

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A)

Madurai - 625 002.



DEPARTMENT OF BOTANY

Syllabus - B.Sc. Botany

June 2021 Onwards

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (A),

MADURAI-2.

DEPARTMENT OF BOTANY

B.Sc. SYLLABUS (Academic Year 2021 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

ELIBGIBILITY 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

The successful completion of B.Sc Programme will enable the students to :

- Demonstrate the comprehensive knowledge in core subjects and allied disciplines
- Develop scientific aptitude and analytical skills
- Apply the acquired knowledge and skills to tackle the real life situations
- Act as socially responsible and effective team player.
- To exhibit appropriate soft skills to attain professional competencies.

Programme specific outcomes

On completion of programme students will be able to

- Recall details and basic information about the various branches of Botany and understand the basic concepts of Botany
- Perform Experiments in the lab and field.
- Acquire thorough knowledge about various primitive to highly evolved plants.
- Equip themselves for higher studies in Botany
- Analyze the importance of plants and apply in various fields of day today life
- Generate data, Test hypothesis, make observations, collect data, analyze, interpret and evaluate the results.

SEMESTER	CREDITS
I	20
II	24
III	15+1*
IV	25
V	23
VI	32
Total	140

*Extension activities

SEM	PART	SUBJECT	TITLE OF THE PAPER	CODE	HRS	CDTS
I	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 Ancillary 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 Ancillary 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
			Major Practical Paper I	PB1	4	-
	III	Ancillary	Chemistry - Paper I	AC1	4	3
			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
			Major Practical Paper I	PB1	4	4
	III	Ancillary	Chemistry Paper II (Theory)	AC2	4	4
			Chemistry Practical Paper –I	CPA	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		Major Practical Paper -II	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		Major Practical Paper –II	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

S.NO	SEM	SUBJECT CODE	NAME OF THE SUBJECT	HRS/ WEEK	CREDIT	HRS/ SEM
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 2021 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

S.No	Semester	Subject Code	Subject	Hours/week	Credit
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

S.No	Semester	Subject Code	Subject	Hours/week	Credit
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.

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
UNIT 1 CO1: spot, collect, identify algal forms, and recognize the ways of utilizing the algal resources for their vocation and livelihood	1	15
UNIT 2 CO2: 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
UNIT 3 CO3: to understand habitat characteristics of marine algal forms and enable their collection and characterization describing structure, functions and adaptations	3	15
UNIT 4 CO4: 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
UNIT 5 CO5: 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).

TEXT BOOKS:

1. Pandey. B.P., 1982, *A Text Book of Botany Bryophyta*, S.Chand and Company.
2. Pandey B.P., 2005, *College Botany Vol I*, S.Chand Company

REFERENCES:

2. Kumar H.D and Singh H.N., 1988, *Text Book of Algae*, East West press.
3. Sharma O.P., 1986, *Text Book of Algae*, Tata Mc Graw Hill Publications.
4. Rashid. A., 1998, *An Introduction of Bryophytes*, Vikas Publishing house, New Delhi.

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 fresh water and marine algae	3 hours	Slide shows and guided 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 Phaeophyceae- Sargassum	5 hours	Charts, AV aids and animated projections Explanation using 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.

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

TEXT BOOKS :

1. Sundara Rajan, S. 2001 – *Introduction to Fungi*, Anmal Publications Pvt. Ltd., New Delhi.
2. Vashishta, B.R. 2000, *Mycology*, Chand & Co. New Delhi.
3. Fungi for degree students ,B.R Vashista

REFERENCES:

1. Alexopoulos and Mims.M.1993, *Introductory Mycology* – Wiley Eastern Ltd. Delhi.
2. Alexopoulos C.J. Mims. C.W & Blackwell, 1996, *Introductory Mycology* 4th 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 3rd 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 : (15hrs/sem)			
	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: (15hrs/sem)			
	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: (15hrs/sem)			
	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.
UNIT IV: (15hrs/sem)			
	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
UNIT V: (15hrs/sem)			
	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: Dr. 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	
PREAMBLE: <ul style="list-style-type: none"><input type="checkbox"/> To gain .Knowledge about cryptogams and phanerogams and primary information about fossil records<input type="checkbox"/> .It provides a thorough knowledge about the diversity, structural organization and reproduction of Pteridophytes and Gymnosperms.<input type="checkbox"/> It also makes the students aware of the preserved vestiges of plant life of the geological past						
COURSE OUTCOME					Unit	Hrs P/S
At the end of the Semester, the Students will be able to						
Unit 1 Co1: Understand the characteristics of Pteridophytes and their classification.Assess the evolutionary features in Pteridophytes					1	15
Unit 2 Co2: Understand the economic importance of the Pteridophytes					2	15
Unit 3 Co3: Understand the morphological diversity of Pteridophytes.					3	15
Unit 4 Co4: Understand the characteristics of Gymnosperms and their classification					4	15
Unit 5 Co5: students are aware of the preserved vestiges of plant life of the geological past					5	15
SYLLABUS						
Unit I: 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						
Unit II: Sporangial organization, Homospory, Heterospory, heterogamy and Seed habit, Apospory and Apogamy, Economic importance of Pteridophytes						
Unit III: Structure and reproduction of following genera- Psilotum, Lycopodium, Equisetum, Gleichenia and Marsilea						
Unit IV: 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
UNIT I (15hrs/sem)			
	Classification of Pteridophytes by G.M.Smith (1955), General characteristics of Pteridophytes with reference to Psilophyta ,	2 hours 4 hours	Chalk and talk Chalk and talk
	Lepidophyta , Calamophyta , Pterophyta.	5 hours	Chalk and talk
	Different types of steles in Pteridophytes	4 hours	ICT
UNIT II (15hrs/sem)			
	Sporangial organization,	6 hours	ICT
	Homospory, Heterospory, heterogamy and Seed habit, Apospory and Apogamy	5 hours	Chalk and talk
	Economic importance of Pteridophytes	4 hours	Chalk and talk
UNIT III (15hrs/sem)			
	Structure and reproduction of following genera- Psilotum, Lycopodium,	4 hours	Peer teaching
	Equisetum,	5 hours	Chalk and talk
	Gleichenia and Marsilea	6 hours	ICT
UNIT IV (15hrs/sem)			
	Classification of Gymnosperms by K.R.Sporne (1965)	2 hours	Chalk and talk

	General characteristics of Gymnosperms with reference to Cycadopsida,	3 hours	ICT
	Coniferopsida Gnetopsida. Structure and reproduction of Pinus Gnetum	4 hours 2 hours 2 hours 2 hours	Chalk and talk Chalk and talk ICT ICT
UNIT V (15hrs/sem)			
	Process of Fossilization, Types of fossils: compressions, impressions, encrustations, petrifications, compactations.	6 hours	Chalk and talk
	Geological time scale.	3 hours	Chalk and talk
	Study of the following fossils: Lepidodendron Lygenopteri	3 hours 3 hours	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: <ul style="list-style-type: none"><input type="checkbox"/> To impart an insight into the internal structure and reproduction of the most evolved group of plants, the Angiosperm.<input type="checkbox"/> To know the detailed structure of and functions of tissue systems of plants<input type="checkbox"/> To get an insight into secondary growth<input type="checkbox"/> To Understand the life cycle pattern of Angiosperms.<input type="checkbox"/> To Understand the morphology and development of reproductive parts.<input type="checkbox"/> To. Get an insight in to the fruit and seed development.						
COURSE OUTCOME					Unit	Hrs P/S
At the end of the Semester, the Students will be able to						
Unit 1 Co1: list down the different kinds of tissues, able to differentiate simple tissue from complex tissue.					1	15/S
Unit 2 Co2: compare and contrast the anatomy of root & stem and also between dicot and monocot appreciate the vascular supply.					2	15/S
Unit 3 Co3: describe the normal secondary growth and differentiate it from anomalous thickening.					3	15/S
Unit 4 Co4 : Analyse the sequences of reproductive process and appreciate the way the life perpetuates.					4	15/S
Unit 5 Co5: differentiate the various kinds of endosperm and summarize the embryogeny and polyembryony, apomixis.					5	15/S

