SYLLABUS</b>						
<b>Unit I:</b> Classification of Pteridophytes by G.M.Smith (1955), General characteristics of Pteridophytes with reference to Psilophyta , Lepidophyta , Calamophyta , Pterophyta. Different types of steles in Pteridophytes						
<b>Unit II:</b> Sporangial organization, Homospory, Heterospory, heterogamy and Seed habit, Apospory and Apogamy, Economic importance of Pteridophytes						
<b>Unit III:</b> Structure and reproduction of following genera- Psilotum, Lycopodium, Equisetum, Gleichenia and Marsilea						
<b>Unit IV:</b> Classification of Gymnosperms by K.R.Sporne (1965). General characteristics of Gymnosperms with reference to Cycadopsida, Coniferopsida and Gnetopsida. Structure and reproduction of Pinus and Gnetum.						

**Unit V:** Process of Fossilization, Types of fossils: compressions, impressions, encrustations, petrifications, compactions. Geological time scale. Study of the following fossils: Lepidodendron, Lygenopteris.

**TEXT BOOKS:** 1. Biswas, C. & Johri, B.M. 1997, *The Gymnosperms*, Narosa Pub.

1. Rashid, A. 1976, *An Introduction to Pteridophytes*, Vikas Publishing House, New Delhi.
2. Sharma, O.P. 2006, *Pteridophyta* Mac Millan India Ltd.
3. Shripad, N. Agashe – 1996, *Paleobotany*, Oxford & IBH.
4. Sporne, K.R.-1965, *Morphology of Gymnosperms*, B.J.Pub

**REFERENCES:**

1. Sporne, K.R.-1975, *Morphology of Pteridophytes*, Hutehinson, University Library, London.
2. Sundararajan, S.-2007, *Introduction to Pteridophyta*, New Age International (p) Ltd., Publishers, New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
	Classification of Pteridophytes by G.M.Smith (1955),	2	Chalk and talk
	General characteristics of Pteridophytes with reference to Psilophyta ,	4	Chalk and talk
	Lepidophyta , Calamophyta , Pterophyta.	5	Chalk and talk
	Different types of steles in Pteridophytes	4	ICT
<b>UNIT II</b>			
	Sporangial organization,	6	ICT
	Homospory, Heterospory, heterogamy and Seed habit, Apospory and Apogamy	5	Chalk and talk
	Economic importance of Pteridophytes	4	Chalk and talk
<b>UNIT III</b>			
	Structure and reproduction of following genera- Psilotum, Lycopodium,	4	Peer teaching
	Equisetum,	5	Chalk and talk
	Gleichenia and Marsilea	6	ICT
<b>UNIT IV</b>			
	Classification of Gymnosperms by K.R.Sporne (1965)	2	Chalk and talk

	General characteristics of Gymnosperms with reference to Cycadopsida,	3	ICT
	Coniferopsida Gnetopsida. Structure and reproduction of Pinus Gnetum	4 2 2 2	Chalk and talk Chalk and talk ICT ICT
<b>UNIT V</b>			
	Process of Fossilization, Types of fossils: compressions, impressions, encrustations, petrifications, compactations.	6	Chalk and talk
	Geological time scale.	3	Chalk and talk
	Study of the following fossils: Lepidodendron Lygenopteri	3 3	Chalk and talk Chalk and talk

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	3	3	4	3	4	3	3	3	3	3	4	3	2	3.14
CO2	3	4	3	4	3	3	4	2	3	2	3	3	3	3	3.07
CO3	4	3	3	3	4	3	3	3	4	3	3	3	3	3	3.21
CO4	3	4	3	3	3	4	3	3	3	2	3	3	3	4	3.14
CO5	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3.07
Mean Overall Score															3.12

Result: The Score for this Course is 3.12 (High Relationship)

Course Designer: Dr.G.Mangai Kasthuri

**Programme : B.Sc.Botany**

**Semester : II**

**Sub. Code : B22**

**Part III: Core Paper IV**

**Hours : 5 P/W 75 Hrs P/S**

**Credits : 4**

**TITLE OF THE PAPER: PLANT ANATOMY AND EMBRYOLOGY OF  
ANGIOSPERMS**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	5	2	1	1	1

**PREAMBLE:**

- Aims to impart an insight into the internal structure and reproduction of the most evolved group of plants, the Angiosperm.
- To know the detailed structure of and functions of tissue systems of plants
- Get an insight into secondary growth
- Understand the life cycle pattern of Angiosperms.
- . Understand the morphology and development of reproductive parts.
- . Get an insight in to the fruit and seed development.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>Unit 1 Co1:</b> list down the different kinds of tissues, able to differentiate simple tissue from complex tissue.	1	15/S
<b>Unit 2 Co2:</b> compare and contrast the anatomy of root & stem and also between dicot and monocot appreciate the vascular supply.	2	15/S
<b>Unit 3 Co3:</b> describe the normal secondary growth and differentiate it from anomalous thickening.	3	15/S
<b>Unit 4 Co4 :</b> Analyse the sequences of reproductive process and appreciate the way the life perpetuates.	4	15/S
<b>Unit 5 Co5:</b> differentiate the various kinds of endosperm and summarize the embryogeny and polyembryony, apomixis.	5	15/S

**Paper IV – Plant Anatomy and Embryology of Angiosperms**  
**Contact Hours: 5hrs/ week**

**Course Code: B22**  
**Credits: 4**

**Unit I:**

Meristems – Types. Root apex: Histogen theory , Korpe Kappe theory, Shoot apex: Apical cell theory, Tunica corpus theory. Tissues: Simple – parenchyma, collenchyma and sclerenchyma. Complex tissues: xylem and phloem.

**Unit II:**

Primary structure of the following: Dicot and Monocot root, Dicot and Monocot stem, Leaf anatomy: Dorsiventral and isobilateral leaf , Stomatal types and distribution, Nodal anatomy, Unilacunar, Trilacunar and Multilacunar.

**Unit III:**

Secondary growth of Dicot stem and Dicot root . Anomalous secondary growth in dicot stem – Boerhaavia. Anomalous secondary growth in Monocot stem – Dracena. General account of vessel elements Annual rings (Dendrochronology) – heart wood , sap wood , porous and nonporous wood– Tyloses.

**Unit IV:**

Microsporangium: Microsporogenesis, Male gametophyte. Megasporangium: Megasporogenesis, female gametophyte. Ovule types, Types of female gametophyte: Monosporic – Polygonum, Bisporic – Allium, Tetrasporic – Adoxa. Fertilization: Porogamy, Chalazogamy and Mesogamy Development and significance of double fertilization. post fertilization changes.

**Unit V:**

Endosperm: Types – Nuclear, Cellular and Helobial. Embryo structure and development: Dicot embryo – Capsella, Monocot embryo – Luzula Polyembryony, Apomixis.

**Reference:**

1. Eames, A.J. Mac Deniels L.H.1999, *An Introduction to Plant Anatomy*, Tata Mc Graw Hill
2. Fahn 1989, *Plant Anatomy* Maxwell Mac Milan Pub.
3. Katherine Esau, 1985 *Plant Anatomy*, Wiley Eastern Ltd.,
4. B.P.Panday 1978, *Plant Anatomy* S. Chand & Company Ltd.,
5. P.C.Vashista 1980, *Plant Anatomy* Pradeep Publication.
6. S.S.Bhojwani, S.P.Bhatnagar 2008, *The Embryology of Angiosperms*, Vikas Publishing House Pvt. Ltd.,
7. P.Maheswari 1998, *An Introduction to Embryology*, Tata Mc Graw Hill.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	Meristems – Types. Root apex: Histogen theory , Korpe Kappe theory, Shoot apex: Apical cell theory, Tunica corpus theory..	5hrs	ICT
	Tissues:Simple parenchyma, collenchyma and sclerenchyma	5hrs	GD
	Complex tissues: xylem and phloem.	5hrs	LECTURE METHOD
UNIT II			
	Primary structure of the following: Dicot and Monocot root, Dicot and Monocot stem,	5hrs	ICT
	Leaf anatomydorsiventral and isobilateral leaf , Stomatal types and distribution,	5hrs	ICT
	Nodalanatomy,unilacunar, Trilacunarand Multilacunar.	5hrs	ICT
UNIT III			
	Secondary growth of Dicot stem and Dicot root . Monocot stem – Dracena.	5hrs	GROUP DISCUSSION
	Anomalous secondary growth in dicot stem – Boerhaavia. Anomalous secondary growth in	5hrs	ICT
	General account of vessel elements Annual rings (Dendrochnology)heart wood , sap wood , porous and nonporous wood– Tyloses.	5hrs	ICT
UNIT IV			
	Microsporangium: Microsporogenesis, Male gametophyte. Megasporangium: Megasporogenesis, female gametophyte.	5hrs	LECTURE METHOD
	Ovule types, Types of female gametophyte: Monosporic –		

	Polygonum, Bisporic – Allium, Tetrasporic – Adoxa.	5hrs	LECTURE METHOD
	Fertilization: Porogamy, Chalazogamy and Mesogamy Development and significance of double fertilization. post fertilization changes	5hrs	
UNIT V			
	Endosperm: Types – Nuclear, Cellular and Helobial	5hrs	LECTURE METHOD
	Embryo structure and development: Dicot embryo – Capsella, Monocot embryo – Luzula	5hrs	ICT
	. Polyembryony, Apomixis.	5hrs	TUTORIAL

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	4	4	4	3	3	3	4	4	4	4	3	2	4	4	3.4
CO2	3	4	4	4	3	3	4	4	4	3	4	3	4	4	3.6
CO3	4	4	4	3	3	3	3	4	4	3	3	3	4	4	3.5
CO4	4	4	3	3	4	3	3	3	4	3	3	3	3	3	3.3
CO5	4	4	4	3	3	3	3	3	4	4	3	3	3	4	3.4
Result: The Score for this Course is 3.4 (High relationship) Course Designer Mrs.R.Latha															

**Programme : B.Sc.**

**Part III: Core Paper V**

**Semester : III**

**Hours: 4 hrs/week 60 hrs/semester**

**Sub. Code : B31**

**Credits : 4**

**TITLE OF THE PAPER: Cell Biology, Genetics and Evolution**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	4	2	-	1	1



**PREAMBLE:**

- To enable the students to study the structure of plant cells and its organelles.
- To acquire the basic knowledge on the cell structure and its features and relate to its function.
- To develop critical thinking in concepts related to Genetics.
- To enable the students to understand the basic concepts involved in inheritance of characters in biological system.
- To enable the students to understand and appreciate the various concepts of evolution.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1</b> understand tissue morphogenesis and ultimately facilitates to know what happens at the cellular and molecular levels.	1	12
<b>UNIT 2 CO2:</b> Learn the principles in microscopy and the structure, chemistry and functions of cellular organelles	2	12
<b>UNIT 3 CO3:</b> Learn about Mendelian principles	3	12
<b>UNIT 4 CO4:</b> understand the different types of genetic interaction, incomplete dominance, codominance, inter allelic genetic interactions, multiple alleles and quantitative inheritance	4	12
<b>UNIT 5 CO5:</b> Familiarize about Evolution and the emergence of evolutionary thoughts	5	12

**SYLLABUS****Unit I:**

Microscopy ; Principles of light microscopy , Electron microscopy , TEM , SEM, Phase contrast. Features of prokaryotic cell and eukaryotic cell : Ultra structure of a plant cell, Structure and chemistry of cell wall and cell membrane – Fluid Mosaic model. Cell cycle. Cell division – Mitosis and Meiosis.

**Unit II:**

Structure and Function of cell organelles: Chloroplast, Mitochondria, Ribosomes Endoplasmic Reticulum, Golgi bodies and Nucleus. Chromosome: Morphology , Structure of an eukaryotic chromosome, Special Types: Polytene and Lamp brush chromosomes. Nucleic acids: DNA structure (Watson and Crick Model), RNA structure and types, Protein synthesis.

**Unit III:**

Mendelism - Monohybrid and Dihybrid cross, Incomplete dominance, Gene interactions: dominant epistasis – complementary factor – Multiple alleles with reference to blood groups

**Unit IV:**

Linkage and Crossing over: Types, mechanism and significance. Sex determination types: XX – XO, XX-XY, and ZZ-ZW. Sex linked inheritance: Eye colour in Drosophila. Mutation types, Molecular basis of mutation, Regulation of gene expression: Lac operon.

**Unit V:**

Evidences of Evolution . Theories of evolution – Lamarck’s theory, Darwin’s theory of Natural selection , Mutation theory of De Vries.

**References:**

- 1.P.K.Gupta 1995, *Cell and Molecular Biology* Rastogi Pub.
- 2.G.Karp 1984, *Cell Biology* Mac Graw Hill Comp. New Delhi.
- 3.Roberties and Roberties 1968, *Cell and Molecular Biology*, K.M.Varchese Pub.
- 4.Sundararajan 1988, *Introduction to Cell Biology* Vikas Pub.
- 5.Arora M.P. and Sandhu G.S. 2000, *Genetics*, Himalayan Pub.
6. Savage J.M. 1976, *Evolution*, Amerind Pub. Co.Ltd.
7. Sinnot E.W. Dunn L.C. and Dbzhansky T.1996, *Principles of Genetics*,  
Tata Mc Graw Hill Pub.
- 8.William S. Klug and Michael R. Cummings, 2000 *Concepts of Genetics*, Prentice Hall.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : 12 hours			
	Microscopy ; Principles of light microscopy , Electron microscopy , TEM , SEM, Phase contrast.	4 hours	Chalk–talk method, use of AV aids
	Features of prokaryotic cell and eukaryotic cell : Ultra structure of a plant cell,	4 hours	Lecture method, AV aids
	Structure and chemistry of cell wall and cell membrane – Fluid Mosaic model. Cell cycle. Cell division – Mitosis and Meiosis.	4 hours	Lecture method, Group discussion using POP,
UNIT II: 12 hours			
	Structure and Function of cell organelles:Chloroplast,Mitochondria,Ribosomes Endoplasmic Reticulum, Golgi bodies and Nucleus.	3 hours	chalk and talk method and AV aids

	Chromosome: Morphology ,Structure of an eukaryotic chromosome, Special Types: Polytene and Lamp brush chromosomes.	4 hours	Explanation using PPT,Lecture method.
	Nucleic acids: DNA structure (Watson and Crick Model), RNA structure and types, Protein synthesis.	4 hours	chalk and talk method and group dicussion
UNIT III: 12 hours			
	Mendelism - Monohybrid and Dihybrid cross,	4 hours	Chalk and talk method ,Use of AV aids.
	Incomplete dominance, Gene interactions: dominant epistasis –	4 hours	Lecture method and GD
	complementary factor – Multiple alleles with reference to blood groups	4 hours	PPT and Chalk and talk method
UNIT IV: 12 hours			
	Linkage and Crossing over: Types, mechanism and significance.	4 hours	Black Board teaching techniques and Use of OHP
	Sex determination types: XX – XO, XX-XY, and ZZ-ZW. Sex linked inheritance: Eye colour in Drosophila.	4 hours	Use of OHP and Chalk and talk method
	Mutation types, Molecular basis of mutation, Regulation of gene expression: Lac operon.	4 hours	Lecture method and group discussions
UNIT V: 12 hours			
	Evidences of Evolution .	4 hours	Lecture method and group discussions
	Theories of evolution – Lamarck’s theory,	4 hours	Use of OHP and Chalk and talk method
	Darwin’s theory of Natural selection , Mutation theory of De Vries.	4hours	Chalk and talk method ,Use of

			AV aids.
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Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	3	4	3	4	3	4	3	3	4	3	3	3	4	3.4
CO2	4	3	3	3	2	4	3	4	3	4	4	3	3	3	3.3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	3	4	3.2
CO4	4	3	3	4	3	4	3	4	3	4	4	3	4	3	3.5
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3.3
Mean Overall score														3.34	

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: Mrs.M.P.SIVASANKARI

**Programme : B.Sc.**

**Part III: Core Paper VI**

**Semester : III**

**Hours: 4 hrs/wee 60 hrs/semester**

**Sub. Code : B41**

**Credits : 4**

**TITLE OF THE PAPER: Biological techniques and Biostatistics**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	4	2	-	1	1

**PREAMBLE:**

- To enable the students to comprehend the principles and methods of studying plant cell using microtechniques.
- To help the students understand the principles and handling of various instruments used in biological research.
- To facilitate the students to learn the applications of various modern biological techniques such as chromatography and spectroscopy and other biological instruments.
- To understand the methods of collecting data and to analyze and interpret the data statistically
- To enable the students to apply statistical methods related to measures of central tendency and dispersion

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> Understand the methods used in micrometry, microtomy and staining procedures.	1	12
<b>UNIT 2 CO2:</b> Gain skills on working principles of pH meter, colorimeter and centrifuge	2	12
<b>UNIT 3 CO3:</b> Learn the technique of electrophoresis & chromatography	3	12
<b>UNIT 4 CO4:</b> Gain knowledge about various statistical methods of analysis	4	12
<b>UNIT 5 CO5:</b> Understand and critically assess data collection and apply statistical tools in in the analysis of biological studies.	5	12

**SYLLABUS****Unit I:**

Micrometry. Principles and methods of measuring plant cell. Microtechniques – fixatives – stains – dehydration – embedding - Sectioning – (rotary microtome) – staining- double staining.