--	--	--

TEXT BOOKS:

1. Mathew, K.M., 1991, *The Excursion Flora of Central Tamilnadu*, India Oxford IBH Pub. New Delhi.
2. Pandey, B.P., 1999, *Taxonomy of Angiosperms* S.Chand & Company.
3. Saxena, N.B., Shamindra Saxena 2006, *Plant Taxonomy*, Pragati Prakashan

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. Sharma, O.P., 2009, *Plant Taxonomy*, Tata Mc Graw Hill Education Private Limited.
4. Subramanyan, N.S., 1996, *Laboratory Manual of Plant Taxonomy*, Vikas Publishing House Pvt Ltd.,
5. Vasishtha, P.C., 2000, *Taxonomy of Angiosperms*, S.Chand and Co. Ltd.,

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I (15 hrs)			
	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 anatomy dorsiventral and isobilateral leaf, Stomatal types and distribution,	5hrs	ICT

	Nodal anatomy, unilacunar, Trilacunar and 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 (Dendrochronology) heart wood, sap wood, porous and nonporous wood– Tyloses.	5hrs	ICT
UNIT IV			
	Microsporangium: Microsporogenesis, Male gametophyte. Megasporangium: Megasporeogenesis, 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

--	--	--	--

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.Botany

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.

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

TEXT BOOKS :

1. Sundararajan 1988, *Introduction to Cell Biology* Vikas Pub.
2. Pandey B.P., 2005, *College Botany Vol I*, S.Chand Company

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. Arora M.P. and Sandhu G.S. 2000, *Genetics*, Himalayan Pub.
5. Savage J.M. 1976, *Evolution*, Amerind Pub. Co.Ltd.
6. Sinnot E.W. Dunn L.C. and Dbzhansky T. 1996, *Principles of Genetics*, Tata Mc Graw Hill Pub.
7. 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,Ri bosomes 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 discussion
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.

Course Outcome s (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	4	3	4	3	4	3	3	4	3	3	3	4
CO2	4	3	3	3	2	4	3	4	3	4	4	3	3	3
CO3	3	3	3	4	3	4	3	3	3	3	3	3	3	4
CO4	4	3	3	4	3	4	3	4	3	4	4	3	4	3
CO5	4	3	4	3	3	3	3	4	3	3	4	3	3	3
Mean Overall score														

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 : IV

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

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
UNIT 1 CO1: Understand the methods used in micrometry, microtomy and staining procedures.	1	12
UNIT 2 CO2: Gain skills on working principles of pH meter, colorimeter and centrifuge	2	12
UNIT 3 CO3: Learn the technique of electrophoresis & chromatography	3	12
UNIT 4 CO4: Gain knowledge about various statistical methods of analysis	4	12
UNIT 5 CO5: 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 co-efficient , regression – simple linear regression , basic idea of significance test – Chi square test, Probability Test.

TEXT BOOKS:

- 1..Johansen, M. 1940, *Plant Microtechniques* Mc Graw Hill, New Delhi
2. Gurumani, N. 2004. *An Introduction to Biostatistics*. MJP Publishers, Chennai.

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
- 4...Balaji, K., Raghavaiah A.V.S., & Jayaveera K.N. 2012. *Biostatistics*. I.K.International Publishing House, New Delhi.
5. Khan, I.A. & Khanum,A. 1994. *Fundamentals of Biostatistics*. Ukaaz Publications, Hyderabad.
- 6...Sundar Rao, P.S.S. & Richard,J. 1997. *An Introduction to Biostatistics*. Prentice-Hall of India Pvt.Ltd. New Delhi.
7. Sunder Rao, P.S.S. & Richard. 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 discussion
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 and Mode.	4 hours	Lecture method and 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 : 5

TITLE OF THE PAPER: Taxonomy of Angiosperms

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT	
	5		-			
PREAMBLE: <ul style="list-style-type: none"><input type="checkbox"/> To get an insight into scientific knowledge of worlds plant resources.<input type="checkbox"/> To understand the different systems of classification.<input type="checkbox"/> To categorize organism which aids easy communication.<input type="checkbox"/> To analyze the evolutionary relationship among plants.<input type="checkbox"/> To relate Taxonomy with other branches of botany.						
COURSE OUTCOME					Unit	Hrs P/S
At the end of the Semester, the students will be able to						
UNIT 1 CO1 understand the different parts of the plant and their modifications.					1	15
UNIT 2 CO2: understand the various systems of classification and appreciates the use of Taxonomy in other branches.					2	15
UNIT 3 CO3: Analyse the important characteristics and relate the evolutionary relationship among Polypetalae.					3	15
UNIT 4 CO4: Analyse the important characteristics and relate the evolutionary relationship among Gamopetalae.					4	15
UNIT 5 CO5: Analyse the important characteristics and relates 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.

TEXT BOOKS :

1. Pandey, B.P., 1999, *Taxonomy of Angiosperms* S.Chand & Company
2. Sharma, O.P., 2009, *Plant Taxonomy*, Tata Mc Graw Hill Education Private Limited.
3. Subramanyan, N.S., 1996, *Laboratory Manual of Plant Taxonomy*, Vikas Publishing House Pvt Ltd.,
4. Vasishta, P.C., 2000, *Taxonomy of Angiosperms*, S.Chand and Co. Ltd.,

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.

5. Saxena, N.B., Shamindra Saxena 2006, *Plant Taxonomy*, Pragati Prakashan.

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 hours	Lecture, Alive specimens
	Leaf; Phyllotaxy, Simple and Compound leaves, Leaf modifications.	5 hours	Lecture, Alive specimens, ICT
	Inflorescence; Racemose, Cymose, Mixed and special types. Fruits: Simple, Aggregate and Multiple fruits	5 hours	Lecture, Alive specimens
UNIT II: 15 hours per semester			
	Systems of classification- Artificial : (Linnaeus) Natural : (Bentham and Hooker), Phylogenetic (Engler and Prantl).	5 hours	Lecture cum ICT
	Merits and Demerits of Bentham & Hooker's system. Definition of APG and Ethnobiological classification.	5 hours	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 hours	Chalk and talk
UNIT III: 15 hours per semester			
	A detailed study and economic importance of the following Angiospermic families. Polypetalae: Nymphaeaceae, Annonaceae.	5 hours	Chalk and talk, Alive specimens

	Capparidaceae, Meliaceae, Fabaceae	5 hours	Chalk and talk, Alive specimens
	Myrtaceae, Cucurbitaceae	5 hours	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 hours	Chalk and talk, Alive specimens
	Sapotaceae, Apocynaceae	5 hours	Chalk and talk, Alive specimens
	Convolvulaceae, Lamiaceae	5 hours	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 hours	Chalk and talk, Alive specimens
	Monocots- Orchidaceae	5 hours	Chalk and talk, Alive specimens
	Liliaceae, Poaceae.	5 hours	Chalk and talk, Alive specimens

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	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
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/VIDOES/TUTORIAL	ICT
	5	4	-	-	1

PREAMBLE:

- To understand the water relationship in plants and gain knowledge in physiological activities like transpiration types, and theories of stomata opening.
- To understand plant mineral nutrition and role of minerals in plants
- To gain a knowledge on photosynthetic processes unique to plants and learn metabolic CO₂ fixation in Plants.
- To understand their physiology of respiration in Plants and diverse sources of nitrogen for Plants.
- To describe the importance of plant growth regulators

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
UNIT 1 CO1: To understand water relations in plants	1	15
UNIT 2 CO2: To give knowledge about Mineral nutrition and the role of minerals in plants	2	15
UNIT 3 CO3: Develop the students, understanding of photosynthesis. and pathways of CO ₂ fixation in plants.	3	15
UNIT 4 CO4: To provide knowledge about respiration and different sources of nitrogen to plants.	4	15
UNIT 5 CO5: 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 Absorbtion 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 CO₂ fixation in C₃ and C₄ plants, CAM pathway,. Factors affecting photosynthesis.

UNIT IV: Respiration: Aerobic and Anaerobic, fermentation, Respiratory quotient, Mechanism of respiration Glycolysis, Kreb'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, Seed dormancy, causes and methods of breaking seed dormancy stress physiology and Biological clock.

TEXT BOOKS:

1.Fundamentals of Plant Physiology by Dr. V.K Jain**REFERENCES:**

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

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I (15hrs/sem)			
	Water relations in plants – Properties of water, Diffusion, Osmosis, imbibition Absorbtion of water.	7 hours	Lecture
	Mechanism of water absorption: cohesion- tension theory. starch glucose theory , potassium ion theory . Guttation.	7 hours	Lecture
	Transpiration: Types, Theories of stomatal opening and closing:	1 hour	ICT
UNIT II (15hrs/sem)			
	Mineral nutrition – Macronutrients, Micronutrients.	6 hours	Lecture
	Role of minerals in plants.	1 hour	ICT
	Translocation of mineral nutrients. Active and passive absorption of minerals. Donnan's equilibrium	8 hours	Lecture
UNIT III (15hrs/sem)			
	Photosynthesis: Photosynthetic apparatus, energy sources.	6 hours	Lecture
	Photosystem I and II, electron flow through Cyclic and Non cyclic Photo Phosphorylation.	1 hour	ICT
	Pathways of CO ₂ fixation in C ₃ and C ₄ plants, CAM pathway,. Factors affecting photosynthesis.	8 hours	Lecture
UNIT IV (15hrs/sem)			
	Respiration: Aerobic and Anaerobic, fermentation, Respiratory quotient, Mechanism of respiration Glycolysis, Kreb's cycle, Oxidative phosphorylation. Factors affecting Respiration.	9 hours	Lecture
	Sources of Nitrogen to plants – Ammonia assimilation, Nitrate reduction, denitrification.	5 hours	Lecture
	Mechanism of Nitrogen fixation,	1 hour	ICT

UNIT V (15hrs/sem)			
	Growth and Development: Sigmoidal growth curve, Plant growth regulators: Auxins, Gibberellins, Cytokinins, Abscissic acid and Ethylene. Physiology of flowering: Photoperiodism, Vernalization.	10 hours	Lecture
	Seed dormancy: Causes and methods of breaking seed dormancy,	1 hour	ICT
	Stress physiology. Biological clock.	4 hours	Lecture

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.

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

TEXT BOOKS:

1. Verma. S.K., 2002, *A Text book of Plant Physiology and Biochemistry*, S.Chand & Co., New Delhi
2. Jain. J.L ,2000, *Fundamentals of Biochemistry*, Chand & Co., New Delhi.

REFERENCES:

1. Conn E.E & Stumpf P.K., 1997, *Outlines of Biochemistry*, Wiley Eastern.
2. Banerjee , P.K. 2008. *Introduction to Biophysics*, S.Chand & Co., New Delhi.
3. 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 , fatty acid – saturated fatty acids – palmitic acid. unsaturated fatty acids – linoleic acid.	4 hours	Explanation using PPT,Lecture method.
	Triglycerides. phospholipids : lecithin – glycolipids- cerebrocides – derived lipid: Cholesterol.	4 hours	chalk and talk method and group discussion
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/VIDOES/TUTORIAL	ICT
	5	4	-	-	1

PREAMBLE:

- To recognize and describe the history and characteristics of bacteria.
- To describe the beneficial role of microorganisms in fermented foods.
- To Identify the bacteria, techniques to study Preparation of various culture media
- To acquire, discover, and apply the theories and principles of food microbiology in practical, real-world situations and problems.
- To understand immune system

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
UNIT 1 CO1: Students will be able to acquire, articulate, retain and apply knowledge relevant to microbiology.	1	15
UNIT 2 CO2: Students will acquire and demonstrate competency growth and reproduction of bacteria.	2	15
UNIT 3 CO3: Students will learn culture medium types and bacterial straining.	3	15
UNIT 4 CO4: Students will make the students to Understand the general characteristics of water and food microbiology.	4	15
UNIT 5 CO5: Students will acquire knowledge on immunology microbiological laboratory skills applicable to microbiological research.	5	15

SYLLABUS

UNIT I:

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

Unit II:

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⁺ & HFr).

Unit III:

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

Unit IV:

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 .

Unit V:

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

TEXT BOOKS:

1. Dubey and D.K. Maheswari – 2001, *A Text Book of Microbiology*, S. Chand and Co., New Delhi.

REFERENCE:

1. Frazier, C.W. Westhoff, C.D. – 2011, *Food Microbiology*, Tata Mc Graw Hill Education Pvt. Ltd., New Delhi.
2. Micheal, J. Pelczar Jr. C.S. Chan, Noel R.Krieg – 1993, *Microbiology*, Tata Mc Graw, New Delhi, 5th ed.
3. Nicklin, J.Grasme Cook, K. Paget & Killington, R. 1998, *Instant Notes in Microbiology*, Viva Books.
4. Purohit, S.S.-1998, *Microbiology and Application Botanica*, 6th Ed.
5. Talora, K.P. & Talora, A.-1998, *Fundamentals in Microbiology*, WCB Mc Graw Hill.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1(15hrs/sem)			
	History-Contributions of Anton von Leewenhoek,Louis Pasteur ,Robert Koch,Classification of Bacteria (Bergey’s Manual), ,	7 hours	Lecture
	ultrastructure of Bacteria, General characters of virus	7hours	Lecture
	Bacteriophage – structure and multiplication	1 hour	ICT
UNIT 11 (15hrs/sem)			
	Growth of Bacteria : growth and multiplication of bacteria ,	6 hours	Lecture

	sigmoidal growth curve-Generation time.	1 hour	ICT
	Nutritional types of Bacteria-Photosynthetic,Chemosynthetic Bacterial Recombination – Transformation, Transduction, Conjugation (F ⁺ & HFr).	8 hours	Lecture
UNIT III (15hrs/sem)			
	Techniques to study bacteria : Staining methods – Simple, Gram staining and Negative Staining.	8 hours	Lecture
	Culture of bacteria : Culture media :Types , preparation and sterilization of medium.	6 hours	ICT
	Pure culture techniques – streak plate, pour plate, spread plate	1 hour	Lecture
UNIT IV (15hrs/sem)			
	Water microbiology-analysis of water for coli forms ,waste water treatment processes-Primary, secondary and tertiary methods.	9 hours	Lecture
	Food microbiology::microbial spoilage of fruits vegetables, meat.	1 hour	ICT
	Flora of Milk and pasteurization of milk .	5 hours	Lecture
UNIT V (15hrs/sem)			
	Immunology-General account of immune system and immunology active and passive immunity.	7 hours	Lecture
	.Types of immunity-Natural and acquired immunity, .Antigen and antibody (types),requirements, antigen, antibody interaction	7 hours	Lecture
	ELISA	1 hour	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
 Sub. Code : B62

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

TITLE OF THE PAPER: Biotechnology, Nanotechnology and Bioinformatics

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

PREAMBLE:

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

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
UNIT 1 CO1: Know and describe the scope and tools of biotechnology.	1	15
UNIT 2 CO2: understand the fermentation technology and it application in daily life.	2	15
UNIT 3 CO3: gain knowledge on plant biotechnology and gene transfer in plants through microbes.	3	15

UNIT 4 CO4: acquires knowledge about nano particles and its application in medicinal field.	4	15
UNIT 5 CO5: 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.