**Unit II:**

Analytical methods –pH meter – principles – measurement of pH . Preparation of buffers – acetate and phosphate buffer. Colorimetry . Spectrophotometry – basic principles Separation methods: Centrifugation techniques – density gradient- basic principles – types (clinical & ultra) and their applications.

**Unit III:**

Chromatographic techniques – principles and techniques - paper and thin layer chromatography -

Electrophoretic techniques – Principle , Types – AGE, SDS - PAGE.

**Unit IV:**

Definition, Scope of biostatistics, Collection, Classification and tabulation of data - diagrammatic and graphic representation of data – frequency distribution. Measure of central tendency – Mean, Median and Mode.

**Unit: V**

Measure of dispersion, Standard deviation, Standard Errors. Simple correlation , correlation coefficient , regression – simple linear regression , basic idea of significance test – Chi square test, Probability Test.

**References:**

1. Anbalagan, K. 1985, *Electrophoresis Life Science Book House*, New Delhi.
2. David Plumer, 1987, *An Introduction to Practical Biochemistry* Tata Mc Graw Hill, New Delhi.
3. Jeyaraman, 1978, *Laboratory Manual in Biochemistry* Wiley Eastern Ltd New Delhi  
.Johansen, M. 1940, *Plant Microtechniques* Mc Graw Hill, New Delhi.
4. Balaji, K., Raghavaiah A.V.S., & Jayaveera K.N. 2012. *Biostatistics*. I.K.International Publishing House, New Delhi.
5. Gurumani,N. 2004. *An Introduction to Biostatistics*. MJP Publishers, Chennai.
6. Khan, I.A. & Khanum,A. 1994. *Fundamentals of Biostatistics*. Ukaaz Publications, Hyderabad.
7. Sundar Rao,P.S.S. & Richard,J. 1997. *An Introduction to Biostatistics*. Prentice-Hall of India Pvt.Ltd., New Delhi.
8. Sundar Rao,P.S.S. & Richard,J. 2008. *Introduction to Biostatistics and Research Methods*. Prentice-Hall of India Pvt.Ltd., New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : 12 hours			
	Micrometry. Principles and methods of measuring plant cell.	4 hours	Chalk–talk method, use of

			AV aids
	Microtechniques – fixatives – stains – dehydration – embedding	4 hours	Lecture method, AV aids
	Sectioning – (rotary microtome) – staining- double staining.	4 hours	Lecture method, Group discussion using POP,
UNIT II: 12 hours			
	Analytical methods –pH meter – principles – measurement of pH . Preparation of buffers – acetate and phosphate buffer. .	5 hours	chalk and talk method and AV aids
	Colorimetry . Spectrophotometry – basic principles	2 hours	Explanation using PPT,Lecture method.
	Separation methods: Centrifugation techniques – density gradient- basic principles – types (clinical & ultra) and their applications	5 hours	chalk and talk method and group dicussion
UNIT III: 12 hours			
	Chromatographic techniques – principles and techniques - paper and thin layer chromatography.	6 hours	Chalk and talk method ,Use of AV aids.
	Electrophoretic techniques – Principle , Types – AGE, SDS - PAGE.	6 hours	Lecture method and GD
UNIT IV: 12 hours			
	Definition, Scope of biostatistics, Collection, Classification and tabulation of data	4 hours	Black Board teaching techniques ,Problem solving method and Use of OHP
	Diagrammatic and graphic representation of data – frequency distribution.	4 hours	Use of PPT and Chalk and talk method
	Measure of central tendency – Mean, Median	4 hours	Lecture method and

	and Mode.		group discussions using AV aids
UNIT V: 12 hours			
	Measure of dispersion, Standard deviation, Standard Errors.	4 hours	Lecture method, problem solving techniques and group discussions
	Simple correlation , correlation co-efficient , regression – simple linear regression,	4 hours	Use of OHP ,Chalk and talk method
	Basic idea of significance test – Chi square test, Probability Test.	4hours	Chalk and talk method ,Use of AV aids and evaluation through problem solving.

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	3	4	4	4	3	4	3	3	4	3	3	3	3	3.4



CO2	4	3	3	3	4	4	3	4	3	4	3	3	3	3	3.4
CO3	3	3	4	4	3	3	3	3	3	3	3	3	3	4	3.2
CO4	4	4	3	4	3	4	3	4	3	4	3	3	4	3	3.5
CO5	4	3	4	3	4	3	3	4	4	3	3	3	3	3	3.4
Mean Overall score															3.38

Result: The Score for this Course is 3.38 (High Relationship)

Course Designer: Mrs.M.P.SIVASANKARI

**Programme : B.Sc.Botany**

**Part III: Core Paper VII**

**Semester : V**

**Hours: 5 hrs/week 75 hrs/semester**

**Sub. Code : B51**

**Credits : 4**

**TITLE OF THE PAPER: Taxonomy of Angiosperms**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	5		-		

**PREAMBLE:**

- To get an insight into scientific knowledge of world's plant resources.
- To understand the different systems of classification.
- To categorize organisms which aids easy communication.
- To analyze the evolutionary relationship among plants.
- To relate taxonomy with other branches of botany.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1</b> understand the different parts of the plant and their modifications.	1	15
<b>UNIT 2 CO2:</b> understand the various systems of classification and appreciate the use of taxonomy in other branches.	2	15
<b>UNIT 3 CO3:</b> Analyse the important characteristics and relate the evolutionary relationship among polypetalae.	3	15
<b>UNIT 4 CO4:</b> Analyse the important characteristics and relate the evolutionary relationship among gamopetalae.	4	15
<b>UNIT 5 CO5:</b> Analyse the important characteristics and relate the evolutionary relationship among monochlamydeae and monocots.	5	15

**SYLLABUS****Unit I:**

Morphology: Root; Types and modifications of tap root and fibrous root system. Stem; Types Aerial and underground stem modifications. Leaf; Phyllotaxy, Simple and Compound leaves, Leaf modifications. Inflorescence; Racemose, Cymose, Mixed and special types. Fruits: Simple, Aggregate and Multiple fruits.

**Unit II:**

Systems of classification- Artificial :(Linnaeus) Natural : (Bentham and Hooker), Phylogenetic (Engler and Prantl). Merits and Demerits of Bentham & Hooker's system. Definition of APG and Ethnobiological classification. Binomial Nomenclature: Typification, Author Citation, ICBN, BSI, Chemotaxonomy, Numerical Taxonomy. Objectives and functions of Herbarium; collection, pressing, poisoning, drying and mounting.

**Unit III:**

A detailed study and economic importance of the following Angiospermic families. Polypetalae: Nymphaeaceae, Annonaceae, Capparidaceae, Meliaceae, Fabaceae, Myrtaceae, Cucurbitaceae.

**Unit IV:**

A detailed study and economic importance of the following Angiospermic families.  
Gamopetalae: Rubiaceae, Asteraceae, Sapotaceae, Apocynaceae, Convolvulaceae, Lamiaceae.

**Unit V:**

Study of the following families and their Economic Importance of Monochlamydeae:  
Amaranthaceae, Euphorbiaceae, and Monocots: Orchidaceae, Liliaceae, Poaceae.

**References:**

1. Gamble, J.S., 1953, *Flora of the Presidency of Madras Vol I, II, III*, Botanical Survey of India Govt. of India Press.
2. Lawrence, H.M.G. , 1964, *Taxonomy of Vascular Plants*, Oxford & I BH Pub. Calcutta.
3. Mathew , K.M., 1991, *The Excursion Flora of Central Tamilnadu*, India Oxford IBH Pub. New Delhi.
- 4 Pandy, B.P., 1999, *Taxonomy of Angiosperms* S.Chand & Company.
5. Saxena, N.B., Shamindra Saxena 2006, *Plant Taxonomy*, Pragati Prakashan.
6. Sharma, O.P., 2009, *Plant Taxonomy*, Tata Mc Graw Hill Education Private Limited.
- 7 Subramanyan, N.S., 1996, *Laboratory Manual of Plant Taxonomy*, Vikas Publishing House Pvt Ltd.,
8. Vasishta, P.C., 2000, *Taxonomy of Angiosperms*, S.Chand and Co. Ltd.,

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : 15 hours per semester			
	Morphology: Root; Types and modifications of tap root and fibrous root system. Stem; Types Aerial and underground stem modifications	5	Lecture, Alive specimens
	Leaf; Phyllotaxy, Simple and Compound leaves, Leaf modifications.	5	Lecture, Alive specimens, ICT
	Inflorescence; Racemose, Cymose, Mixed and special types. Fruits: Simple, Aggregate and Multiple fruits	5	Lecture, Alive specimens
UNIT II: 15 hours per semester			
	Systems of classification- Artificial : (Linnaeus) Natural : (Bentham and Hooker), Phylogenetic (Engler and Prantl).	5	Lecture cum ICT
	Merits and Demerits of Bentham & Hooker's system. Definition of APG and Ethnobiological classification.	5	Lecture cum ICT

	Binomial Nomenclature: Typification, Author Citation, ICBN, BSI, Chemotaxonomy, Numerical Taxonomy. Objectives and functions of Herbarium; collection, pressing, poisoning, drying and mounting	5	Chalk and talk
UNIT III: 15 hours per semester			
	A detailed study and economic importance of the following Angiospermic families. Polypetalae: Nymphaeaceae, Annonaceae.	5	Chalk and talk, Alive specimens
	Capparidaceae, Meliaceae, Fabaceae	5	Chalk and talk, Alive specimens
	Myrtaceae, Cucurbitaceae	5	Chalk and talk, Alive specimens
UNIT IV: 15 hours per semester			
	A detailed study and economic importance of the following Angiospermic families. Gamopetalae: Rubiaceae, Asteraceae	5	Chalk and talk, Alive specimens
	Sapotaceae, Apocynaceae	5	Chalk and talk, Alive specimens
	Convolvulaceae, Lamiaceae	5	Chalk and talk, Alive specimens
UNIT V: 15 hours per semester			
	Study of the following families and their Economic Importance of Monochlamydeae: Amaranthaceae, Euphorbiaceae	5	Chalk and talk, Alive specimens
	Monocots- Orchidaceae	5	Chalk and talk, Alive specimens
	Liliaceae, Poaceae.	5	Chalk and talk, Alive specimens

Course	Programme Outcomes (Pos)	Programme Specific Outcomes (PSOs)	Mean
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Outcomes (Cos)															scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	3	4	3	4	3	4	3	3	4	3	3	3	4	3.4
CO2	4	3	3	3	2	4	3	4	3	4	4	3	3	3	3.3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	3	4	3.2
CO4	4	3	3	4	3	4	3	4	3	4	4	3	4	3	3.5
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3.3
Mean Overall score															3.34

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: Mrs.R.Latha.

**Programme : B.Sc Botany**

**Semester : V**

**Sub. Code : B52**

**Part III:**

**Hours : 5 P/W 75Hrs P/S**

**Credits :5**

**TITLE OF THE PAPER: Plant Physiology**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	5	4	-	-	1

**PREAMBLE:**

- 1) The course objectives, help students to understand the water relationship in plants and gain knowledge in physiological activities like transpiration types, and theories of stomata opening.
- 2) The course objectives, broadly speaks, on plant mineral nutrition and role of minerals in plants
- 3) Students will gain a knowledge on photosynthetic processes unique to plants and learn metabolic CO<sub>2</sub> fixation in Plants.
- 4) The main objective is to understand their physiological respiratory function in Plants and diverse source of nitrogen fixation in Plants.
- 5) Describe the importance of plant growth regulators on plant growth and explain how different plant growth regulators structures function to support plant growth and Understand the main biochemical processes that allow plants to survive in terrestrial systems, plant development and gain knowledge about responses to environmental factors.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1:</b> To understand water relations in plants	1	15
<b>UNIT 2 CO2:</b> To give knowledge about Mineral nutrition and the role of minerals in plants	2	15
<b>UNIT 3 CO3:</b> Develop the students, understanding of photosynthesis. and pathways of CO <sub>2</sub> fixation in plants.	3	15
<b>UNIT 4 CO4:</b> To provide knowledge about respiration and different sources of nitrogen to plants.	4	15
<b>UNIT 5 CO5:</b> Develop the students' appreciation for the complexity of plant growth and development and physiology of flowering in plants.	5	15

**SYLLABUS**

**UNIT I:** Water relations in plants – Properties of water, Diffusion, Osmosis, imbibition Absorption of water, Mechanism of water absorption: cohesion- tension theory. Transpiration: Types, Theories of stomatal opening and closing: starch glucose theory, potassium ion theory. Guttation

**UNIT II:** Mineral nutrition – Macronutrients, Micronutrients. Role of minerals in plants. Translocation of mineral nutrients. Active and passive absorption of minerals. Donnan's equilibrium

**UNIT III:** Photosynthesis: Photosynthetic apparatus, energy sources, Photosystem I and II, electron flow through Cyclic and Non cyclic Photo Phosphorylation, Pathways of CO<sub>2</sub> fixation in C<sub>3</sub> and C<sub>4</sub> plants, CAM pathway, Factors affecting photosynthesis.

**UNIT IV:** Respiration: Aerobic and Anaerobic, fermentation, Respiratory quotient, Mechanism of respiration Glycolysis, Krebs's cycle, Oxidative phosphorylation. Factors affecting Respiration. Sources of Nitrogen to plants – Mechanism of Nitrogen fixation, Ammonia assimilation, Nitrate reduction, denitrification.

**UNIT V:** Growth and Development: Sigmoidal growth curve, Plant growth regulators: Auxins, Gibberellins, Cytokinins, Abscissic acid and Ethylene. Physiology of flowering: Photoperiodism, Vernalization.