TEXT BOOKS :

1. Dubey. R.C., 2006, *A Text Book of Biotechnology* S.Chand and Company, New Delhi.

REFERENCE:

1. Balasubramanian. D. – Bryce CFA , Dharmalingam K. Green J, Kunthala Jayaraman, 2007, *Concepts in Biotechnology* – University Press India Pvt. Ltd.
2. Singh. B.D., 2007, *Biotechnology, Expanding Horizon*, Kalyani Publications, Ludhiana.
3. Veer Bala Rastogi 2008, *Fundamentals of Molecular Biology*, Ane Books Pvt. Ltd.
4. Remawat. K.G., 2006, *Plant Biotechnology* S. Chand & Company Ltd., New Delhi.
5. Purohit. S. S., 2004, *A Laboratory Manual of Plant Biotechnology*. Agro bios India.
6. Balaji, S. 2010. *Nanobiotechnology*. MJP Publishers, Chennai.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1 (15hrs/sem)			
	Brief introduction on Biotechnology, Scope of Biotechnology, Recombinant DNA Technology: Tools- Restriction enzymes: Endonuclease and Exonuclease. Basic	12 hours	Lecture

	properties of Plasmids: Vector- Types of vectors – Plasmid- PBR 322. Phage Lambda vector. Analysis of cloned genes – Southern and Northern Blotting –		
	PCR Technique	3 hours	ICT
UNIT 11 (15hrs/sem)			
	Fermentation technology : fermentor – design and basic functions, aeration, agitators (impellers and Spargers).	12 hours	Lecture
	Types of fermentors	3 hours	ICT
UNIT III (15hrs/sem)			
	Plant biotechnology – Introduction to tissue culture – Genetic transformation of plants by Agrobacterium tumefaciens. Genetic organisation of	12 hours	Lecture
	Ti plasmid, structure and functions encoded by T-DNA.	3 hours	ICT
UNIT IV (15hrs/sem)			
	Nanoparticles: Definition, Classification, Characterization, biological synthesis of gold nanoparticles.	12 hours	Lecture
	Applications of nanoparticles in medical field	3 hours	ICT
UNIT V (15hrs/sem)			
	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	12 hours	Lecture

	analogy – Protein sequences –		
	Nucleic acid sequences, Phylogenetic analysis.	3 hours	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	Major Practical Paper –I	4+4	40	60	100
PB2	VI	2	Major Practical Paper –II	3+3+2	40	60	100

Programme: B.Sc. Botany

Part III: Core Paper

Semester : IV

Hours: 8 hrs/week 120 hrs/semester

Sub. Code : PB1

Credits: 4

TITLE OF THE PAPER: MAJOR PRACTICAL PAPER I

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

PREAMBLE:

- To make the students know about the concepts on Plant diversity and to develop the skills in identifying the various plant group.
- To understand the principles and concepts in Anatomy.
- To acquire the skills in sectioning and identifying them with characteristic features.
- To understand the practical aspects of Biostatistics and solve 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. Verification of Mendelian laws-Monohybrid, Dihybrid. 10. Drosophila eye colour – demonstration 11. Human traits-Earlobes, clasping the hand. 12. To calculate the Mean, Median, Mode and Standard Deviation for Polyalthia & Neem leaf. 13. Problems related to Probability. 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	3.2
CO2	3	3	3	3	4	3	3	3	4	4	3	3	3	3	3	3.2
CO3	3	3	4	3	4	3	4	3	3	3	3	4	3	4	4	3.4
CO4	4	3	4	3	3	4	3	4	3	4	3	3	3	3	3	3.4
CO5	4	3	4	3	3	4	3	4	4	3	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.Sobhakumari

Programme : B.Sc. Botany

Part III: Practical Paper II

Semester : V

Hours: 8 hrs/week 120 hrs/semester

Sub. Code : PB2

Credits : 4

TITLE OF THE PAPER: MAJOR PRACTICAL PAPER II

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

PREAMBLE:

- To make the students to know about the concepts of 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 identify the 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
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
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 Outcome (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	PSO 3	PS O4	PS O5	PSO 6	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															

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

Course Designer: Mrs.M.P.SIVASANKARI

Programme : B.Sc.Botany

Semester : V

Sub. Code : EB51

Part III: Core Elective

Hours : 5 hrs/week 75 hrs/semester

Credits: 5

TITLE OF THE PAPER: FORESTRY AND ECONOMIC BOTANY

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

PREAMBLE:

- To effectively demonstrate knowledge of the value of plants in our everyday lives.
- .To make the students aware about conservation and sustainable use of plants for the people and future generation
- . To disseminate the value of plants ,the types of forest, its degradation, agroforestry
- . To inculcate the habit of economic utilization of plants .

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
UNIT 1 CO1 ; 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
UNIT 2 CO2: incorporate the foundational natural and social sciences into decision making, Study the interactions of people and plants	2	15
UNIT 3 CO3: . 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
UNIT 4 CO4: . 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
UNIT 5 CO5: 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

SYLLABUS

UNIT I: Introduction, Types of forest in India, Indian institutes involving forest management and conservation

UNIT II: Deforestation – natural and man made, Afforestation and Reforestation. Shifting cultivation.-Social forestry, Agro forestry and its components and their significance

UNIT III: Major forest products: Wood, (Sandal, Eucalyptus) Timber (Teak and Rosewood) 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

UNIT IV: Economic Botany: Name, Family, Cultivation (in brief) and Uses of Cereals (Rice, Wheat), Pulses (Red gram, Black gram), Oil (Gingelly oil, Cocount oil), Spices (Chilly, Crocus), Condiments (Garlic, Ginger) and Beverages (Tea, Coffee).

UNIT V: Ethnobotany: History of Ethnobotany, Tribals in Tamil Nadu, Types of Ethnic groups, Traditional Medicines used by Ethnic groups for diseases management, Ethno medicines.

TEXT BOOKS:

1. Krishnamoorthy.T., 1993, *Minor forest products of India*, Oxford and IBN Publishing Co.Pvt., Ltd., New Delhi.
2. Pandey.B.P., 1995, *Economic Botany*, Chand & Company Ltd., New Delhi.
3. Ganesan. S., 2011, *Vol.1, South India Ethomedicinal Plants*, Thiagarajar College, Madurai

REFERENCES:

1. Agarwal.V.P., 1990, *Forests in India*, Oxford & IBH Publsiing Co,Pvt., Ltd., New Delhi.
2. Bandyopadhyay, A.K., 1997, *A Text Book of Agroforestry with Applications*, Vikas Publishing House Pvt., Ltd., New Delhi

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1 (15hrs/sem)			
	Introduction, Types of forest in India,	8 hours	Chalk and talk
	Indian institutes involving forest management and conservation	7 hours	ICT
UNIT 11 (15hrs/sem)			
	Deforestation – natural and man made,	3 hours	Chalk and talk

	Afforestation and Reforestation. Shifting cultivation.	5 hours	Chalk and talk
	Social forestry, Agro forestry and its components and their significance	7 hours	Peer teaching Peer teaching
UNIT III (15hrs/sem)			
	Major forest products: Wood, (Sandal, Rosewood) Timber (Teak and Eucalyptus) Fuel Wood (Acacia and Prosopis).	4 hours 5 hours	ICT ICT
	Minor forest products: Essential oils (Lemon grass) spices and condiments: Cinnamon, Clove and Pepper. Gums and resins: Gum Arabic & Ferula	2 hours 2 hours 2 hours	Chalk and talk Chalk and talk
UNIT IV (15hrs/sem)			
	Economic Botany: Name, Family, Cultivation (in brief) and Uses of Cereals (Rice, Wheat), Pulses (Red gram, Black gram), Oil (Gingelly oil, Cocount oil),).	5 hours 4 hours	Chalk and talk Chalk and talk
	Spices (Chilly, Crocus), Condiments (Garlic, Ginger) and	3 hours	Chalk and talk
	Beverages (Tea, Coffee)	3 hours	Chalk and talk
UNIT V (15hrs/sem)			
	Ethnobotany: History of Ethnobotany,	4 hours	ICT
	Tribals in Tamil Nadu, Types of Ethnic groups	5 hours	ICT
	Traditional Medicines used by Ethnic groups for diseases management, Ethno medicines	3 hours 3 hours	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	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 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.

Part III: Major related Elective Paper II

Semester : VI

Hours: 6 hrs/week 90hrs/semester

Sub. Code : EB62

Credits : 5

TITLE OF THE PAPER: INDUSTRIAL MICROBIOLOGY

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT	
	6	3	1	1	1	
PREAMBLE: <ul style="list-style-type: none"><input type="checkbox"/> 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.<input type="checkbox"/> Thus with opportunities booming, this course is all set out to entrain learners looking for career opportunities in the various avenues.						
COURSE OUTCOME At the end of the Semester, students will be able to					Unit	Hrs P/S
UNIT 1 CO1: understand the role and functions of microbes in nature and confidently handle microbes for gainful employment as technician and expert					1	14 hrs
UNIT 2 CO2: apply their knowledge and training for manipulation of microbes and microbial processes in production and service industries					2	22 hrs
UNIT 3 CO3: 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

UNIT 4 CO4: 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
UNIT 5 CO5: 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

SYLLABUS

Unit I:

Introduction, microbes as ideal organisms for Industries, microbes as suppliers of Natural Resources. Role of microorganisms in the production of Industrial Products.

Unit II:

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.

Unit III:

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.

Text Book:

1. A Text Book of industrial Microbiology by A.H Patel, Macmillan , 1984.

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 Technology- Stages of Fermentation	3 hours	Explaining pathways using 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, Protease	6 hours	AV aids and Power point 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 Outcome (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	PSO1	PSO 2	PSO3	PSO 4	PSO 5	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.Botany

Part III: Major related Elective Paper III

Semester : VI

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.						
COURSE OUTCOME					Unit	Hrs P/S
At the end of the Semester, the students will be able to						
UNIT 1 CO1: 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
UNIT 2 CO2: handle issues that are considered serious threats to biodiversity as they would be sensitized to prevent the ongoing onslaughts on nature					2	15 hours
UNIT 3 CO3: 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
UNIT 4 CO4: 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
UNIT 5 CO5: 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.

TEXT BOOKS

1. Krishnamurthy, K.V. 2003, *An Advanced Text book on Biodiversity*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. A Text Book of Biodiversity by Anupam Rajak, Independently Published ,2020

REFERENCES :

- 1.Jaganmohan Reddy, K. & Veeraiah, S. 2010, *Aavishkar*, Publishers, Distributors, Jaipur.
- 2.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, vegetation classification	4 hours	Short films and Documentaries
	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
	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	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

Sub. Code : AH1

Part III: Allied

Hours : 4P/W 60 Hrs P/S

Credits : 4

TITLE OF THE PAPER: INTRODUCTION TO ECOBIOLOGY

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT	
	4	2		1	1	
PREAMBLE: <ul style="list-style-type: none"><input type="checkbox"/> To compare morphological and anatomical adaptations of plants with respect to their habitat.<input type="checkbox"/> To acquire knowledge about Organisms and their interactions with reference to habitat and Evolution.<input type="checkbox"/> To acquire knowledge about Ecosystem<input type="checkbox"/> To analyze the causes of succession and to differentiate Hydrosere from Xerosere.<input type="checkbox"/> To assess the vegetation using transect and quadrat methods						
COURSE OUTCOME					Unit	Hrs P/S
At the end of the Semester, the Students will be able to						
UNIT 1 CO1: Understand various zones of environment and adaptations of Hydrophytes, Xerophytes and Halophytes to their respective habitat.					1	12
UNIT 2 CO2: Differentiate positive and negative interrogations					2	12
UNIT 3 CO3: Understand the structure and function of ecosystem					3	12
UNIT 4 CO4: Develop concept on hydrosere and Xerosere. Causes and basic types of succession.					4	12
UNIT 5 CO5: 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.

TEXT BOOKS:

1. Sharma. P.D., 1995, *Ecology and Environment*, Rakesh Kumar Publications, New Delhi.
2. Shukla, R.S. and Chandel, P.S. 2006, *A text book of plant Ecology*, S. Chand & Company Ltd., New Delhi.

REFERENCES:

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.
1. Sharma. P.D., 1995, *Ecology and Environment*, Rakesh Kumar Publications, New Delhi.
2. Shukla, R.S. and Chandel, P.S. 2006, *A text book of plant Ecology*, S. Chand & Company Ltd., New Delhi.
3. 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 1(12hrs/sem)			
	Concept of biosphere physical chemical properties of water lithosphere Atmosphere: various zones.	6 hours	Lecture

	Adaptations - Hydrophytes: <i>Hydrilla</i> , Xerophytes: <i>Opuntia</i> , Halophytes: <i>Rhizophora</i> .	6 hours	ICT
UNIT 11 (12hrs/sem)			
	Biotic interaction Mutualism- <i>Rhizobium</i> ; Commensalism- Vanda; Parasitism- <i>Cuscuta</i> ; Insectivorous plants- <i>Nepenthes</i> .	6 hours 6 hours	ICT ICT ICT ICT
UNIT III (12hrs/sem)			
	Structure of Ecosystem -Abiotic and Biotic components Functions of Ecosystem Food Chain, Food web, Ecological pyramid, Energy flow and productivity.	6 hours 6 hours	Lecture Lecture
UNIT IV (12hrs/sem)			
	Ecological succession, causes and basic types of succession	4 hours	Lecture PPT & Video
	General process-nudation,invasion,competition,sta bilisation	4 hours	Lecture
	Hydrosere & Xerosere	4 hours	Lecture Video
UNIT V (12hrs/sem)			
	Methods of Study of vegetation Quadrat	6 hours	Lecture Video and PPT
	Transect	6 hours	Lecture Video

Course Outco mes (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	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.

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the students will be able to		
UNIT 1 CO1: understands the world energy resources and its availability	1	12
UNIT 2 CO2: Learns about conventional and nonconventional energy and distinguishes them.	2	12

UNIT 3 CO3: understands the principles and mechanism behind solar equipments	3	12
UNIT 4 CO4: Enable the students to apply the principles of solar energy in routine life	4	12
UNIT 5 CO5: 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.

TEXT BOOKS

1. Sharma. P.D., 2009, *Environmental Biology*, Rastogi Publications, Meerut

REFERENCES :

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

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : (12hrs/sem)			
	Energy resources, energy consumption, world energy features	4 hours	Chalk–talk
	Availability of energy resources	4 hours	Lecture , A V aids
	Conventional and non-conventional resources	4 hours	Lecture
UNIT II: (12hrs/sem)			
	Conventional energy- coal	6 hours	chalk - talk AV aids
	Oil and gas	6 hours	Lecture
UNIT III: (12hrs/sem)			
	Non-conventional energyresources-solar energy	4 hours	Chalk- talk
	Principle,mechanism and application of solar energy	4 hours	Lecture AV aids.
	Solar powered equipments- solar cooker,solar water heater	4 hours	Lecture AV aids.
UNIT IV: (12hrs/sem)			
	Wind energy	4 hours	Chalk- talk
	Principles of wind energy	4 hours	Chalk- talk
	Applications of wind energy	4 hours	Lecture AV aids
UNIT V: (12hrs/sem)			
	Biomass energy, Energy plantation- ethanol production, biogas generation	4 hours	Lecture PPT

	Community biogas plant(KVIC and Janata)	4 hours	Chalk talk, PPT
	Hydrogen as source of energy,biofuel,biodiesel	4 hours	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: Dr.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)	Ancillary Practical Paper -I	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.