**TEXT BOOKS: Reference:**

1. Bidwell. R.G.S. 1974 – *Plant Physiology*, Mac Millan Pub.
2. Devlin. R.M. Witham, F.H. 1999 – *Plant Physiology*, 4<sup>th</sup> Ed CBS. Pub. New Delhi.
3. Noggle, G.R. Fritz, G.J.-2010, *Introductory Plant Physiology*, 2<sup>nd</sup> Ed PHI Learning Pvt. Ltd., New Delhi.
4. Sinha, R.K. – 2007, *Modern Plant Physiology*, Narosa Publishing House, New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
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UNIT 1			
	Water relations in plants – Properties of water, Diffusion, Osmosis, imbibition Absorbtion of water.	7	Lecture
	Mechanism of water absorption: cohesion- tension theory. starch glucose theory , potassium ion theory . Guttation.	7	Lecture
	Transpiration: Types, Theories of stomatal opening and closing:	1	ICT
UNIT 11			
	Mineral nutrition – Macronutrients, Micronutrients.	6	Lecture
	Role of minerals in plants.	1	ICT
	Translocation of mineral nutrients. Active and passive absorption of minerals. Donnan's equilibrium	8	Lecture
UNIT III			
	Photosynthesis: Photosynthetic apparatus, energy sources.	6	Lecture
	Photosystem I and II, electron flow through Cyclic and Non cyclic Photo Phosphorylation.	1	ICT
	Pathways of CO <sub>2</sub> fixation in C <sub>3</sub> and C <sub>4</sub> plants, CAM pathway,. Factors affecting photosynthesis.	8	Lecture
UNIT IV			
	Respiration: Aerobic and Anaerobic, fermentation, Respiratory quotient, Mechanism of respiration Glycolysis, Kreb's cycle, Oxidative phosphorylation. Factors affecting Respiration.	9	Lecture
	Sources of Nitrogen to plants – Ammonia assimilation, Nitrate reduction, denitrification.	5	Lecture
	Mechanism of Nitrogen fixation,	1	ICT
UNIT V			
	Growth and Development: Sigmoidal growth curve, Plant growth regulators: Auxins, Gibberellins, Cytokinins, Abscissic acid and Ethylene. Physiology of flowering: Photoperiodism, Vernalization.	10	Lecture
	Seed dormancy: Causes and methods of breaking seed dormancy,	1	ICT

	Stress physiology. Biological clock.	4	Lecture
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Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	2	3	3	3	3	4	4	4	5	3	4	3	2	5	3.42
CO2	2	2	4	4	4	4	3	5	3	5	5	5	4	4	3.85
CO3	2	4	4	3	3	3	3	5	5	5	4	4	2	2	3.50
CO4	3	4	4	3	5	3	3	3	3	3	2	4	5	5	3.57
CO5	4	4	4	4	4	2	2	2	2	4	4	3	2	3	3.14
Mean Overall Score														3.49	

Result: The Score for this Course is 3.49 (High Relationship)

Course Designer: Dr.S.M.Janetta Nithia,

**Programme : B.Sc.**

**Part III: Core Paper IX**

**Semester : III**

**Hours: 4 hrs/week 60 hrs/semester**

**Sub. Code : B53**

**Credits : 4**

**TITLE OF THE PAPER: Biochemistry and Biophysics**



Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	4	2	-	1	1

**PREAMBLE:**

- To familiarize the students about the fundamental concepts of various biomolecules like carbohydrates, lipids, proteins and amino acids.
- To help the students to acquire knowledge on the structure, properties and biological significance of various biological molecules.
- To facilitate the students to learn the concepts involved in the mechanism of enzyme action using enzyme kinetics.
- To emphasize the significance and role of vitamins and coenzymes.
- To appreciate the laws of thermodynamics and their biological significance.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> Understand the structure and properties of Macromolecules	1	12
<b>UNIT 2 CO2:</b> learn about the Significance of Carbohydrates, protein and lipids.	2	12
<b>UNIT 3 CO3:</b> learn the properties of enzymes, enzyme catalysis and Mechanism of enzyme action	3	12
<b>UNIT 4 CO4:</b> understand the role and function of water soluble and fat soluble vitamins.	4	12
<b>UNIT 5 CO5:</b> Understand the concepts in biophysics	5	12

**SYLLABUS**

**Unit I:**

Introduction . Types of Biomolecules – Brief Introduction, carbohydrates :classification , structure and properties of Monosaccharides – Glucose. Disaccharides – Sucrose and Lactose. Polysaccharides – Starch and Cellulose. Amino acids - general structure – properties and classification of Amino acids: Essential and Non-essential amino acids. Nucleic acids-Structure of DNA and RNA.

**Unit II:**

General structure of protein , classification , chemical bonds involved in protein structure – primary , secondary , tertiary , quarternary structure. Lipid: Structure of Lipids – general structure , fatty acid – saturated fatty acids – palmitic acid. unsaturated fatty acids – linoleic acid. Triglycerides. phospholipids : lecithin – glycolipids- cerebrocides – derived lipid: Cholesterol.

**Unit III:**

Nomenclature and classification of enzymes , chemical nature of enzymes , mechanism of enzymes action – Energy Kinetics – Michaelis Menton Equation. Models : lock and key model ,

induced fit model, Enzyme Inhibition – competitive ,non competitive and feedback inhibition.

**Unit IV:**

Vitamins – occurrence, classification, function and deficiency symptoms of water soluble and fat soluble vitamins. Coenzymes : NAD and FAD.

**Unit V:**

Bioenergetics – concept of free energy – Energy rich compounds – Structure of ATP – Laws of thermodynamics – Entropy – Enthalpy – Standard free energy

**References:**

1. Conn E.E & Stumpf P.K., 1997, *Outlines of Biochemistry*, Wiley Eastern.
2. Jain. J.L ,2000, *Fundamentals of Biochemistry*, Chand & Co., New Delhi.
3. Verma. S.K., 2002, *A Text book of Plant Physiology and Biochemistry*, S.Chand & Co., New Delhi.
4. Banerjee , P.K. 2008. *Introduction to Biophysics*, S.Chand & Co., New Delhi.
5. Tuszynski, J.A. and Kurzynski, M. 2003. *Introduction to Molecular Biophysics*, CRC Press , Chennai.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : 12 hours			
	Introduction . Types of Biomolecules – Brief Introduction, carbohydrates :classification , structure and properties of Monosaccharides – Glucose.	4 hours	Chalk–talk method, use of AV aids
	Disaccharides – Sucrose and Lactose. Polysaccharides – Starch and Cellulose. Nucleic acids-Structure of DNA and RNA.	4 hours	Lecture method, AV aids
	Amino acids - general structure – properties and classification of Amino acids: Essential and Non-essential amino acids.	4 hours	Lecture method, Group discussion using POP,
UNIT II: 12 hours			
	General structure of protein , classification , chemical bonds involved in protein structure – primary , secondary , tertiary , quarternary structure.	4 hours	chalk and talk method and AV aids
	Lipid: Structure of Lipids – general structure ,	4 hours	Explanation using

	fatty acid – saturated fatty acids – palmitic acid. unsaturated fatty acids – linoleic acid.		PPT,Lecture method.
	Triglycerides. phospholipids : lecithin – glycolipids- cerebrocides – derived lipid: Cholesterol.	4 hours	chalk and talk method and group dicussion
UNIT III: 12 hours			
	Nomenclature and classification of enzymes , chemical nature of enzymes ,	4 hours	Chalk and talk method ,Use of AV aids.
	Mechanism of enzymes action – Energy Kinetics – Michaelis Menton Equation.	4 hours	Lecture method and GD
	Models : lock and key model , induced fit model, Enzyme Inhibition – competitive ,non competitive and feedback inhibition.	4 hours	AV aids and Chalk and talk method.
UNIT IV: 12 hours			
	Vitamins – occurrence, classification, function and deficiency symptoms of water soluble vitamins.	5 hours	Black Board teaching techniques and Use of OHP
	Vitamins – occurrence, classification, function and deficiency symptoms of fat soluble vitamins	5 hours	Use of PPT and Chalk and talk method
	Coenzymes : NAD and FAD.	2 hours	Lecture method and group discussions using AV aids
UNIT V: 12 hours			
	Bioenergetics – concept of free energy	4 hours	Lecture method and group discussions
	Energy rich compounds – Structure of ATP	4 hours	Use of OHP ,Chalk and talk method
	Laws of thermodynamics – Entropy – Enthalpy – Standard free energy	4hours	Chalk and talk method ,Use of AV aids .

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PSO 2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	3	3	4	4	3	4	3	3	3	3	3	3	3	3.2
CO2	3	3	3	3	4	3	3	3	3	4	3	3	3	3	3.1
CO3	3	3	4	4	3	3	3	3	3	3	3	3	3	4	3.2
CO4	4	4	3	3	3	4	3	4	3	4	3	3	3	3	3.4
CO5	4	3	4	3	4	3	3	4	4	3	3	3	3	3	3.4
Mean Overall score														3.26	

Result: The Score for this Course is 3.26 (High Relationship)

Course Designer: Mrs.M.P.SIVASANKARI

**Programme : B.Sc - Botany**

**Semester : VI**

**Sub. Code : B61**

**Part III: Core/Allied/Elective**

**Hours : 5 P/W 75 Hrs P/S**

**Credits :5**

**TITLE OF THE PAPER: Microbiology**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
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	5	4	-	-	1	
<b>PREAMBLE:</b>						
<p>1) This course recognize and describe the history and characteristics of bacteria.</p> <p>2) Describe the beneficial role of microorganisms in fermented foods and bacterial reproduction.</p> <p>3) Helps to Identify the bacteria, techniques to study culture media.</p> <p>4) Acquire, discover, and apply the theories and principles of food microbiology in practical, real-world situations and problems.</p> <p>5) Understand immune system and immunology.</p>						
<b>COURSE OUTCOME</b>					Unit	Hrs P/S
At the end of the Semester, the Students will be able to						
<b>UNIT 1 CO1:</b> Students will be able to acquire, articulate, retain and apply knowledge relevant to microbiology.					1	15
<b>UNIT 2 CO2:</b> Students will acquire and demonstrate competency growth and reproduction of bacteria.					2	15
<b>UNIT 3 CO3:</b> Students will learn culture medium types and bacterial straining.					3	15
<b>UNIT 4 CO4:</b> Students will make the students to Understand the general characteristics of water and food microbiology.					4	15
<b>UNIT 5 CO5:</b> Students will acquire knowledge on immunology microbiological laboratory skills applicable to microbiological research.					5	15
<b>SYLLABUS</b>						
<b>UNIT I:</b>						
History-Contributions of Anton von Leewenhoek, Louis Pasteur, Robert Koch, Classification of Bacteria (Bergey's Manual), ultrastructure of Bacteria, General characters of virus, Bacteriophage – structure and multiplication						
<b>Unit II:</b>						
Growth of Bacteria : growth and multiplication of bacteria , sigmoidal growth curve-Generation time. Nutritional types of Bacteria-Photosynthetic, Chemosynthetic Bacterial Recombination – Transformation, Transduction, Conjugation ( F <sup>+</sup> & HFr).						
<b>Unit III:</b>						
Techniques to study bacteria : Staining methods – Simple, Gram staining and Negative Staining. Culture of bacteria : Culture media :Types , preparation and sterilization of medium. Pure culture techniques – streak plate, pour plate, spread plate						
<b>Unit IV:</b>						
Water microbiology-analysis of water for coli forms ,waste water treatment processes- Primary, secondary and tertiary methods. Food microbiology::microbial spoilage of fruits vegetables, meat. Flora of Milk and pasteurization of milk .						
<b>Unit V:</b>						
Immunology-General account of immune system and immunology .Types of immunity-Natural and acquired immunity, active and passive immunity .Antigen and antibody (types), requirements, antigen, antibody interaction. ELISA						
<b>Reference:</b>						
<ol style="list-style-type: none"> <li>1. Dubey and D.K. Maheswari – 2001, <i>A Text Book of Microbiology</i>, S. Chand and Co., New Delhi.</li> <li>2. Frazier, C.W. Westhoff, C.D. – 2011, <i>Food Microbiology</i>, Tata Mc Graw Hill Education Pvt. Ltd., New Delhi.</li> <li>3. Micheal, J. Pelczar Jr. C.S. Chan, Noel R. Krieg – 1993, <i>Microbiology</i>, Tata Mc Graw, New Delhi, 5<sup>th</sup> ed.</li> <li>4. Nicklin, J. Grasmee Cook, K. Paget &amp; Killington, R. 1998, <i>Instant Notes in Microbiology</i>, Viva Books.</li> <li>5. Purohit, S.S.-1998, <i>Microbiology and Application Botanica</i>, 6<sup>th</sup> Ed.</li> </ol>						

6. Talora, K.P. & Talora, A.-1998, *Fundamentals in Microbiology*, WCB Mc Graw Hill.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	History-Contributions of Anton von Leewenhoek,Louis Pasteur ,Robert Koch,Classification of Bacteria (Bergey's Manual), ,	7 hrs	Lecture
	ultrastructure of Bacteria, General characters of virus	7hrs	Lecture
	Bacteriophage – structure and multiplication	1 hr	ICT
UNIT II			
	Growth of Bacteria : growth and multiplication of bacteria ,	6	Lecture
	sigmoidal growth curve- Generation time.	1	ICT
	Nutritional types of Bacteria-Photosynthetic,Chemosynthetic Bacterial Recombination – Transformation, Transduction, Conjugation ( F <sup>+</sup> & HFr).	8	Lecture
UNIT III			
	Techniques to study bacteria : Staining methods – Simple, Gram staining and Negative Staining.	8	Lecture
	Culture of bacteria : Culture media :Types , preparation and sterilization of medium.	6	ICT
	Pure culture techniques – streak plate, pour plate, spread plate	1	Lecture
UNIT IV			
	Water microbiology-analysis of water for coli forms ,waste water treatment processes-Primary, secondary and tertiary methods.	9	Lecture
	Food microbiology::microbial spoilage of fruits vegetables, meat.	1	ICT
	Flora of Milk and pasteurization of milk .	5	Lecture
UNIT V			

	Immunology-General account of immune system and immunology active and passive immunity.	7	Lecture
	.Types of immunity-Natural and acquired immunity, .Antigen and antibody (types),requirements, antigen, antibody interaction	7	Lecture
	ELISA	1	ICT

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	5	4	4	4	4	4	3	3	3	3	3	3	3	2	3.42
CO2	3	3	3	3	3	3	3	3	3	3	3	4	4	4	3.21
CO3	4	4	4	2	2	2	3	3	3	3	3	3	5	5	3.28
CO4	2	2	3	3	3	2	2	2	5	5	3	3	2	3	2.85
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	5	3.14
Mean Overall Score															3.18

Result: The Score for this Course is 3.18 (High Relationship)  
Course Designer: Dr.S.M.Janetta Nithia,

**Programme : B.Sc -Botany**  
**Semester : VI**

**Part III: Core/Allied/Elective**  
**Hours : 5 P/W 75 Hrs P/S**

Sub. Code : B62

Credits :5

**TITLE OF THE PAPER: Biotechnology, Nanotechnology and Bioinformatics**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	5	4	-	-	1

**PREAMBLE:**

- 1) To provide brief introduction and tools of biotechnology
- 2) To know fermentation technology and fermentor types and design.
- 3) To introduce the students about plant biotechnology and gain knowledge on gene transfer through microbes
- 4). To analyze nanoparticles and learn its application in medical field.
- 5) This course will provide students to know about bioinformatics and types of databases.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1:</b> Know and describe the scope and tools of biotechnology.	1	15
<b>UNIT 2 CO2:</b> understand the fermentation technology and it application in daily life.	2	15
<b>UNIT 3 CO3:</b> gain knowledge on plant biotechnology and gene transfer in plants through microbes.	3	15
<b>UNIT 4 CO4:</b> acquires knowledge about nano particles and its application in medicinal field.	4	15
<b>UNIT 5 CO5:</b> Understand bioinformatics and data bases.	5	15

**SYLLABUS**

**Unit I:**

Brief introduction on Biotechnology, Scope of Biotechnology, Recombinant DNA Technology: Tools- Restriction enzymes: Endonuclease and Exonuclease. Basic properties of Plasmids: Vector- Types of vectors – Plasmid- PBR 322. Phage Lambda vector. Analysis of cloned genes – Southern and Northern Blotting – PCR Technique

**Unit II:**

Fermentation technology : fermentor – design and basic functions, aeration, agitators (impellers and Spargers). Types of fermentors.