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

TEXT BOOKS :

1. 4. Kumar N., 1994. *Introduction to Horticulture*, Rajalakshmi Pub. Nagarcoil

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*. 4th Edn. TMH New Delhi.
3. John Weathers. 1993, *Encyclopaedia of Horticulture*, Discovery Pub. House, New Delhi.
4. Manibhushan Rao K. 2005. *Text Book of Horticulture*, Macmillan India Ltd.
5. Randhawa G.S., Mukhopadhyay A. 1986. *Floriculture in India*, Allied Publishers Pvt. Ltd. Ahamedabad.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : (6 hrs/sem)			
	Importance of horticulture.	3 hours	Chalk–talk AV aids
	Divisions of horticulture – Pomology , Olericulture ,Floriculture.	3 hours	Lecture , AV aids
UNIT II: (6 hrs/sem)			
	Vegetative propagation: Advantages. cuttage: root cutting, stem cutting ,leaf cutting.	1 hour	chalk - talk AV aids
	Layerage: Simple, Compound, Trench and Air layering.	2 hours	Lecture AV aids
	Graftage: Side grafting, Whip grafting, Cleft grafting.	3 hours	PPT
UNIT III: (6 hrs/sem)			

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: Dr.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

PREAMBLE:

- To gain information about Medicinal Plants, History of medicinal plants in India and its conservation.
- To understand the medicinal practices based on indigenous plant knowledge, and plant as source of food and medicine.
- To appreciate the medicinal value of non-flowering plants.
- To appreciate the medicinal value of flowering plants

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
UNIT 1 CO1: describe the applications of plants in a historical, cultural, medicinal, legislative, and global context .	1	6
UNIT 2 CO2: critically evaluate the ideas and discussed plant as source of food and medicine.	2	6
UNIT 3 CO3: identify and learnt medicines obtained from Non-flowering plants.	3	6
UNIT 4 CO4: identify and learnt medicines obtained from flowering plants.	4	6
UNIT 5 CO5: acquired knowledge on cultivation and uses of medicinal plants.	5	6

Unit I:

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.

Unit II:

Plants as source of food and medicine, kitchen herbs as source of medicine, folk medicines- traditional methods.

Unit III:

Drugs from Non-flowering plant: Algae – *Spirulina*, Fungi – *Penicillium*, Lichens: *Cetraeria*, Bryophyte : *Sphagnum*, Fern – *Dryopteris*, Gymnosperm – *Ephedra*.

Unit IV:

Drugs from flowering plants: Roots – *Withania somnifera*, Rhizome - *Curcuma longa*, Leaves - *Ocimum basilicum*, *Aloe barbadensis* , Bark – *Cinchona*.

Unit V:

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>

Reference :

1. Krishnamoorthy.T., 1993, *Minor forest products of India*, Oxford and IBN Publishing Co.Pvt., Ltd.,
2. Pandey.B.P., 1995, *Economic Botany*, S.Chand & Company.
3. Albert.F.Hill, 1952, *Economic Botany*, Tata Mc Graw Hill Publishing Company Ltd.
4. Kumar.N.C., *An Introduction to Medical Botany*, Pharmacognosy Emkay Publications, New Delhi.
5. Kokate.C.K.Purohit, A.P.Gokhale, 2003, *Pharmacognosy Nivali Prakashan*, Pune.
6. Pal.D.C., 1998, *Tribal Medicine*, Naya Prakash, Calcutta.
7. Wallis.T.E., 1985, *Text Book of Pharmacognosy*, CBS Publishers & Distributors, Delhi.
8. Sinha.R.K., and S.Sinha, 2001, *Ethnobiology*, Surabhi Publications, Jaipur.
9. Ganesan. S., 2011, *Vol.1, South India Ethomedicinal Plants*, Thiagarajar College, Madurai.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I (6 hrs/sem)			
	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 hours	Lecture
	Conservation of medicinal plants	1 hour	ICT
UNIT II (6 hrs/sem)			
	Plants as source of food and medicine, , folk medicines-traditional methods.	5 hours	Lecture
	kitchen herbs as source of medicine	1 hour	ICT
UNIT III (6 hrs/sem)			
	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 hours	Lecture
	Gymnosperm – <i>Ephedra</i> .	1 hour	ICT
UNIT IV (6 hrs/sem)			
	Drugs from flowering plants: Roots – <i>Withania somnifera</i> , Rhizome - <i>Curcuma longa</i> , Leaves - <i>Ocimum basilicum</i> , <i>Aloe barbadensis</i> ,	5 hours	Lecture
	Bark – <i>Cinchona</i> .	1 hour	ICT
UNIT V (6 hrs/sem)			
	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>	5 hours	Lecture
	Entire plant – <i>Phyllanthus niruri</i>	1 hour	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	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
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:

- To know the principles and practices of organic farming for sustainable crop production.
- To reduce the usage of chemical fertilizers gradually and usage of Integrated pest management..
- To make the students aware of sustainable use of biofertilizers.

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
UNIT 1 CO1 To appraise the philosophy and ecological basis of organic agriculture	1	6
UNIT 2 CO2: Learns the characteristics, identification, cultural methods and maintenance of Azospirillum, Azotobacter, Azolla and Anabaena	2	6
UNIT 3 CO3: Understands and appreciates the use of organic and biological methods to control pests and diseases	3	5
UNIT 4 CO4: learns the benefit reducing the usage of fertilizers gradually and usage of integrated of pest management	4	7
UNIT 5 CO5: 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 fluorescens*

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(6 hrs/sem)			
	Green revolution	2 hours	Chalk and talk
	uses of inorganic fertilizer and pesticides in agriculture,	2 hours	Chalk and talk
	its impact on environment, human and animals	1 hour	Chalk and talk
	Organic farming and its advantages	1 hour	Chalk and talk
UNIT II (6 hrs/sem)			
	Integrated Nutrient Management (INM): production and applications of <i>Rhizobium</i> ,	2 hours	Chalk and talk
	<i>Azotobacter</i> , <i>Anabaena – Azolla</i>	2 hours	ICT
	<i>Phosphobacteria</i> , VAM fungi	2 hours	Chalk and talk
UNIT III (6 hrs/sem)			

	Integrated Disease Management (IDM): production and application of <i>Trichoderma</i> ,	3 hours	Chalk and talk
	<i>Pseudomonas fluorescence</i>	3 hours	Chalk and talk
UNIT IV (6 hrs/sem)			
	Integrated Pest Management (IPM): - production and application of Bacteria – <i>Bacillus thuringiensis</i> , Fungi – <i>Beauveria bassiana</i> (<i>Metarhizium</i>),	3 hours	ICT
	Fungi – <i>Beauveria bassiana</i>	1 hour	Chalk and talk
	Virus – NPV	2 hours	Chalk and talk
UNIT V (6 hrs/sem)			
	Organic Manure: Farmyard manure , Green manure ,	1 hour	Chalk and talk
	Vermi compost, Vermi wash. Bioenhancers:	1 hour	Chalk and talk
	preparations and applications of Effective microorganisms (EM)	2 hours	Chalk and talk
	Panchakavya, Fish Gunabajalam	2 hours	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	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/VIDOES/TUTORIAL	ICT
	2	1	-	-	1

PREAMBLE:

- To acquire knowledge about types of medium used in tissue culture lab.
- To understand the various types of cultures .
- To gain knowledge about the concept of totipotency and microropagation in plants.
- To apply tissue culture techniques in Agriculture, Horticulture and Forestry.
- To understand the physiology of invitro production of secondary metabolites.

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

TEXT BOOKS :

1. Razdan, M. K. (2004). Introduction to Plant Tissue Culture. 2nd ed. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
- 2.Plant Tissue culture by K.G Ramawat

REFERENCES :

1. Bhojwani S.S and Razdan MK 2000 *Plant Tissue Culture* – Theory and practice Elsevier
2. Kalyan De Kumar,2006. *Plant Tissue Culture*, New Central Book Agency, Calcutta.
3. Narayana Swami S. 2005 *Plant Cell & Tissue culture*. Mc Graw Hill Company.
5. Timir Baran Jha and Biswajith Ghosh 2007, *Plant Tissue Culture*, University Press.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1 (6 hrs/sem)			
	Basic requirements : pre requisites of a tissue culture lab. Methods of asepsis , preparation of media . and suspension culture.	5 hours	Lecture
	explants- initiation of callus	1 hour	ICT
UNIT 11 (6 hrs/sem)			
	Types of culture : batch and continuous culture. somatic hybridization – cybrids, hybrids	5 hours	Lecture
	Isolation , fusion and culture of protoplast,	1 hour	ICT
UNIT III (6 hrs/sem)			
	In vitro regeneration – concept of totipotency, micropropagation, organogenesis, somatic embryogenesis, artificial seed,.	5 hours	Lecture
	somaclonal variation	1 hour	ICT
UNIT IV (6 hrs/sem)			
	Application of tissue culture in Agriculture, Horticulture and Forestry,	5 hours	Lecture
	haploid and triploid plant production.	1 hour	ICT