**Unit III:**

Plant biotechnology – Introduction to tissue culture – Genetic transformation of plants by *Agrobacterium tumefaciens*. Genetic organisation of Ti plasmid, structure and ,functions encoded by T-DNA.

**Unit IV:**

Nanoparticles: Definition, Classification, Characterization, biological synthesis of gold nanoparticles. Applications of nanoparticles in medical field

**Unit V**

Bioinformatics, Data base, Types of data base – Retrieval of information from Data Base – Protein and Nucleic acids. Details of websites – Pairwise Alignment – FASTA, BLAST. Multiple Sequence Alignment- Clustal W, Sequence analogy – Protein sequences – Nucleic acid sequences, Phylogenetic analysis.

**References:**

1. Balasubramanian. D. – Bryce CFA , Dharmalingam K. Green J, Kunthala Jayaraman, 2007, *Concepts in Biotechnology* – University Press India Pvt. Ltd.
2. Becker. J.M., Coldwell GA and Zachgo EA. 2007, *Biotechnology* – A Laboratory Course Academic Press.
3. Brown. T.A. *Gene cloning and DNA analysis*. Black Well publishing.
4. Colin Ratledge and Bjorn Krishansen, 2008, *Basic Biotechnology*, Cambridge University Press.
5. Dubey. R.C., 2006, *A Text Book of Biotechnology* S.Chand and Company, New Delhi.
6. Gupta. PK., 2006, *Biotechnology and Genomics*. Rastogi Publications.



7. Jogdand. S.N., 1999, *Advances in Biotechnology*, Himalaya Publishers, Mumbai.
8. John E. Smith., 2006, *Biotechnology*, Cambridge University Press
9. Singh. B.D., 2007, *Biotechnology, Expanding Horizon*, Kalyani Publications, Ludhiana.
10. Sobti. R.C. and Suparna. S. Panchauri. 2009, *Essentials of Biotechnology*, Ane Books Pvt. Ltd.
11. Veer Bala Rastogi 2008, *Fundamentals of Molecular Biology*, Ane Books Pvt. Ltd.
12. Desmond. S.T., Nicholl 1994, *An Introduction to Genetic engineering* (second edition) Cambridge University Press, Foundation Books Pvt. Ltd., New Delhi.
13. Remawat. K.G., 2006, *Plant Biotechnology* S. Chand & Company Ltd., New Delhi.
14. Purohit. S. S., 2004, *A Laboratory Manual of Plant Biotechnology*. Agro bios India.
15. Balaji,S. 2010. *Nanobiotechnology*. MJP Publishers, Chennai.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
	Brief introduction on Biotechnology, Scope of Biotechnology, Recombinant DNA Technology: Tools- Restriction enzymes: Endonuclease and Exonuclease. Basic properties of Plasmids: Vector- Types of vectors –Plasmid- PBR 322. Phage Lambda vector. Analysis of cloned genes – Southern and Northern Blotting –	12	Lecture
	PCR Technique	3	ICT
<b>UNIT II</b>			
	Fermentation technology : fermentor – design and basic functions, aeration, agitators (impellers and Spargers).	12	Lecture
	Types of fermentors	3	ICT
<b>UNIT III</b>			
	Plant biotechnology – Introduction to tissue culture – Genetic transformation of plants by Agrobacterium tumefaciens. Genetic organisation of	12	Lecture
	Ti plasmid, structure and ,functions encoded by T-DNA.	3	ICT

UNIT IV			
	Nanoparticles: Definition, Classification, Characterization, biological synthesis of gold nanoparticles.	12	Lecture
	Applications of nanoparticles in medical field	3	ICT
UNIT V			
	Bioinformatics, Data base, Types of data base – Retrieval of information from Data Base – Protein and Nucleic acids. Details of websites – Pairwise Alignment – FASTA, BLAST. Multiple Sequence Alignment- Clustal W, Sequence analogy – Protein sequences –	12	Lecture
	Nucleic acid sequences, Phylogenetic analysis.	3	ICT

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3	3	3	3	3	4	4	4	4	4	4	2	2	3	3.28
CO2	3	3	4	4	4	4	4	4	4	4	4	3	3	3	3.71
CO3	2	2	4	4	4	3	3	3	3	3	4	4	4	4	3.35
CO4	4	4	4	4	4	4	2	2	3	3	3	3	3	4	3.35
CO5	5	4	4	3	3	4	4	4	3	3	3	3	3	4	3.57
Mean Overall Score														3.45	

Result: The Score for this Course is = 3.45 (High Relationship)

Course Designer: Dr.S.M.Janetta Nithia

**Major Botany Practical – Scheme of Examination**

Sub. Code	Sem. No.	Paper No.	Subject	Duration in Hours	Passing Minimum 40%		
					Int.	Ext.	Total
PB1	IV	1	Plant Anatomy and Embryology of Angiosperms. & Biological Techniques and Biostatistics	4+4	40	60	100
PB2	VI	2	Taxonomy of Angiosperms, Plant Physiology, Biochemistry & Biophysics, Microbiology, Biotechnology, Nanotechnology & Bioinformatics.	3+3+2	40	60	100

**Programme : B.Sc.Botany**

**Semester : IV**

**Part III: Core Paper**

**Hours: 8 hrs/week 120 hrs/semester**

Sub. Code : PB1

Credits : 4

**TITLE OF THE PAPER: Practical Paper I**

Pedagogy	Hours	Lab experimentation	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	8	8	-	-	-

**PREAMBLE:**

- To help the students about the concepts on plant diversity and to develop the skills in identifying the plant group.
- To understand the principles and concepts in anatomy.
- To acquire the skills on sectioning and identifying them with characteristic features.
- To understand the practical aspects of biostatistics and problems related to probability.
- To acquire knowledge about the Mendelian laws.

**COURSE OUTCOME**

At the end of the Semester, the students will be able to

**UNIT 1 CO1:** able to write technical description of plants to their systemic position.

**UNIT 2 CO2:** apply the knowledge of plant observation and identify them with characteristic features.

**UNIT 3 CO3:** learn the concept of biostatistics and apply it in experiments.

**UNIT 4 CO4:** identify the types of stomata and its distribution in plants

**UNIT 5 CO5:** acquire knowledge in Mendelian laws.

**Syllabus**

1. Section cutting-Thallus of Riccia,Anthoceros,sporophyte of funaria
2. Puccinia – Types of spores
3. Section cutting-Marsilea,Lycopodium
4. Section cutting –Pinus needle
5. Anatomy of root, stem and leaf- Dicot and Monocot.
6. Stomatal types.
7. Anomalous Secondary growth in Dicot stem-Boerhaavia.
8. Mounting of Dicot embryo – Globular, Heart shaped
9. Mean, Median, Mode and Standard Deviation for Polyalthia & Neem leaf.

10. Problems related to Probability.
11. Verification of Mendelian laws-Monohybrid, Dihybrid.
12. Drosophila eye colour – demonstration.
13. Human traits-Earlobes, clasping the hand.
14. Spotters related to theory

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS 1	PS 2	PS 3	PS 4	PS 5	PS 6	PS 7	
CO1	3	3	3	4	4	3	4	3	3	3	3	3	3	3	3.2
CO2	3	3	3	3	4	3	3	3	4	4	3	3	3	3	3.2
CO3	3	3	4	3	4	3	4	3	3	3	3	4	3	4	3.4
CO4	4	3	4	3	3	4	3	4	3	4	3	3	3	3	3.4
CO5	4	3	4	3	3	4	3	4	4	3	3	3	3	3	3.4
Mean Overall score														3.32	

Result: The Score for this Course is 3.32 (High Relationship)

Course Designer: Dr.Grace Lydial pushpalatha

**Programme : B.Sc.**

**Semester : V**

**Sub. Code : PB2**

**Part III: Practical Paper II**

**Hours: 8 hrs/week 120 hrs/semester**

**Credits : 4**

**TITLE OF THE PAPER: Practical Paper II**

Pedagogy	Hours	Lab experimentation	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	8	8	-	-	-

**PREAMBLE:**

- To help the students about the concepts on plant systematics and to develop the skills in identifying the flora.
- To understand the principles and concepts involved in plant physiological systems through simple experiments.
- To acquire the skills on basic principles of biomolecules using biochemical experiments.
- To understand the practical aspects of microbiology such as characterization of microbes, staining procedures and preparation of pure cultures.
- To acquire knowledge about the techniques and basic concepts in biotechnology.

**COURSE OUTCOME**

At the end of the Semester, the students will be able to

**CO1:** able to write technical description of plants and construct and use keys for identification.

**CO2:** apply the knowledge of plant observation to their underline physiological causes.

**CO3:** learn the qualitative and quantitative analysis of biomolecules through various lab techniques.

**CO4:** identify common microbes from diverse natural habitats and isolate microbial cultures.

**CO5:** acquire knowledge in experiments pertaining to biotechnology..

**SYLLABUS**

- 1.Submission of 10 herbarium sheets
- 2.Floral description of families related to theory
- 3.Potato Osmoscope
- 4.Measurement of water potential by plasmolytic method
- 5.Stomatal index.
- 6.Rate of transpiration – Ganong’s photometer.
- 7.Rate of photosynthesis using Wilmot’s bubbler – effect of carbonate source monochromatic light.
- 8.Respiration – Ganong’s respiroscope
- 9.Growth – Arc auxanometer.
- 10.Estimation of glucose , protein and lipid from plant tissue
- 11.Preparation of standard graph for glucose and protein from plant tissue.

12. Paper chromatography – separation of Pigments
13. Preparation of buffer
14. Estimation of chlorophyll and carotenoids
15. Qualitative test for carbohydrates, protein, lipid.
16. Preparation of media.
17. Isolation of bacteria from soil/water/food.
18. Pure culture Techniques –streak plate/spread plate/pour plate.
19. Simple staining.
20. Gram staining.
21. Hanging drop method
22. Isolation of DNA – Plant 23. Spotters related to theory.

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PSO 2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	3	3	4	4	3	4	3	3	3	3	3	3	3	3.2
CO2	3	3	3	3	4	3	3	3	4	4	3	3	3	3	3.2
CO3	3	3	4	4	3	3	4	3	3	3	3	4	3	4	3.4
CO4	4	4	3	3	3	4	3	4	3	4	3	3	3	3	3.4
CO5	4	3	4	3	4	3	3	4	4	3	3	3	3	3	3.4
Mean Overall score														3.32	

Result: The Score for this Course is 3.32 (High Relationship)

Course Designer: Mrs.M.P.SIVASANKARI

**Programme : B.Sc**

**Semester : V**

**Sub. Code : EB51**

**TITLE OF THE PAPER: FORESTRY AND ECONOMIC BOTANY**

**Part III: Core Elective**

**Hours : 5 P/W 75Hrs P/S**

**Credits :5**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
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	5	3	1	-	1	
<b>PREAMBLE:</b>						
1. Effectively demonstrate knowledge of the value of plants in our everyday lives.						
2. To make the students aware about conservation and sustainable use of plants for the people and future generation						
3. To disseminate the value of plants, the types of forest, its degradation, agroforestry						
4. To inculcate the habit of economic utilization of plants .						
<b>COURSE OUTCOME</b>					Unit	Hrs P/S
At the end of the Semester, the Students will be able to						
<b>UNIT 1 CO1</b> ; make decisions and exercise informed judgement in relation to native forest, plantation, develop and implement well-justified forest management strategies Get awareness on the conservation practices of medicinal plants					1	15
<b>UNIT 2 CO2:</b> incorporate the foundational natural and social sciences into decision making, Study the interactions of people and plants					2	15
<b>UNIT 3 CO3:</b> Understand the economic products with special reference to the Botanical name, family, morphology of useful part and the uses, Describe healing and medicinal uses of plants					3	15
<b>UNIT 4 CO4:</b> Gain knowledge about economic products with special reference to the Botanical name, family, morphology of useful part and the uses, Describe healing and medicinal uses of plants					4	15
<b>UNIT 5 CO5:</b> Know about the major and minor ethnic groups or Tribals of India, and their life styles. Gain knowledge on the role of ethnobotany in modern Medicine					5	15
<b>SYLLABUS</b>						
<b>UNIT I:</b> Introduction, Types of forest in India, Indian institutes involving forest management and conservation						
<b>UNIT II:</b> Deforestation – natural and man made, Afforestation and Reforestation. Shifting cultivation.-Social forestry, Agro forestry and its components and their significance						
<b>UNIT III:</b> Major forest products: Wood, (Sandal, Rosewood ) Timber (Teak and Eucalyptus) Fuel Wood (Acacia and Prosopis). Minor forest products: Essential oils (Lemon grass) spices and condiments: Cinnamon, Clove and Pepper. Gums and resins: Gum Arabic & Ferula						
<b>UNIT IV:</b> Economic Botany: Name, Family, Cultivation (in brief) and Uses of Cereals (Rice, Wheat), Pulses (Red gram, Black gram), Oil (Gingelly oil, Coconut oil), Spices (Chilly, Crocus), Condiments (Garlic, Ginger) and Beverages (Tea, Coffee).						
<b>UNIT V:</b> Ethnobotany: History of Ethnobotany, Tribals in Tamil Nadu, Types of Ethnic groups, Traditional Medicines used by Ethnic groups for diseases management, Ethno medicines.						
<b>TEXT BOOKS:</b> 1. Krishnamoorthy.T., 1993, <i>Minor forest products of India</i> , Oxford and IBN Publishing Co.Pvt., Ltd., New Delhi.						
2. Pandey.B.P., 1995, <i>Economic Botany</i> , S.Chand & Company Ltd., New Delhi.						
3. Ganesan. S., 2011, <i>Vol.1, South India Ethomedicinal Plants</i> , Thiagarajar College, Madurai						
<b>REFERENCES:</b> 1. Agarwal.V.P., 1990, <i>Forests in India</i> , Oxford & IBH Publishing Co,Pvt., Ltd., New Delhi.						
2. Bandyopadhyay, A.K., 1997, <i>A Text Book of Agroforestry with Applications</i> , Vikas Publishing House Pvt., Ltd., New Delhi						





	1	2	3	4	5	6	7	1	2	3	4	5	6	7	
CO1	4	3	3	3	3	4	4	4	3	3	3	3	3	3	3.21
CO2	3	4	3	4	3	4	3	3	3	4	3	3	4	3	3.35
CO3	3	3	4	3	3	3	3	3	4	3	4	3	3	3	3.21
CO4	3	4	3	3	3	4	3	3	3	4	3	3	3	2	3.14
CO5	3	3	3	3	3	3	4	3	3	4	3	4	3	4	3.28
Mean Overall Score															3.23

Result: The Score for this Course is 3.23 (High Relationship)

Course Designer: Dr.G.MANGAI KASTHURI

**Programme : B.Sc.**

**Semester : VI**

**Sub. Code : EB62**

**Part III: Major related Elective Paper II**

**Hours: 6 hrs/week 90hrs/semester**

**Credits : 5**

## TITLE OF THE PAPER: INDUSTRIAL MICROBIOLOGY

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT	
	6	3	1	1	1	
<p><b>PREAMBLE:</b> The drive to device and develop bio-base technologies make structurally simple and easy to manoeuvre microbes as agents of change in food, pharmaceutical and health industries where marketable products are made. Thus with opportunities booming, this course is all set out to entrain learners looking for career opportunities in the various avenues.</p>						
<b>COURSE OUTCOME</b>					Unit	Hrs P/S
At the end of the Semester, students will be able to						
<b>UNIT 1 CO1:</b> understand the role and functions of microbes in nature and confidently handle microbes for gainful employment as technician and expert					1	14 hrs
<b>UNIT 2 CO2:</b> apply their knowledge and training for manipulation of microbes and microbial processes in production and service industries					2	22 hrs
<b>UNIT 3 CO3:</b> produce marketable products that they will be job-ready to join large scale and small or can start their own entrepreneurial projects					3	18 hrs
<b>UNIT 4 CO4:</b> find their spaces of engagement in the extended domains of food industries and energy production and gain confidence in taking job roles as technicians and managers					4	18 hrs
<b>UNIT 5 CO5:</b> to intelligently manipulate microbes in producing vaccines and antibiotics thereby gaining confidence in seeking placements in sales and service sector of the pharmaceutical companies					5	18 hrs
<p><b>SYLLABUS</b></p> <p><b>Unit I:</b></p> <p style="padding-left: 40px;">Introduction, microbes as ideal organisms for Industries, microbes as suppliers of Natural Resources. Role of microorganisms in the production of Industrial Products.</p> <p><b>Unit II:</b></p> <p style="padding-left: 40px;">Fermentation Technology- Stages of Fermentation, Designing of Bioreactors, Stirred tank Fermentor, Formulation of Medium, Sterilization, Isolation, Selection of microorganisms. Inoculum development: Culture of Microorganisms. Downstream processing- Purification of Products.</p> <p><b>Unit III:</b></p>						

Fermentation Products- Amino Acids, Alcohols, Vinegar. Industrial Production of Ethanol.

**Unit IV:**

Enzymes: Amylase, Protease. Organic Acids: Citric Acid, Lactic Acid. Biomass into bio energy- Production of Biogas.

**Unit V:**

Production of Antibiotics: Penicillin, Streptomycin . Preparation of Vaccines & Marketing.

**References:**

1. Pelzar. M.J., Chan. E.C.S., Kreig. N.R., 1993, *Microbiology Concepts and Applications*, Mc Graw Hills, Inc. New York.
2. Dubey and D.K.Maheswari, *Text Book of Microbiology*, S.Chand and Company, New Delhi.
3. Sullia.S. and S.Shantha Ram, *General Microbiology*, Oxford and IBH Publishing, New Delhi.
4. Atlas. R.M., 1997, *Principles of Microbiology*, Mc Graw Hills.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1 : 14 hours per semester			
	Introduction, microbes as ideal organisms for Industries	4 hours	Using collection of data of microbes used as catalysts and raw materials for industrial processes
	Microbes as suppliers of Natural Resources	5 hours	Industrial visit Market Sensitization
	Role of microorganisms in the production of Industrial Products	5 hours	Using collection of appropriate material, products and produce for making display as exhibits, GD
UNIT II : 22 hours per semester			
	Fermentation	3 hours	Explaining pathways using

	Technology- Stages of Fermentation		charts and AV aids
	Designing of Bioreactors, Stirred tank fermentor	5 hours	AV aids, charts and Power point presentation
	Formulation of Medium, Sterilization	4 hours	Demonstrations and group work , Power point presentation
	Isolation, Selection of microorganisms. Inoculum development: Culture of Microorganisms	5 hours	Hands- on training and study in asepsis in small volume cultures and large installations
	Downstream processing- Purification of Products	5 hours	Industrial Visits to study equipment design on small and large installations
UNIT III : 18 hours per semester			
	Fermentation Products- Amino Acids	5 hours	Survey of market potential Peer teaching
	Fermentation Products- Alcohols	3 hours	Using collection of marketable products for Display, AV aids, charts and slides
	Fermentation Products- Vinegar	5 hours	Assessment of diversified use in Food Industry, Peer teaching
	Industrial Production of Ethanol	5 hours	Power point presentation,GD and Peer Teaching Technique
UNIT IV : 18 hours per semester			
	Enzymes: Amylase,	6 hours	AV aids and Power point

	Protease		presentation
	Organic Acids: Citric Acid, Lactic Acid	6 hours	AV aids and Power point presentation, Site Study at Commercial Plant
	Biomass into bioenergy- Production of Biogas	6 hours	Power point presentation, Site Study, Creation of Table Top POP Model
UNIT V : 18 hours per semester			
	Production of Antibiotics: Penicillin	6 hours	Visit to Production Units Study of equipment design at installations in a site study AV aids, charts and slides
	Production of Streptomycin	6 hours	Industrial Visit and Market Survey for Impact Assessment
	Preparation of Vaccines & Marketing	6 hours	Industrial visit and site study at King /Pasteur institute Study of production-sales network

Course Outco	Programme Outcomes (Pos)	Programme Specific Outcomes (PSOs)	Mean scores
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mes (Cos)															of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	4	4	3	4	3	4	4	4	4	4	4	3	4	4	3.79
CO2	3	4	3	4	4	3	4	4	4	3	4	3	4	4	3.64
CO3	3	4	3	4	4	3	4	3	4	4	3	4	4	4	3.64
CO4	4	4	3	4	3	3	4	4	4	3	4	3	4	4	3.64
CO5	3	4	3	4	3	4	4	3	4	3	4	4	4	4	3.64
Mean Overall Score														3.67	

Result: The Score for this Course is 3.67 (High Relationship)

Course Designer: Dr.G.Grace Lydial Pushpalatha

**Programme : B.Sc.**

**Semester : VI**

**Part III: Major related Elective Paper III**

**Hours: 5 hrs/week 75 hrs/semester**

Sub. Code : EB63

Credits : 5

**TITLE OF THE PAPER: BIODIVERSITY**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	5	2	1	1	1

**PREAMBLE:** This paper is structured to cap the learning of plant sciences at its threshold. Content selection is done in such way to impress upon the student to realize her obligation in protecting, conserving and judiciously managing nature and its resources.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> scientifically and systematically study and investigate botanical elements that have material, cultural and aesthetic values and take upon themselves the obligation to upkeep and replenish the dwindling resources	1	15 hours
<b>UNIT 2 CO2:</b> handle issues that are considered serious threats to biodiversity as they would be sensitized to prevent the ongoing onslaughts on nature	2	15 hours
<b>UNIT 3 CO3:</b> creatively participate and contribute to the implementation of national and global initiatives and involve in focussed efforts directed on saving nature and biodiversity	3	15 hours
<b>UNIT 4 CO4:</b> to preserve depleting bioresources and evince interest in proactive and confident engagement in preparing action plans and advocacies aimed to conserve the bioresources	4	15 hours
<b>UNIT 5 CO5:</b> wilfully give their time and effort in fulfilling the tasks and goals they set before themselves to benefit their training for a meaningful participation and wholesome involvement directed at protecting and managing biodiversity	5	15 hours

**SYLLABUS**

**Unit I:**

Biodiversity and its importance. Genetic, species and ecosystem diversity. Uses of biodiversity-source of food, medicine, raw material, aesthetic and cultural values. Keystone species, umbrella species, flagship species, charismatic species and feral species.

**Unit II:**

Biodiversity centres- Global and Indian level. Hotspots and Mega diversity zones of India. Threats to biodiversity (natural and anthropogenic), IUCN threat categories, Red data book.

**Unit III :**

Conventions on Biodiversity (CBD)-Rio summit, Kyoto conference. Man and Biosphere-UNEP- IUCN . Characteristic features of biosphere reserves : Gulf of Mannar, Nilgris Biosphere Reserve.

**Unit IV:**



Principles and strategies of biodiversity conservation: Ex situ-Botanical garden, Zoos, Aquaria, Herbarium. In situ-Sanctuaries, Biosphere reserve, National park. In vitro germplasm, gene bank, tissue culture, pollen bank, DNA bank.

**Unit V:**

Remote sensing: definition, applications of GIS, GPS, Remote sensing in environmental studies, vegetation classification (techniques need not be discussed in detail). Intellectual property rights : TRIP, Patent Act, Traditional knowledge in relation to IPR.

**Reference:**

1. Jaganmohan Reddy, K. & Veeraiah, S. 2010, *Aavishkar*, Publishers, Distributors, Jaipur.
2. Krishnamurthy, K.V. 2003, *An Advanced Text book on Biodiversity*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Narasaiah, M.L. 2005, *Biodiversity and Sustainable Development*, Discovery Publishing House, New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : 15 hours per semester			
	Biodiversity and its importance. Genetic, species and ecosystem diversity	5 hours	Blackboard use to familiarize and internalize terms, definitions and key words
	Uses of biodiversity-source of food, medicine, raw material, aesthetic and cultural values.	5 hours	Sensitising students to do surveys and to collect appropriate materials, products and produce that would form an input for food, health and pharmaceutical industries and exhibit the collections

	Keystone species, umbrella species, flagship species, charismatic species and feral species.	5 hours	Comparative studies with charts and Power point presentations
UNIT II : 15 hours per semester			
	Biodiversity centres- Global and Indian level	4 hours	ICT enabled presentations and video conferencing with experts
	Hotspots and Mega diversity zones of India	4 hours	Appraisal through field trips and site study, use of museum mounts and AV aids, Peer teaching
	Threats to biodiversity (natural and anthropogenic)	4 hours	Preparation of chart, models and other exhibits for knowledge dissemination and public viewing
	IUCN threat categories, Red data book	3 hours	Power Point Presentation with animations and video clips, Peer teaching
UNIT III : 15 hours per semester			
	Conventions on Biodiversity (CBD)- Rio summit, Kyoto conference	3 hours	Power point presentations, videos
	Man and Biosphere- UNEP-IUCN	3 hours	GD, Videos, Tutorial
	Characteristic features of biosphere reserves	3 hours	Use of AV aids, Peer teaching techniques
	Gulf of Mannar Biosphere Reserve	3 hours	Appraisal through field trips and site study, Documentaries and slide shows

	Nilgris Biosphere Reserve	3 hours	Appraisal through field trips and site study, Documentaries and slide shows
UNIT IV : 15 hours per semester			
	Principles and strategies of biodiversity conservation	2 hours	Blackboard use towards familiarising and internalising key words, terms, definitions used GD and Peer teaching to present schemes of nature conservation and management
	Ex situ-Botanical garden, Zoos, Aquaria, Herbarium	4 hours	Study of designs and constructions making use of ICT tools Field trips and institutional visits for site study
	In situ-Sanctuaries, Biosphere reserve, National park	4 hours	Appraisal through field trips and site study, Documentaries and slide shows
	In vitro germplasm, gene bank, tissue culture, pollen bank, DNA bank	5 hours	AV aids, Peer teaching, Power point presentations
UNIT V : 15 hours per semester			
	Remote sensing: definition, applications of GIS, GPS	4 hours	Visits and site study of installations, Power point presentations
	Remote sensing in environmental studies,	4 hours	Short films and Documentaries

	vegetation classification		
	Intellectual property rights : TRIP, Patent Act	4 hours	GD and Peer Teaching, Power point presentations
	Traditional knowledge in relation to IPR	3 hours	Community Interactions Survey and Interview techniques using formatted questionnaires

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	4	4	4	4	4	4	4	4	3	4	4	3	4	4	3.86
CO2	4	3	4	4	4	4	4	3	3	3	4	4	3	4	3.64
CO3	4	4	4	4	3	4	4	4	3	4	3	4	3	4	3.71
CO4	4	4	4	4	3	4	4	4	3	3	4	4	3	4	3.71
CO5	4	3	4	4	3	4	4	4	3	4	4	3	4	4	3.71
Mean Overall Score														3.73	

Result: The Score for this Course is 3.73 (High Relationship)

Course Designer: Dr.G.Grace Lydial Pushpalatha

**Ancillary Environmental Biology for Botany – Theory**  
**Scheme of Examination**

Year	Sem. No.	Paper No.	Subject	Duration of Exam (Hours)	Passing Minimum 40%		
					Int.	Ext.	Total
I	I	1.	Introduction to Ecobiology	3	25	75	100
	II	2.	Energy Resources	3	25	75	100

**Programme : B.Sc., Botany**  
**Semester : I**

**Part III: Allied**  
**Hours : 4P/W 60 Hrs P/S**

Sub. Code : AH1

Credits : 4

**TITLE OF THE PAPER: INTRODUCTION TO ECOBIOLOGY**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	4	2		1	1

**PREAMBLE:**

1. Compare morphological and anatomical adaptations of plants with respect to their habitat.
2. Develop knowledge to study Organisms and their interactions with reference to habitat and evolution.
3. To acquire knowledge about ecosystem
4. Analyze the causes of succession. Differentiate Hydrosere from Xerosere.
5. Application of quadrat and transect method to assess vegetation.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1:</b> Understand various zones of environment and adaptations of Hydrophytes, Xerophytes and Halophytes to their respective habitat.	1	12
<b>UNIT 2 CO2:</b> Differentiate positive and negative interrogations	2	12
<b>UNIT 3 CO3:</b> Understand the structure and function of ecosystem	3	12
<b>UNIT 4 CO4:</b> Develop concept on hydrosere and Xerosere. Causes and basic types of succession.	4	12
<b>UNIT 5 CO5:</b> Enable students to carry out vegetation studies	5	12

**SYLLABUS**

**Unit I:**

Concept of biosphere, Hydrosphere: physical chemical properties of water, lithosphere: soil profile , Atmosphere: various zones. Adaptations - Hydrophytes: *Hydrilla*, Xerophytes: *Opuntia*, Halophytes: *Rhizophora* .

**Unit II:**

Biotic interactions: Mutualism- *Rhizobium*; Commensalism- *Vanda*; Parasitism- *Cuscuta*; Insectivorous plants-*Nepenthes*.

**Unit III:**

Structure of Ecosystem: Abiotic and Biotic components; Functions of Ecosystem; Food Chain, Food web, Ecological pyramid, Energy flow and productivity.

**Unit IV:**

Ecological succession – causes and basic types of succession, general process – Nudation, Invasion, competition, stabilization Hydrosere and Xerosere.

**Unit V:**

Methods of study of vegetation: Quadrat and Transect methods.

**References:**

1. Krishnamurthy. T 1993, *Minor Forest products of India*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
2. Engene P. Odum, 1971, *Fundamentals of Ecology*, W.B. Saunders Company, Philadelphia, London.
3. Sharma. P.D., 1995, *Ecology and Environment*, Rakesh Kumar Publications, New Delhi.

4. Shukla, R.S. and Chandel, P.S. 2006, *A text book of plant Ecology*, S. Chand & Company Ltd., New Delhi.

5. Verma, P.S. and Agarwal, V.K. 1998, *Concept of Ecology*, S. Chand & Company Ltd., New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	Concept of biosphere physical chemical properties of water lithosphere Atmosphere: various zones. Adaptations - Hydrophytes: <i>Hydrilla</i> , Xerophytes: <i>Opuntia</i> , Halophytes: <i>Rhizophora</i> .	6  6	Lecture  ICT
UNIT II			
	Biotic interaction Mutualism- <i>Rhizobium</i> ; Commensalism- <i>Vanda</i> ; Parasitism- <i>Cuscuta</i> ; Insectivorous plants- <i>Nepenthes</i> .	6  6	ICT  ICT  ICT  ICT
UNIT III			
	Structure of Ecosystem -Abiotic and Biotic components Functions of Ecosystem Food Chain, Food web, Ecological pyramid, Energy flow and productivity.	6  6	Lecture  Lecture
UNIT IV			
	Ecological succession, causes and basic types of succession	4	Lecture PPT & Video
	General process- nudation, invasion, competition, stabilisation	4	Lecture
	Hydrosere & Xerosere	4	Lecture Video
UNIT V			
	Methods of Study of vegetation Quadrat	6	Lecture Video and PPT
	Transect	6	Lecture Video

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	5	5	5	5	2	5	5	4	5	5	3	4	2	5	4.28
CO2	5	5	5	2	2	5	2	3	2	4	3	3	2	2	3.36
CO3	4	3	2	2	2	5	3	5	2	5	4	4	2	4	3.36
CO4	5	4	4	3	2	5	2	5	2	5	3	2	2	5	3.5
CO5	5	2	3	2	2	4	5	2	5	2	2	5	2	3	3.14
Mean Overall Score															3.53

Result: The Score for this Course is 3.53 (High Relationship)

Course Designer: Dr.V.PANDIMADEVI



**Programme: B.Sc. Botany**

**Part III: Allied Paper II**

**Semester : II**

**Hours: 4 hrs/week 60 hrs/semester**

**Sub. Code : AH2**

**Credits : 3**

**TITLE OF THE PAPER: ENERGY RESOURCES**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	4	2	-		2

**PREAMBLE:**

- To enable the students to understand the various energy resources on earth.
- To acquire the basic knowledge on the availability of world energy resources
- To make conscious of conserving the energy available on globe.
- To think about the utilisation of natural resources in proper way
- To enable the students to understand and appreciate the applications of solar energy.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> understands the world energy resources and its availability	1	12
<b>UNIT 2 CO2:</b> Learns about conventional and nonconventional energy and distinguishes them.	2	12
<b>UNIT 3 CO3:</b> understands the principles and mechanism behind solar equipments .	3	12
<b>UNIT 4 CO4:</b> Enable the students to apply the principles of solar energy in routine life	4	12
<b>UNIT 5 CO5:</b> Recognizes the source of biogas production and appreciates its applications.	5	12

## SYLLABUS

### Unit I:

Introduction to Energy resources , Energy consumption as a measure of prosperity, world energy features. Energy resources and their availability, conventional and non conventional energy Resources.