UNIT V (6 hrs/sem)			
	In vitro production of secondary metabolites-alkaloids,	5 hours	Lecture
	transgenic plants - resistance to diseases, insect pests, abiotic stress and herbicides	1 hour	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	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	
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:

- Able 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 understand the nutritive values of mushroom

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

TEXT BOOK

1. Bahl.N., 2009, *Hand book on Mushrooms*, 4th Edition, Oxford and IBH Publishing Co.Pvt., Ltd., New Delhi.

REFERENCE:

1. Bahl.N., 2009, *Hand book on Mushrooms*, 4th 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 : (6 hrs/sem)			
	External and internal structure of mushroom	4 hours	Chalk–talk AV aids
	Types of edible mushroom in India	1 hour	Lecture , AV aids
	Identification of poisonous mushrooms	1 hour	Lecture
UNIT II: (6 hrs/sem)			
	Techniques of mushroom cultivation- spawn production	3 hours	chalk - talk AV aids
	Compost and maintenance of mushroom sheds	3 hours	PPT, Lecture
UNIT III: (6 hrs/sem)			
	Cultivation of Button Mushroom (<i>Agaricus bisporous</i>)	3 hours	Chalk- talk , AV aids.
	Cultivation of Paddy straw mushroom(<i>Volvariella volvacea</i>)	3 hours	Lecture AV aids.
UNIT IV: (6 hrs/sem)			
	Harvesting –storage ,preservation,marketing of mushrooms	2 hours	Chalk- talk
	Significance of mushrooms Risks involved in mushroom cultivation	3 hours	Lecture AV aids
	Common pathogens affecting mushroom	1 hour	Lecture

UNIT V: (6 hrs/sem)			
	Nutritive value and uses of mushroom	3 hours	Lecture
	Recipes prepared from mushroom- omlet,soup,mushroom biriyani,pakoda,pickle	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: Dr.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 know the importance of horticulture.
- To develop interest in propagation techniques.
- To acquire the knowledge of preservation methods of vegetables and fruits.
- To understand the art of gardening.

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

TEXT BOOKS :

1.. Kumar N., 1994. *Introduction to Horticulture*, Rajalakshmi Pub. Nagarcoil.

REFERENCES:

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*. 4th Edn. TMH New Delhi.
3. John Weathers. 1993, *Encyclopaedia of Horticulture*, Discovery Pub. House, New Delhi.
4. Manibhushan Rao K. 2005. *Text Book of Horticulture*, Macmillan India Ltd.
5. Randhawa G.S., Mukhopadhyay A. 1986. *Floriculture in India*, Allied Publishers Pvt. Ltd. Ahamedabad.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I : (6 hrs/sem)			
	Importance of horticulture.	3 hours	Chalk–talk AV aids
	Divisions of horticulture – Pomology , Olericulture ,Floriculture.	3 hours	Lecture , AV aids
UNIT II: (6 hrs/sem)			
	Vegetative propagation: Advantages. cuttage: root cutting, stem cutting ,leaf cutting.	1 hour	chalk - talk AV aids
	Layerage: Simple, Compound, Trench and Air layering.	2 hours	Lecture AV aids
	Graftage: Side grafting, Whip grafting, Cleft grafting.	3 hours	PPT
UNIT III: (6 hrs/sem)			
	Establishment and lay out of orchards	2 hours	Chalk- talk , AV aids.
	Harvesting, marketing and storage of fruits	2 hours	Lecture AV aids.
	Preservation of fruits	2 hours	Lecture

			AV aids
UNIT IV: (6 hrs/sem)			
	Types of vegetable growing- kitchen garden, truck garden, market garden	3 hours	Chalk- talk AV aids
	Vegetable forcing, vegetable seed industry	1 hour	Chalk- talk
	Preservation of vegetables	2 hours	Lecture AV aids
UNIT V: (6 hrs/sem)			
	Indoor gardening, indoor plants	2 hours	Lecture
	Types of indoor gardening- hanging basket, bonsai, bottle garden	2 hours	Chalk talk AV aids.
	Flower arrangement and Dry decoration	2 hours	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: Dr.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 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 understand the nutritive values of mushroom

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

TEXT BOOKS :

1.Bahl.N., 2009, *Hand book on Mushrooms*, 4th Edition, Oxford and IBH Publishing Co.Pvt., Ltd., New Delhi.

REFERENCES:

1. Bahl.N., 2009, *Hand book on Mushrooms*, 4th 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 : (6 hrs/sem)			
	External and internal structure of mushroom	4 hours	Chalk–talk AV aids
	Types of edible mushroom in India	1 hour	Lecture , AV aids
	Identification of poisonous mushrooms	1 hour	Lecture
UNIT II: (6 hrs/sem)			
	Techniques of mushroom cultivation- spawn production	3 hours	chalk - talk AV aids
	Compost and maintenance of mushroom sheds	3 hours	PPT, Lecture
UNIT III: (6 hrs/sem)			
	Cultivation of Button Mushroom (<i>Agaricus bisporous</i>)	3 hours	Chalk- talk , AV aids.
	Cultivation of Paddy straw mushroom(<i>Volvariella volvacea</i>)	3 hours	Lecture AV aids.
UNIT IV: (6 hrs/sem)			
	Harvesting –storage ,preservation,marketing of mushrooms	2 hours	Chalk- talk
	Significance of mushrooms Risks involved in mushroom cultivation	3 hours	Lecture AV aids
	Common pathogens affecting mushroom	1 hour	Lecture
UNIT V: (6 hrs/sem)			
	Nutritive value and uses of mushroom	3 hours	Lecture
	Recipes prepared from mushroom-omlet,soup,mushroom biriyani,pakoda,pickle	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: Dr. 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
Semester : I
Sub. Code : AB1

Part III: Allied for Geography Major
Hours : 4 P/W 60Hrs P/S
Credits : 4

TITLE OF THE PAPER: INTRODUCTION TO ECOBIOLOGY

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

PREAMBLE:

- Able to relate the anatomical and Morphological modifications with reference to their habitat and environment.
- To appreciate dual nature of lichens and their importance and mode of nutrition and interactions in plants.
- To understand the concept of eco system.
- To trace the evolutionary origins and inter relatedness of different forms with reference to habitat.
- To assess the vegetation, using quadrat and transect.

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

TEXT BOOKS

1. Shukla, R.S. and Chandel, P.S. 2006, A text book of plant Ecology, *S. Chand & Company Ltd., New Delhi.*
2. Verma, P.S. and Agarwal, V.K. 1998. Concept of Ecology, *S. Chand & Company Ltd., New Delhi*

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 (12hrs/sem)			
	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 hours 6 hours	Lecture ICT
UNIT II			
	Biotic interaction Mutualism- <i>Rhizobium</i> ; Commensalism- Vanda; Parasitism- <i>Cuscuta</i> ; Insectivorous plants- <i>Nepenthes</i> .	6 hours 6 hours	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 hours 6 hours	Lecture Lecture
UNIT IV			
	Ecological succession, causes and basic types of succession	4 hours	Lecture PPT & Video
	General process-nudation, invasion, competition, sta bilisation	4 hours	
	Hydrosere & Xerosere	4 hours	
UNIT V			
	Methods of Study of vegetation Quadrat	6 hours	Lecture Video and PPT
	Transect	6 hours	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

Part III: Allied for Geography Major

Semester : II

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 acquire knowledge about natural forests, social forests and Agroforests
- To understand the threats to forests
- To acquire the knowledge about the causes and the effects of deforestation
- To understand the need for conservation of forests

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

UnitV:

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

TEXT BOOKS :