### Unit II:

Conventional Energy Resources - coal, oil, gas.

### Unit III:

Non conventional energy resources: solar energy – Principle, mechanism and application of solar energy in daily life. Solar powered equipments – solar cooker, solar light, solar water heater.

### Unit IV:

Wind energy – principles of wind energy conversion, applications of Wind energy.

### Unit V:

Biomass energy – Energy plantation –Ethanol production, biogas generation, community biogas plant (KVIC and Janata), hydrogen as a source of energy, Biodiesel, Biofuel.

### References:

1. Rai. G.D., 1998, *Non-conventional sources of energy (A text book for engineering students)* Khanna Publishers, New Delhi.
2. Sharma. P.D., 2009, *Environmental Biology*, Rastogi Publications, Meerut
3. Garg. H.P, 2000, *Solar Energy - Fundamental and Applications*, Tata Mc Graw-Hill Publishing Co.
4. James Mitchesll, General Editor- *The illustrated Reference Book in Natural Resources*.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I :			
	Energy resources, energy consumption, world energy features	4	Chalk–talk
	Availability of energy resources	4	Lecture , A V aids
	Conventional and non-conventional resources	4	Lecture
UNIT II:			
	Conventional energy- coal	6	chalk - talk AV aids
	Oil and gas	6	Lecture
UNIT III:			
	Non-conventional energyresources-solar energy	4	Chalk- talk

	Principle, mechanism and application of solar energy	4	Lecture AV aids.
	Solar powered equipments- solar cooker, solar water heater	4	Lecture AV aids.
UNIT IV:			
	Wind energy	4	Chalk- talk
	Principles of wind energy	4	Chalk- talk
	Applications of wind energy	4	Lecture AV aids
UNIT V:			
	Biomass energy, Energy plantation- ethanol production, biogas generation	4	Lecture PPT
	Community biogas plant( KVIC and Janata)	4	Chalk talk, PPT
	Hydrogen as source of energy, biofuel, biodiesel	4	Chalk talk

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	3	4	3	3	4	4	3	3	3	4	3	4	3	3.4
CO2	3	4	3	2	3	4	3	3	4	4	3	4	3	3	3.3
CO3	3	3	3	4	4	3	3	3	3	3	3	3	4	3	3.2
CO4	4	3	4	3	3	4	3	4	3	4	3	4	4	3	3.5
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3.3
Mean Overall score														3.34	

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: I.SOBHA KUMARI

**Ancillary Environmental Biology Practical -for Botany Major**  
**Scheme of Examination**

Year	Sem. No.	Code	Subject	Duration of Exam (Hours)	Passing Minimum 40%		
					Int.	Ext.	Total
I	II	(HPA)	Introduction to Ecobiology and Energy resources	3	40	60	100

Programme : B.Sc.

Part III: Core Paper

Semester : II

Hours: 3 hrs/week 75 hrs/semester

Sub. Code :HPA

Credits : 3

**TITLE OF THE PAPER: Ancillary Practical Paper I**

Pedagogy	Hours	Lab experimentation	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	3	3	-	-	-

**PREAMBLE:**

- To help the students know about the habitats of plants
- To understand the positive and negative interaction.
- To acquire the skills on sectioning and identifying them with characteristic features.
- To understand the principles of solar equipments.
- To acquire knowledge about the study of vegetation.

**COURSE OUTCOME**

At the end of the Semester, the students will be able to

**UNIT 1 CO1:** able to compare the distinguishing features of plants of various habitats.

**UNIT 2 CO2:** apply the knowledge of plant interaction and identify them with special features.

**UNIT 3 CO3:** develops the skill of sectioning and handling lab wares.

**UNIT 4 CO4:** identify and apply the principles of solar powered equipments.

**UNIT 5 CO5:** enable the students to study vegetation using quadrat method.

**Syllabus**

1. External study of Hydrophytes: *Hydrilla*; Xerophytes: *Opuntia* ; Halophytes: *Rhizophora*
2. Anatomical study of *Hydrilla* stem.
3. Positive and Negative Interactions.
4. Study of vegetation using Quadrat method.
5. Ecosystem – Food chain, Food web, Ecological Pyramid.
6. Model showing: Solar light, solar cooker and Solar water heater.
7. Photographs showing conventional and non conventional energy sources.

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS 1	PS 2	PS 3	PS 4	PS 5	PS 6	PS 7	
CO1	3	3	3	4	4	3	4	3	3	3	3	3	3	3	3.2
CO2	3	3	3	3	4	3	3	3	4	4	3	3	3	3	3.2
CO3	3	3	4	3	4	3	4	3	3	3	3	4	3	4	3.4
CO4	3	4	4	3	3	4	3	3	4	4	3	3	3	3	3.4
CO5	4	3	4	3	3	4	3	4	4	3	3	3	3	3	3.4
Mean Overall score														3.32	

Result: The Score for this Course is 3.32 (High Relationship)

Course Designer: Dr.V.Pandimadevi

Programme : B.Sc.Botany

Part III: Skill Based Elective

Semester : V

Hours: 2 hrs/week 30hrs/semester

Sub. Code : SB31

Credits : 2

**TITLE OF THE PAPER: Horticulture**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	2	1	-		1

**PREAMBLE:**

- To enable the students to know the importance of horticulture.
- To develop interest in propagation techniques.
- To acquire the knowledge of preservation methods of vegetables and fruits.
- To enable the students understand the art of gardening.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> Understands the basic knowledge of horticulture	1	6
<b>UNIT 2 CO2:</b> Learns the techniques of artificial propagation.	2	6
<b>UNIT 3 CO3:</b> Enable the students to know the preservation methods for storing vegetables.	3	6
<b>UNIT 4 CO4:</b> Understands and recognizes the vegetable growing methods.	4	6
<b>UNIT 5 CO5:</b> Appreciates the art of gardening and develops interest in decoration.	5	6

**SYLLABUS**

**Unit I:**

Introduction, importance of horticulture. Divisions of horticulture – Pomology , Olericulture ,Floriculture.

**Unit II:**

**Vegetative propagation: Advantages. cuttage: root cutting, stem cutting ,leaf cutting. Layerage: Simple, Compound, Trench and Air layering. Graftage: Side grafting, Whip grafting, Cleft grafting.**

**Unit III:**

Establishment of orchard, lay out of orchards, planting, harvesting, marketing and storage of fruits. Preservation of fruits.

**Unit IV:**

Type of vegetable growing: Kitchen garden , market gardening, truck garden, vegetable forcing, vegetable seed industry. Preservation of vegetables.

**Unit V:**

Indoor gardening: Indoor plants, **Types of indoor gardening -Hanging baskets, Bonsai Bottle garden. Flower arrangement and Dry decoration.**

**Reference :**

1. Adams C.R., Early M.P. 2004. *Principles of Horticulture*, Elsevier, New Delhi.
2. Edmond J.B., Senn T.L., Andrews F.S., Halfacre P.G. 1975. *Fundamentals of Horticulture*. 4<sup>th</sup> Edn. TMH New Delhi.
3. John Weathers. 1993, *Encyclopaedia of Horticulture*, Discovery Pub. House, New Delhi.
4. Kumar N., 1994. *Introduction to Horticulture*, Rajalakshmi Pub. Nagarcovil.
5. Manibhushan Rao K. 2005. *Text Book of Horticulture*, Macmillan India Ltd.
6. Randhawa G.S., Mukhopadhyay A. 1986. *Floriculture in India*, Allied Publishers Pvt. Ltd. Ahamedabad.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I :			
	Importance of horticulture.	3	Chalk–talk AV aids
	Divisions of horticulture – Pomology , Olericulture ,Floriculture.	3	Lecture , AV aids
UNIT II:			
	Vegetative propagation: Advantages. cuttage: root cutting, stem cutting ,leaf cutting.	1	chalk - talk AV aids
	Layerage: Simple, Compound, Trench and Air layering.	2	Lecture AV aids
	Graftage: Side grafting, Whip grafting, Cleft grafting.	3	PPT
UNIT III:			
	Establishment and lay out of orchards	2	Chalk- talk , AV aids.
	Harvesting, marketing and storage of fruits	2	Lecture AV aids.
	Preservation of fruits	2	Lecture



			AV aids
UNIT IV:			
	Types of vegetable growing- kitchen garden, truck garden, market garden	3	Chalk- talk AV aids
	Vegetable forcing, vegetable seed industry	1	Chalk- talk
	Preservation of vegetables	2	Lecture AV aids
UNIT V:			
	Indoor gardening, indoor plants	2	Lecture
	Types of indoor gardening- hanging basket, bonsai, bottle garden	2	Chalk talk AV aids.
	Flower arrangement and Dry decoration	2	

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	4	3	3	3	4	4	3	3	4	3	3	3	4	3.4
CO2	3	4	3	2	3	4	3	3	4	4	3	4	3	3	3.3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	4	3	3.2
CO4	4	3	3	4	3	4	3	4	3	4	4	3	4	3	3.5
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3.3
Mean Overall score														3.34	

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: I.SOBHAKUMARI

**Programme : B.Sc -Botany**  
**Semester : IV**  
**Sub. Code : SB42**

**Part III: Core**  
**Hours : 2 P/W 30 Hrs P/S**  
**Credits : 2**

**TITLE OF THE PAPER: Medicinal Botany**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	2	1	-	-	1	
<b>PREAMBLE:</b>						
<p>1) The objectives of this course are to provide students with an opportunity to gain information in Medicinal Plants, History of medicinal plants in India and its conservation.</p> <p>2) Provide students with an understanding of how current medicinal practices are often based on indigenous plant knowledge, and plant .as source of food and medicine.</p> <p>3) This course will enable students to learn drugs from Non-flowering plants.</p> <p>4) This course will enable students to learn drugs from flowering plants.</p> <p>5) ) Provide students with an understanding of how current medicinal practices are often based on indigenous plant knowledge, based on cultivation and uses of Medicinal plants.</p>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1 CO1:</b> describe the applications of plants in a historical, cultural, medicinal, legislative, and global context .					1	6
<b>UNIT 2 CO2:</b> critically evaluate the ideas and discussed plant as source of food and medicine.					2	6
<b>UNIT 3 CO3:</b> identify and learnt medicines obtained from Non-flowering plants.					3	6
<b>UNIT 4 CO4:</b> identify and learnt medicines obtained from flowering plants.					4	6
<b>UNIT 5 CO5:</b> acquired knowledge on cultivation and uses of medicinal plants.					5	6
<b>Unit I:</b>						
Medicinal plants – an overview. History of medicinal plants in India. Indian system of medicine- Siddha, Ayurveda, Unani. Indigenous medical system – Conservation of medicinal plants. Classification of medicinal plants based on useful parts.						
<b>Unit II:</b>						
Plants as source of food and medicine, kitchen herbs as source of medicine, folk medicines- traditional methods.						
<b>Unit III:</b>						
Drugs from Non-flowering plant: Algae – <i>Spirulina</i> , Fungi – <i>Penicillium</i> , Lichens: <i>Cetraeria</i> , Bryophyte : <i>Sphagnum</i> , Fern – <i>Dryopteris</i> , Gymnosperm – <i>Ephedra</i> .						
<b>Unit IV:</b>						
Drugs from flowering plants: Roots – <i>Withania somnifera</i> , Rhizome - <i>Curcuma longa</i> , Leaves - <i>Ocimum basilicum</i> , <i>Aloe barbadensis</i> , Bark – <i>Cinchona</i> .						
<b>Unit V:</b>						
Brief study about cultivation, collection, constituents and uses of the following plants.						
Flower – <i>Hibiscus rosa-sinensis</i> .						
Fruits – <i>Emblica officinalis</i>						
Seeds – <i>Trigonella foenum- graceum</i>						
Entire plant – <i>Phyllanthus niruri</i>						

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	Medicinal plants – an overview. History of medicinal plants in India. Indian system of medicine- Siddha, Ayurveda, Unani. Indigenous medical system – . Classification of medicinal plants based on useful parts.	5	Lecture
	Conservation of medicinal plants	1	ICT
UNIT II			
	Plants as source of food and medicine, , folk medicines- traditional methods.	5	Lecture
	kitchen herbs as source of medicine	1	ICT
UNIT III			
	Drugs from Non-flowering plant: Algae – <i>Spirulina</i> , Fungi – <i>Penicillium</i> , Lichens: <i>Cetraeria</i> , Bryophyte : <i>Sphagnum</i> , Fern – <i>Dryopteris</i> ,	5	Lecture
	Gymnosperm – <i>Ephedra</i> .	1	ICT
UNIT IV			
	Drugs from flowering plants: Roots – <i>Withania somnifera</i> , Rhizome - <i>Curcuma longa</i> , Leaves - <i>Ocimum basilicum</i> , <i>Aloe barbadensis</i> ,	5	Lecture
	Bark – <i>Cinchona</i> .	1	ICT
UNIT V			
	Brief study about cultivation, collection, constituents and uses of the following plants. Flower – <i>Hibiscus rosa-sinensis</i> . Fruits - <i>Embllica officinalis</i> Seeds – <i>Trigonella foenum-graceum</i>	5	Lecture
	Entire plant – <i>Phyllanthus niruri</i>	1	ICT

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3	3	3	2	2	2	5	5	5	5	5	2	3	3	3.42
CO2	4	4	4	3	3	3	3	3	5	2	2	4	3	3	3.28
CO3	4	4	3	2	4	4	2	4	5	5	2	3	3	3	3.42
CO4	5	5	5	5	2	3	3	3	3	3	3	3	4	4	3.62
CO5	4	4	4	3	3	3	2	2	5	3	4	2	5	2	3.28
Mean Overall Score															3.40

Result: The Score for this Course is 3.40 (High Relationship)

Course Designer: Dr.S.M.Janetta Nithia

**Programme : B.Sc**  
**Semester : IV**  
**Sub. Code : SB43**

**Part III: Core/Allied/Elective**  
**Hours : 2 P/W 30Hrs P/S**  
**Credits :2**

**TITLE OF THE PAPER:ORGANIC FARMING**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	2	1	-	-	1

**PREAMBLE:**

1. To study the principles and practices of organic farming for sustainable crop production.
2. To reduce fertilizers gradually and usage of Integrated pest management..
3. To make the students aware about sustainable use of biofertilizers.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1</b> To appraise the philosophy and ecological basis of organic agriculture	1	6
<b>UNIT 2 CO2:</b> Learns the characteristics, identification, cultural methods and maintenance of Azospirillum, Azotobacter, Azolla and Anabaena	2	6
<b>UNIT 3 CO3:</b> Understands and appreciates the use of organic and biological methods to control pests and diseases	3	5
<b>UNIT 4 CO4:</b> learns the benefit reducing the usage of fertilizers gradually and usage of integrated of pest management	4	7
<b>UNIT 5 CO5:</b> The importance of organic manures, farm yard manure, compost, advantages of green manure, concentrated manures, vermicompost, most widely used.	5	6

**SYLLABUS**

**UNIT I:**Green revolution and uses of inorganic fertilizer and pesticides in agriculture, its impact on environment, human and animals. Organic farming and its advantages.

**UNIT II:** Integrated Nutrient Management (INM): production and applications of *Rhizobium*, *Azotobacter*, *Anabaena* – *Azolla*, *Phosphobacteria*, VAM fungi.

**UNIT III:** Integrated Disease Management (IDM): production and application of *Trichoderma*, *Pseudomonas fluorescense*

**UNIT IV:** Integrated Pest Management (IPM): - production and application of Bacteria – *Bacillus thuringiensis*, Fungi – *Beauveria bassiana* (*Metarhizium*), Virus – NPV.

**UNIT V:** Organic Manure: Farmyard manure, Green manure, Vermi compost, Vermi wash. Bioenhancers: preparations and applications of Effective microorganisms (EM), Panchakavya, Fish Gunabajalam

**TEXT BOOKS:** 1.Arun, K. Sharma – 2008, *A Hand book of Organic Farming* Agrobios (India), Jodhpur.

2.Dahama, A.K.-2009, *Organic Farming for Sustainable Agriculture* Agrobios (India), Jodhpur.

3.Gupta, M.K.-2007, *Hand book of Organic Farming and Biofertilizers*, ABD Publishers, New Delhi.

**REFERENCES:** 1.Talashilkar, S.C. and Dosani, A.A.K.-2008, *Earth Worms in Agriculture*, Agrobios (India) Jodhpur.

2.Swaminathan, C. Swaminathan, V. & Vijayalakshmi, K.-2007 *Panchagarya boon to Organic Farming*, International Book Distributers, New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	Green revolution	2	Chalk and talk
	uses of inorganic fertilizer and pesticides in agriculture,	2	Chalk and talk
	its impact on environment, human and animals	1	Chalk and talk
	Organic farming and its advantages	1	Chalk and talk
UNIT II			
	Integrated Nutrient Management (INM): production and applications of <i>Rhizobium</i> ,	2	Chalk and talk
	<i>Azotobacter</i> , <i>Anabaena</i> – <i>Azolla</i>	2	ICT
	<i>Phosphobacteria</i> ,VAM fungi	2	Chalk and talk
UNIT III			
	Integrated Disease Management (IDM): production and application of <i>Trichoderma</i> ,	3	Chalk and talk
	<i>Pseudomonas fluorescense</i>	3	Chalk and talk
UNIT IV			
	Integrated Pest Management (IPM): - production and application of Bacteria – <i>Bacillus thuringiensis</i> , Fungi – <i>Beauveria bassiana</i> ( <i>Metarhizium</i> ),	3	ICT
	Fungi – <i>Beauveria bassiana</i>	1	Chalk and talk
	Virus – NPV	2	Chalk and talk
UNIT V			
	Organic Manure: Farmyard manure , Green manure ,	1	Chalk and talk
	Vermi compost, Vermi wash. Bioenhancers:	1	Chalk and talk
	preparations and applications of Effective microorganisms (EM)	2	Chalk and talk
	Panchakavya, Fish Gunabajalam	2	Chalk and talk

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	4	3	3	3	3	3	3	4	3	3	3	3	3	3	3.14
CO2	3	4	3	3	3	3	3	3	3	4	3	3	4	3	3.21
CO3	3	3	3	3	3	3	3	3	4	3	4	3	3	3	3.14
CO4	3	4	3	3	3	4	3	3	3	3	3	3	3	2	3.07
CO5	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3.07
Mean Overall Score															3.12

Result: The Score for this Course is 3.12(High Relationship)

Course Designer: Dr.G.MANGAI KASTHURI

**Programme : B.Sc-Botany**  
**Semester : VI**  
**Sub. Code : SB65**

**Part IV: Skill Based**  
**Hours : 2 P/W 30hrs P/S**  
**Credits :2**

**TITLE OF THE PAPER: Tissue Culture**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	2	1	-	-	1

**PREAMBLE:**

- 1) This course provides pre requirements and types of medium used in tissue culture lab.
- 2) Students will Learn various types of culture used in tissue culture lab.
- 3) This course provide to gain knowledge about the concept of totipotency and microropagation in plants.
- 4) Provide and help to learn tissue culture in Agriculture, Horticulture and Forestry.
- 5) This course helps to learn In vitro production of secondary metabolites.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1:</b> Apply theoretical knowledge in basic pre requirements of a tissue culture lab.	1	6
<b>UNIT 2 CO2:</b> Gain knowledge in types of culture in tissue culture lab.	2	6
<b>UNIT 3 CO3:</b> describe in vitro propagation of plant tissues.	3	6
<b>UNIT 4 CO4:</b> Appropriate documentation of application of tissue culture in various fields.	4	6
<b>UNIT 5 CO5:</b> Understand the theoretical aspects of In vitro production of secondary metabolites.	5	6

**SYLLABUS**

**UNIT I:** Basic requirements : pre requisites of a tissue culture lab. Methods of asepsis , preparation of media . explants- initiation of callus and suspension culture.

**UNIT II:**

Types of culture : batch and continuous culture. Isolation , fusion and culture of protoplast, somatic hybridization – cybrids, hybrids.

**UNIT III:**

In vitro regeneration – concept of totipotency, micropropagation, organogenesis, somatic embryogenesis, artificial seed, somaclonal variation.

**UNIT IV:**

Application of tissue culture in Agriculture, Horticulture and Forestry, haploid and triploid plant production.

**UNIT V:**

In vitro production of secondary metabolites-alkaloids, transgenic plants - resistance to diseases, insect pests, abiotic stress and herbicides.

**Reference :**

1. Bhojwani S.S and Razdan MK 2000 *Plant Tissue Culture* – Theory and practice Elsevier
2. Dixon R.A, 2003. *Plant Cell Culture*, IRC Press
3. Edwin F. George 1996, *Plant Propagation by Tissue Culture: Part.2 - In Practice*. Exegetics, UK
4. Edwin George ,1993, *Plant Propagation by Tissue Culture: Part 1 - The Technology* . Exegetics, UK
5. Edwin F. George, Michael A. Hall,Geert-Jan De Klerk 2007.*Plant Propagation by Tissue Culture: Volume 1. The Background* .December 3, 2007 | ISBN-10: 1402050046 | ISBN-13: 978-1402050046 Springer.PO Box.17, 3300 AA Doerdecht, The Netherlands
6. Kalyan De Kumar,2006. *Plant Tissue Culture*, New Central Book Agency, Culcutta.



7. Narayana Swami S. 2005 *Plant Cell & Tissue culture*. Mc Graw Hill Company.
  8. Razdan, M. K. (2004). *Introduction to Plant Tissue Culture*. 2nd ed. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
  9. Reinert and Bajaj YPS. 1989. *Applied and Fundamental Aspects of Plant Cell Tissue and Organ Culture*. Narora Publications, New Delhi.
- Timir Baran Jha and Biswajith Ghosh 2007, *Plant Tissue Culture*, University Press.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
	Basic requirements : pre requisites of a tissue culture lab. Methods of asepsis , preparation of media . and suspension culture.	5	Lecture
	explants- initiation of callus	1	ICT
<b>UNIT II</b>			
	Types of culture : batch and continuous culture. somatic hybridization – cybrids, hybrids	5	Lecture
	Isolation , fusion and culture of protoplast,	1	ICT
<b>UNIT III</b>			
	In vitro regeneration – concept of totipotency, micropropagation, organogenesis, somatic embryogenesis, artificial seed,.	5	Lecture
	somaclonal variation	1	ICT
<b>UNIT IV</b>			
	Application of tissue culture in Agriculture, Horticulture and Forestry,	5	Lecture
	haploid and triploid plant production.	1	ICT
<b>UNIT V</b>			
	In vitro production of secondary metabolites- alkaloids,	5	Lecture
	transgenic plants - resistance to diseases, insect pests, abiotic	1	ICT

	stress and herbicides		

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3	3	3	2	2	2	2	4	4	2	3	2	3	3	2.71
CO2	4	4	3	2	3	4	3	2	3	4	3	5	4	3	3.35
CO3	4	4	2	2	2	2	2	5	5	5	3	2	1	4	3.07
CO4	3	3	3	5	4	5	5	3	3	4	4	3	3	3	3.64
CO5	4	4	4	4	3	3	3	3	3	3	3	5	5	5	3.71
Mean Overall Score														3.29	

Result: The Score for this Course is 3.29 (High Relationship)  
 Course Designer: Dr.S.M.Janetta Nithia

Programme : B.Sc.Botany

Part IV: Skill Based Elective

Semester : VI

Hours: 2 hrs/week 30hrs/semester

Sub. Code : SB66

Credits : 2

**TITLE OF THE PAPER: MUSHROOM CULTIVATION**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	2	1	-		1

**PREAMBLE:**

- To enable the students to identify edible mushroom from the poisonous one
- To develop interest in cultivating mushrooms
- To acquire the knowledge of raw materials used for growing mushrooms
- To enable the students understand the nutritive values of mushroom

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> Understands the basic knowledge of identifying edible mushroom from the poisonous one	1	6
<b>UNIT 2 CO2:</b> Learns the techniques of mushroom cultivation	2	6
<b>UNIT 3 CO3:</b> Understands and recognizes the raw materials used for growing mushrooms	3	6
<b>UNIT 4 CO4:</b> Enable the students to know the preservation methods and marketing of mushrooms	4	6
<b>UNIT 5 CO5:</b> Appreciates the nutritive values of mushroom and prepares recipes from it.	5	6

**SYLLABUS**

**Unit I:**

Introduction to Mushroom cultivation . external and Internal structure of mushroom. Types of edible mushroom available in India- *Agaricus bisporous*, *Pleurotus citrinopileatus*, *Volvariella volvacea*. Identification of poisonous mushroom.

**Unit II:**

Techniques of mushroom cultivation – Spawn production-composting and maintenance of Mushroom sheds.

**Unit III:**

Working procedure for cultivation of Button Mushroom (*Agaricus bisporous*) and paddy straw mushroom (*Volvariella volvacea*).

**Unit IV:**

Harvesting –storage ,preservation,(refrigeration,canning,drying,salt), marketing, commercial significance of mushrooms. Risks involved in mushroom cultivation. Common pathogens affecting mushroom.-bacteria, fungi, insects and nematodes.

**UnitV:**

Nutritive value and uses of mushroom. Food recipies prepared from mushroom :omlet,soup,

pakoda,pickle,mushroom biriyani.

**References:**

1. Bahl.N., 2009, *Hand book on Mushrooms*, 4<sup>th</sup> Edition, Oxford and IBH Publishing Co.Pvt., Ltd., New Delhi.
2. Fletcher. J.T., White P.F., & Gaze.R.H., *Pest and Disease Control*, Intercept Limited Ponteland, Newcastle, England.
3. Kapoor. J.N., 1989, *Mushroom Cultivation*, ICAR Publication, Krishi Anusandhan, Pusa, New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I :			
	External and internal structure of mushroom	4	Chalk–talk AV aids
	Types of edible mushroom in India	1	Lecture , AV aids
	Identification of poisonous mushrooms	1	Lecture
UNIT II:			
	Techniques of mushroom cultivation- spawn production	3	chalk - talk AV aids
	Compost and maintenance of mushroom sheds	3	PPT, Lecture
UNIT III:			
	Cultivation of Button Mushroom ( <i>Agaricus bisporous</i> )	3	Chalk- talk , AV aids.
	Cultivation of Paddy straw mushroom( <i>Volvariella volvacea</i> )	3	Lecture AV aids.
UNIT IV:			
	Harvesting –storage ,preservation,marketing of mushrooms	2	Chalk- talk
	Significance of mushrooms Risks involved in mushroom cultivation	3	Lecture AV aids
	Common pathogens affecting mushroom	1	Lecture
UNIT V:			
	Nutritive value and uses of mushroom	3	Lecture
	Recipes prepared from mushroom- omlet,soup,mushroom biriyani,pakoda,pickle	3	Chalk talk AV aids.

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	4	3	3	3	4	4	3	3	4	3	3	3	4	3.4
CO2	3	4	3	3	2	4	3	3	4	4	3	4	3	3	3.3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	4	3	3.2
CO4	4	3	3	4	3	4	3	4	3	4	4	3	4	3	3.5
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3.3
Mean Overall score															3.34

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: I.SOBHAKUMARI

Programme : B.Sc/B.A/B.COM

Part IV: Non Major Elective

Semester : V

Hours: 2 hrs/week 30hrs/semester

Sub. Code : NMB1

Credits : 2

**TITLE OF THE PAPER: Horticulture**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	2	1	-		1

**PREAMBLE:**

- To enable the students to know the importance of horticulture.
- To develop interest in propagation techniques.
- To acquire the knowledge of preservation methods of vegetables and fruits.
- To enable the students understand the art of gardening.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> Understands the basic knowledge of horticulture	1	6
<b>UNIT 2 CO2:</b> Learns the techniques of artificial propagation.	2	6
<b>UNIT 3 CO3:</b> Enable the students to know the preservation methods for storing vegetables.	3	6
<b>UNIT 4 CO4:</b> Understands and recognizes the vegetable growing methods.	4	6
<b>UNIT 5 CO5:</b> Appreciates the art of gardening and develops interest in decoration.	5	6

**SYLLABUS**

**Unit I:**

Introduction, importance of horticulture. Divisions of horticulture – Pomology , Olericulture Floriculture.

**Unit II:**

**Vegetative propagation: Advantages. cuttage: root cutting, stem cutting ,leaf cutting. Layerage: Simple, Compound, Trench and Air layering. Graftage: Side grafting, Whip grafting, Cleft grafting.**

**Unit III:**

Establishment of orchard, lay out of orchards, planting, harvesting, marketing and storage of fruits. Preservation of fruits.

**Unit IV:**

Type of vegetable growing: Kitchen garden , market gardening, truck garden, vegetable forcing, vegetable seed industry. Preservation of vegetables.