1. Shukla, R.S. and Chandel, P.S. 2006, A text book of plant Ecology, S. Chand & Company Ltd., New Delhi.
2. Verma, P.S. and Agarwal, V.K. 1998. Concept of Ecology, S. Chand & Company Ltd., New Delhi

REFERENCE:

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.
3. P.D. Sharma, 2009, *Environmental Biology*, Rastogi Publications, Meerut.
4. R. Rajagopalan, 2005, *Environmental Studies*, Oxford Univers.
5. Juneja, Kavita, 2002, *Ecology*, Anmol Publications Pvt. Ltd., New Delh

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I :			
	Types of forests in India, threats to forest Causes of deforestation	6 hours	Lecture Lecture Peer discussion
	Effects of deforestation	6 hours	Lecture
UNIT II:			
	Components of social forestry, significance	6 hours	chalk - talk AV aids
	Models of Agroforestry, Agronomic importance of Agroforestry	6 hours	Lecture AV aids
UNIT III:			
	Major forestproducts- wood,timber,fuel wood	6 hours	Chalk- talk , AV aids.
	Essential oil - lemongrass, spices and condiments- cinnamon,pepper,clove	6 hours	Lecture AV aids.
UNIT IV:			
	Forestmanagement- nursery development,transplantation,weeding,mulching,plant protection,rotation fixation and harvesting	6 hours	Chalk- talk AV aids
	Forest conservation- insitu and exsitu	6 hours	Chalk- talk AV aids
UNIT V:			
	Forest legislation –national parks and sancturies	4 hours	Lecture
	Wild life protection Act Forest conservation Act	4 hours	Chalk talk
	Vanamahotsava, Joint forest management	4 hours	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	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

Ancillary Environmental Biology practical for Geography Major

Scheme of Examination

Year	Sem. No.	Paper No.	Subject	Duration of exam	Passing Minimum 40%		
					Int.	Ext.	Total
I	II	I (BPA)	Ancillary Practical	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 know about the habitats of plants
- To understand the positive and negative interaction.
- To acquire knowledge about Ecosystem
- To understand the major and minor forest products.
- To assess the 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	3.2
CO2	3	3	3	3	4	3	3	3	4	4	3	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

Programme : B.Sc.Botany

Value added course

Class : II B.Sc. BOTANY

Hours: 30 hrs/semester

Sub. Code :

Credits : 2

TITLE OF THE PAPER: PHYTOCHEMISTRY

Objective:

- To learn about phytochemistry of medicinal plants

Course Outcomes:

After completion of the course, student will

- Understand the concepts of Phytochemistry
- Able to appreciate the medicinal values of plants
- Know the various techniques involved in phytochemical screening

Syllabus

UNIT I

Herbal medicine : History of Herbal medicine ,Indian systems of Medicine –Siddha,Ayurvedha and unani.Important phytochemicals ,their sources and potential utilities. Phytochemicals as drugs, cosmetics, food additives, flavours and nutraceuticals

UNIT II

Phytochemical screening : Qualitative chemical examination –i) Detection of different classes of phytoconstituents by test tube and TLC methods,ii)Detection of volatile oil by hydrodistillation . Alkaloids: Morphine, Terpenoids: Taxol, Glycosides: Sennosides, Flavonoids :Rutin -Natural sources, extraction, purification, isolation.

UNIT III

Industrially important volatile oils: Sandalwood oil,lemon grass oil,citronella oil ,Chenopodium oil,eucalyptus oil- Natural sources , extraction ,purification their chemistry and trade.

UNIT IV

Phytochemical fingerprinting: HPTLC and GCMS characterization of extracts containing alkaloids, saponins, glycosides and flavanoids.

UNIT V

Biogenetic pathways for the production of Phytopharmaceuticals, such as Tropane (Belladonna), Isoquinoline (Opium), Indole (Ergot), Coumarins and Flavones

TEXT BOOKS :

1. A Text Book of Pharmacognosy and Phytochemistry by Biren and seith Elsevier Health Sciences, 2012
2. Pharmacognosy & Phytochemistry of medical plants by Jean Brunton. Intercept Ltd; 2nd Revised edition (1 January 1999)
3. Chromatography of Alkaloids by Varpoorte Swendson, Elsevier Scientific Publishing **Company**
4. A Textbook of Pharmacognosy and Phytochemistry by Kumar G.S. & Jayaveera K.N. S.Chand & company

REFERENCE

1. Modern methods of plant analysis- peach & M.V. Tracey Vol. 1 to VII, Springer-Verlag Berlin Heidelberg 1955
2. Thin layer chromatography by Stahl, Springer-Verlag Berlin Heidelberg, 1969
3. Comprehensive Medicinal Chemistry, Vol 1-6, Elsevier Publication
4. Pharmacognosy, Phytochemistry, Medicinal Plants, By Jean Bruneton · Technique & Documentation 1999

Programme: B.Sc.Botany

Class :II B.A/B.Sc/B.B.A/B.Com,B.C.A

Sub. Code :VAB1

Value added course

Hours: 30 hrs/semester

Credits : 2

TITLE OF THE PAPER: NUTRACEUTICALS

Objectives:

- To familiarize the students with the field of functional foods and nutraceuticals.
- Students will have the knowledge about the functional components of the food and regulatory framework required for regulatory approval of functional foods and Nutraceuticals.
- To understand the importance of functional foods or nutraceutical supplementation for chronic disease prevention.

Student Learning Outcomes:

- On completion of the course the student will be able to: differentiate between different classes of Nutraceuticals ,
- To Explain regulatory aspects of nutraceuticals and functional foods ,
- To apply the knowledge of nutraceuticals and functional foods in food industries.

Syllabus

UNIT:I

Introduction to Functional foods and Nutraceuticals : Introduction to nutraceuticals and functional food, basis of claims for a compound as a nutraceuticals , ,nutraceuticals bridging gap between food and drug .Important definitions associated with the nutraceutical –Potential nutraceuticals, established nutraceuticals, prebiotics ,probiotics, omega 3 fatty acid ,MUFA(monounsaturated fatty acid),phytoestrogen.

UNIT :II

Role of functional foods in Health :Role of nutraceuticals in management of health and disease ,Nutraceuticals for cardiovascular diseases, hypertension , cancer, diabetes, cholesterol management, obesity, joint pain, immune enhancement, age-related muscular degeneration

UNIT:III

Functional properties of Nutraceuticals : Properties and functions of various nutraceuticals such as lycopene, isoflavonoids, prebiotics and probiotics, glucosamine, phytosterols, free radicals, mushroom extracts, concept of antioxidants.

UNIT:IV

FOOD SOURCES Different foods as functional food: cereal products (oats, wheat bran, rice bran, etc.), fruits (apple ,oranges and banana)and vegetables(broccoli and cauliflower), milk and milk products, legumes, nuts(almonds and cashews), seeds (flax and pumpkin seeds),. Coffee and tea as functional foods and their protective effect

UNIT:V

Regulatory aspects- International and national regulatory aspects of functional foods in India, ICMR guidelines for probiotics regulatory aspects for nutraceuticals /functional foods including CODEX
Anti nutritional factors present in foods:Types of inhibitors present in various foods and their inactivation
Adverse effects and toxicity of nutraceuticals

TEXT BOOKS :

1. Robert EC. 2006. Handbook of Nutraceuticals and Functional Foods. 2nd Ed. Wildman.
2. Gibson GR & William CM. 2000. Functional Foods - Concept to Product.

REFERENCE:

1. Brigelius-Flohé, J & Joost HG. 2006. Nutritional Genomics: Impact on Health and Disease. Wiley VCH.
2. Goldberg I. 1994. Functional Foods: Designer Foods, Pharma Foods.
3. Shi J. (Ed.). 2006. Functional Food Ingredients and Nutraceuticals: Processing Technologies. CRC Press.
- 4.. Webb GP. 2006. Dietary Supplements and Functional Foods. Blackwell Publ

Code :

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

2.

B.Sc Degree Examination Nov /April

Title of the Paper :

(For those who joined in June 2021)

Duration : 3 hours

Maximum Marks : 75

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