**Unit V:**

Indoor gardening: Indoor plants, **Types of indoor gardening -Hanging baskets, Bonsai Bottle garden. Flower arrangement and Dry decoration.**

**Reference :**

1. Adams C.R., Early M.P. 2004. *Principles of Horticulture*, Elsevier, New Delhi.
2. Edmond J.B., Senn T.L., Andrews F.S., Halfacre P.G. 1975. *Fundamentals of Horticulture*. 4<sup>th</sup> Edn. TMH New Delhi.
3. John Weathers. 1993, *Encyclopaedia of Horticulture*, Discovery Pub. House, New Delhi.
4. Kumar N., 1994. *Introduction to Horticulture*, Rajalakshmi Pub. Nagarcoil.
5. Manibhushan Rao K. 2005. *Text Book of Horticulture*, Macmillan India Ltd.
6. Randhawa G.S., Mukhopadhyay A. 1986. *Floriculture in India*, Allied Publishers Pvt. Ltd. Ahamedabad.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I :			
	Importance of horticulture.	3	Chalk–talk AV aids
	Divisions of horticulture – Pomology , Olericulture ,Floriculture.	3	Lecture , AV aids
UNIT II:			
	Vegetative propagation: Advantages. cuttage: root cutting, stem cutting ,leaf cutting.	1	chalk - talk AV aids
	Layerage: Simple, Compound, Trench and Air layering.	2	Lecture AV aids
	Graftage: Side grafting, Whip grafting, Cleft grafting.	3	PPT
UNIT III:			
	Establishment and lay out of orchards	2	Chalk- talk , AV aids.
	Harvesting, marketing and storage of fruits	2	Lecture AV aids.
	Preservation of fruits	2	Lecture

			AV aids
UNIT IV:			
	Types of vegetable growing- kitchen garden, truck garden, market garden	3	Chalk- talk AV aids
	Vegetable forcing, vegetable seed industry	1	Chalk- talk
	Preservation of vegetables	2	Lecture AV aids
UNIT V:			
	Indoor gardening, indoor plants	2	Lecture
	Types of indoor gardening- hanging basket, bonsai, bottle garden	2	Chalk talk AV aids.
	Flower arrangement and Dry decoration	2	Lecture Models

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	4	3	3	3	4	4	3	3	4	3	3	3	4	3.4
CO2	3	4	3	2	3	4	3	3	4	4	3	4	3	3	3.3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	4	3	3.2
CO4	4	3	3	4	3	4	3	4	3	4	4	3	4	3	3.5
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3.3
Mean Overall score														3.34	

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: I.SOBHAKUMARI



Programme : B.Sc/B.A/B.COM

Part IV: Non Major Elective

Semester : VI

Hours: 2 hrs/week 30hrs/semester

Sub. Code : NMB2

Credits : 2

**TITLE OF THE PAPER: MUSHROOM CULTIVATION**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	2	1	-		1

**PREAMBLE:**

- To enable the students to identify edible mushroom from the poisonous one
- To develop interest in cultivating mushrooms
- To acquire the knowledge of raw materials used for growing mushrooms
- To enable the students understand the nutritive values of mushroom

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> Understands the basic knowledge of identifying edible mushroom from the poisonous one	1	6
<b>UNIT 2 CO2:</b> Learns the techniques of mushroom cultivation	2	6
<b>UNIT 3 CO3:</b> Understands and recognizes the raw materials used for growing mushrooms	3	6
<b>UNIT 4 CO4:</b> Enable the students to know the preservation methods and marketing of mushrooms	4	6
<b>UNIT 5 CO5:</b> Appreciates the nutritive values of mushroom and prepares recipes from it.	5	6

**SYLLABUS**

**Unit I:**

Introduction to Mushroom cultivation . external and Internal structure of mushroom. Types of edible mushroom available in India- *Agaricus bisporous*, *Pleurotus citrinopileatus*, *Volvariella volvacea*. Identification of poisonous mushroom.

**Unit II:**

Techniques of mushroom cultivation – Spawn production-composting and maintenance of Mushroom sheds.

**Unit III:**

Working procedure for cultivation of Button Mushroom (*Agaricus bisporous*) and paddy straw mushroom (*Volvariella volvacea*).

**Unit IV:**

Harvesting –storage ,preservation,(refrigeration,canning,drying,salt), marketing, commercial significance of mushrooms. Risks involved in mushroom cultivation. Common pathogens affecting mushroom.-bacteria, fungi, insects and nematodes.

**UnitV:**

Nutritive value and uses of mushroom. Food recipes prepared from mushroom :omlet,soup, pakoda,pickle,mushroom biriyani.

**References:**

1. Bahl.N., 2009, *Hand book on Mushrooms*, 4<sup>th</sup> Edition, Oxford and IBH Publishing Co.Pvt., Ltd., New Delhi.
2. Fletcher. J.T., White P.F., & Gaze.R.H., *Pest and Disease Control*, Intercept Limited Ponteland, Newcastle, England.
3. Kapoor. J.N., 1989, *Mushroom Cultivation*, ICAR Publication, Krishi Anusandhan, Pusa, New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I :			
	External and internal structure of mushroom	4	Chalk–talk AV aids
	Types of edible mushroom in India	1	Lecture , AV aids
	Identification of poisonous mushrooms	1	Lecture
UNIT II:			
	Techniques of mushroom cultivation- spawn production	3	chalk - talk AV aids
	Compost and maintenance of mushroom sheds	3	PPT, Lecture
UNIT III:			
	Cultivation of Button Mushroom ( <i>Agaricus bisporous</i> )	3	Chalk- talk , AV aids.
	Cultivation of Paddy straw mushroom( <i>Volvariella volvacea</i> )	3	Lecture AV aids.
UNIT IV:			
	Harvesting –storage ,preservation,marketing of mushrooms	2	Chalk- talk
	Significance of mushrooms Risks involved in mushroom cultivation	3	Lecture AV aids
	Common pathogens affecting mushroom	1	Lecture
UNIT V:			
	Nutritive value and uses of mushroom	3	Lecture
	Recipes prepared from mushroom-omlet,soup,mushroom biriyani,pakoda,pickle	3	Chalk talk AV aids.

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
CO1	3	4	3	3	3	4	4	3	3	4	3	3	3	4	3.4
CO2	3	4	3	3	2	4	3	3	4	4	3	4	3	3	3.3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	4	3	3.2
CO4	4	3	3	4	3	4	3	4	3	4	4	3	4	3	3.5
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3.3
Mean Overall score														3.34	

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: I.SOBHAKUMARI

## Ancillary Environmental Biology Theory for Geography Major

### Scheme of Examination

Year	Sem.	Subject Code	Credit	Name of the Subject	Duration of exam (Hours)	Passing Minimum 40%		
						Int	Ext	Total
1	I	AB1	4	Introduction to Ecobiology	3	25	75	100
2	II	AB2	3	Basic Forest Botany.	3	25	75	100

**Programme :B.Sc., Geography**

**Part III: Allied for Geography**

**Major**

**Semester : I**

**Hours : 4 P/W 60Hrs**

**P/S**

**Sub. Code : AB1**

**Credits : 4**

**TITLE OF THE PAPER: INTRODUCTION TO ECOBIOLOGY**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	4	2			2

**PREAMBLE:**

1. Relate the anatomical and Morphological modifications with reference to their eco system and environment.
2. Appreciate dual nature of lichens and their importance and mode of nutrition and interactions in plants.
3. Understand the concept of eco system.
4. Trace the evolutionary origins and inter relatedness of different forms with reference to habitat.
5. Build knowledge to study vegetation, using quadrat and transect.

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1:</b> Understand and analyze different zones of environment and relates adaptations of plants to respective environment.	1	12
<b>UNIT 2 CO2:</b> Differentiate positive and negative interrogations	2	12
<b>UNIT 3 CO3:</b> Understand relationship between biotic and abiotic components.	3	12
<b>UNIT 4 CO4:</b> Develop concept on hydrosere and Xerosere. Causes and basic types of succession.	4	12
<b>UNIT 5 CO5:</b> Enable students to carry out vegetation studies.	5	12

**SYLLABUS:**

**Unit I**

Environment: Definition and various zones of environment, Hydrosphere: physical chemical properties of water, lithosphere: Soil profile, **Atmosphere -various zones of Atmosphere.** Concept of biosphere, **Adaptations – Hydrophytes: *Hydrilla*, Xerophytes: *Opuntia* and Halophytes: *Rhizophora*.**

**Unit II:**

Biotic interactions: **Mutualism- *Rhizobium*, Commensalism- *Vanda*, Parasitism- *Cuscuta*, Insectivorous plants- *Nepenthes*.**

**Unit III:**

Structure of Ecosystem: Abiotic and Biotic components; Function of Ecosystem; Food chains, Food web, Ecological pyramid, Energy flow and productivity.

**Unit IV:**

Ecological succession Causes and basic types of succession General process of succession, nudation, invasion, competition, stabilization; Hydrosere and Xerosere.

**Unit V:**

Methods of study of vegetation: Quadrat and Transect methods.

**REFERENCE:**

1. Krishnamurthy. T 1993. Minor Forest products of India, Oxford & IBH Publishing Co. Pvt. Ltd., New

Delhi

2. Eugene P. Odum, 1971. Fundamentals of Ecology, *W.B. Saunders Company, Philadelphia, London*
3. Sharma. P.D., 1995. Ecology and *Environment, Rakesh Kumar Publications, New Delhi*
4. Shukla, R.S. and Chandel, P.S. 2006, A text book of plant Ecology, *S. Chand & Company Ltd., New Delhi.*
5. Verma, P.S. and Agarwal, V.K. 1998. Concept of Ecology, *S. Chand & Company Ltd., New Delhi*

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I			
	Concept of biosphere physical chemical properties of water lithosphere Atmosphere: various zones. Adaptations - Hydrophytes: <i>Hydrilla</i> , Xerophytes: <i>Opuntia</i> , Halophytes: <i>Rhizophora</i> .	6     6	Lecture     ICT
UNIT II			
	Biotic interaction Mutualism- <i>Rhizobium</i> ; Commensalism- Vanda; Parasitism- <i>Cuscuta</i> ; Insectivorous plants- <i>Nepenthes</i> .	6     6	ICT  ICT  ICT  ICT
UNIT III			
	Structure of Ecosystem -Abiotic and Biotic components Functions of Ecosystem Food Chain, Food web, Ecological pyramid, Energy flow and productivity.	6     6	Lecture  Lecture
UNIT IV			
	Ecological succession, causes and basic types of succession	4	Lecture PPT & Video
	General process- nudation, invasion, competition, stabilisation	4	
	Hydrosere & Xerosere	4	
UNIT V			
	Methods of Study of vegetation Quadrat	6	Lecture Video and PPT
	Transect	6	Lecture ,Video

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	5	5	5	5	2	5	5	4	5	5	3	4	2	5	4.28
CO2	5	5	5	2	2	5	2	3	2	4	3	3	2	2	3.36
CO3	4	3	2	2	2	5	3	5	2	5	4	4	2	4	3.36
CO4	5	4	4	3	2	5	2	5	2	5	3	2	2	5	3.5
CO5	5	2	3	2	2	4	5	2	5	2	2	5	2	3	3.14
Mean Overall Score															3.53

Result: The Score for this Course is 3.53 (High Relationship)

Course Designer: Dr.V.PANDIMADEVI

**Programme : B.Sc.Geography**

**Semester : II**

**Part III: Allied for Geography Major**

**Hours: 4 hrs/week 60 hrs/semester**

Sub. Code : AB2

Credits : 3

**TITLE OF THE PAPER: – Basic Forest Botany**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	4	3	-	1	

**PREAMBLE:**

- To enable the students to know about natural forests, social forests and Agroforests
- To acquire the knowledge of threats to forests
- To make aware the students the causes and effects of deforestation
- To develop in them the need for conservation of forests

<b>COURSE OUTCOME</b>	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
<b>UNIT 1 CO1:</b> understands the different types of forests in India	1	12
<b>UNIT 2 CO2:</b> Learns the components of social forest and Agroforests	2	12
<b>UNIT 3 CO3:</b> understands and compares the major and minor forest products	3	12
<b>UNIT 4 CO4:</b> Enable the students to develop nursery and recognizes the forest conservation strategies	4	12
<b>UNIT 5 CO5:</b> Develops keen interest in forest legislation and management	5	12

**SYLLABUS**

**Unit I:**

Introduction, types of forest in India , Threats to forest-causes and effects of deforestation.

**Unit II:**

Social forestry:- components and significance. Agroforestry- various models of Agroforestry, plants suitable for Agroforestry, Agronomic importance of Agroforestry.

**Unit III:**

Major forest products: wood (Sandal wood and Rose wood), timber (Neem and Teak), fuel wood (Prosopis). Essential oil: Lemon grass, Spices and condiments: cinnamon, pepper, clove.

**Unit IV:**

Forest management –Nursery development ,transplantation ,weeding ,manuring ,mulching ,plant protection ,rotation ,fixation ,and harvesting. Forest conservation-insitu exsitu conservation .

**Unit V:**

Forest Legislation with reference to national parks and sanctuaries –Wild life protection act, forest conservation act ,vanamahotsava, joint forest management .

**References:**

1. P.S. Verma V.K. Agarwal., 2001 *Environmental Biology: Principles of Ecology*, S.Chand & Company Ltd., New Delhi.
2. Odum H.T., E.P.Odum., 1957, *Fundamentals of Ecology*, W.B.Saunders Company, Philadelphia, London.





	O 1	2	3	4	5	6	7	O1	O2	O3	O4	O5	O6	O7	
CO1	3	4	3	3	4	3	4	3	3	3	4	3	3	4	3.4
CO2	3	3	4	3	2	4	3	3	4	4	3	4	3	3	3.3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	4	3	3.2
CO4	4	3	3	3	4	4	3	4	3	4	4	3	3	4	3.5
CO5	4	3	3	4	3	3	3	4	3	3	3	4	3	3	3.3
Mean Overall score															3.34

Result: The Score for this Course is 3.34 (High Relationship)

Course Designer: I.SOBHAKUMARI

### Scheme of Examination

Year	Sem. No.	Paper No.	Subject	Duration of exam	Passing Minimum 40%		
					Int.	Ext.	Total
I	II	I (BPA)	Introduction to Ecobiology & Basic Forest Botany.	3	40	60	100

**Programme : B.Sc.Geography**

**Part III: Ancillary practical Paper**

**Semester : II**

**Hours: 3 hrs/week 75 hrs/semester**

**Sub. Code :BPA**

**Credits : 3**

**TITLE OF THE PAPER: Ancillary Practical For Geography Major**

Pedagogy	Hours	Lab experimentation	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	3	3	-	-	-

**PREAMBLE:**

- To help the students know about the habitats of plants
- To understand the positive and negative interaction.
- To acquire knowledge in Ecosystem
- To understand the major and minor forest products.
- To acquire knowledge about the study of vegetation.

**COURSE OUTCOME**

At the end of the Semester, the students will be able to

**UNIT 1 CO1:** able to compare the distinguishing features of plants of various habitats.

**UNIT 2 CO2:** apply the knowledge of plant interaction and identify them with special features.

**UNIT 3 CO3:** develops the knowledge of locating parks and sanctuaries in the country.

**UNIT 4 CO4:** identify the types of forests and the products obtained from it.

**UNIT 5 CO5:** enable the students to study vegetation using quadrat method.

**Syllabus**

1. Positive Interactions-Mutualism -*Rhizobium*, Commensalism –*Vanda*.
2. Negative Interactions – Parasitism - *Cuscuta*.
3. Insectivorous plants- *Nepenthes*.
4. Ecosystem, food chain, food web, Ecological pyramid.
5. Study of vegetation using Quadrat method.
6. Photographs showing social and agro forestry.
7. Major and Minor Forest Products.
8. Map showing National parks and Sanctuaries.

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS 1	PS 2	PS 3	PS 4	PS 5	PS 6	PS 7	
CO1	3	3	3	4	4	3	4	3	3	3	3	3	3	3	3.2
CO2	3	3	3	3	4	3	3	3	4	4	3	3	3	3	3.2
CO3	3	3	4	3	4	3	4	3	3	3	3	4	3	4	3.4
CO4	3	4	4	3	3	4	3	3	4	4	3	3	3	3	3.4
CO5	4	3	4	3	3	4	3	4	4	3	3	3	3	3	3.4
Mean Overall score														3.32	

Result: The Score for this Course is 3.32 (High Relationship)

Course Designer: Dr.I.Sobha Kumari

Code :

Sri Meenakshi Government Arts College for Women (Autonomous) Madurai –

2.

B.Sc Degree Examination Nov /April 2019/2020....

Title of the Paper :

**(For those who joined in June 2019)**

Duration : 3 hours  
75

Maximum Marks :

Section-A (5x2=10 Marks)

Answer all Questions (Each answer not exceeding half a page)

(Q.No:1-5)

Section-B (5x7=35Marks)

Answer all Questions (Each answer not exceeding Two pages)

(Q.No:6-10)

Section-C (3x10=30Marks)

Answer any **three** Questions (Each answer not exceeding Three pages)

(Q.No:11-15)

**Blueprint**

Section/ Unit	I	II	III	IV	V
A	2	2	2	2	2
B	1	1	1	1	1
C	1	1	1	1	1

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