SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN

(Autonomous)

Madurai - 625 002.

DEPARTMENT OF BOTANY

Syllabus for M.Sc. Botany

June 2021 Onwards

SEM	COURSE CODE	COURSE TITLE	HRS/ WEEK	CREDIT	EXAM HRS	MARKS		TOTAL
						INT	EXT	
I	FA1	Plant Diversity I -Algae, Fungi, Lichens and Bryophytes	6	5	3	25	75	100
	FA2	Plant Diversity II -Pteridophytes, Gymnosperms and Paleobotany	6	5	3	25	75	100
	FA3	Genetics and Evolution	5	4	3	25	75	100
	FL1	Practical Paper - I	8	4	3	40	60	100
	EFA	Elective Paper I - Ecology and Biodiversity	5	5	3	25	75	100
II	FB1	Plant Anatomy and Embryology of Angiosperms	6	5	3	25	75	100
	FB2	Cell and Molecular Biology	6	4	3	25	75	100
	FB3	Microbiology and Plant Pathology	5	4	3	25	75	100
	FL2	Practical Paper - II	8	4	3	40	60	100
	EFB	Elective Paper II- Horticulture and Plant breeding	5	5	3	25	75	100
III	FC1	Taxonomy of Angiosperms	5	4	3	25	75	100
	FC2	Plant Physiology	5	4	3	25	75	100
	FC3	Bioinstrumentation and Biostatistics	5	4	3	25	75	100
	FL3	Practical Paper -III	8	4	3	40	60	100
	EFC	Elective Paper III - Plant Tissue Culture	5	5	3	25	75	100
	NMPF	Non-major Elective -Gardening	2	2	3	25	75	100
	FD1	Plant Biotechnology and Bioinformatics	6	5	3	25	75	100
	FD2	Biochemistry and Biophysics	6	4	3	25	75	100
	FL4	Practical Paper - IV	5	4	3	40	60	100

	EFD	Elective Paper IV- Applied Botany	5	5	3	25	75	100
	FPW	Project	8	4	-	80	20	100

SEMESTER – I

S.No	TITLE OF THE PAPER	CODE	HRS	CREDITS
1	PLANT DIVERSITY –I ALGAE, FUNGI, LICHENS AND BRYOPHYTES	FA1	6	5
2	PLANT DIVERSITY – II PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY	FA2	6	5
3	GENETICS AND EVOLUTION	FA3	5	4
4	PRACTICAL PAPER– I	FL1	8	4

5	ELECTIVE PAPER –I ECOLOGY AND BIODIVERSITY	EFA	5	5

SEMESTER – II

S.No	TITLE OF THE PAPER	CODE	HRS	CREDITS
1	PLANT ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS	FB1	6	5
2	CELL AND MOLECULAR BIOLOGY	FB2	6	4
3	MICROBIOLOGY AND PLANT PATHOLOGY	FB3	5	4
4	PRACTICAL PAPER -II	FL2	8	4

5	ELECTIVE PAPER- II HORTICULTURE AND PLANT BREEDING	EFB	5	5

SEMESTER – III

S.No	TITLE OF THE PAPER	CODE	HRS	CREDITS
1	TAXONOMY OF ANGIOSPERMS	FC1	5	4
2	PLANT PHYSIOLOGY	FC2	5	4
3	BIOINSTRUMENTATION AND BIOSTATISTICS	FC3	5	4
4	PRACTICAL PAPER - III	FL3	8	4

5	ELECTIVE PAPER- III -PLANT TISSUE CULTURE	EFC	5	5
6	NON-MAJOR ELECTIVE-GARDENING	NMPF	2	2

SEMESTER – IV

S.No	TITLE OF THE PAPER	CODE	HRS	CREDITS
1	PLANT BIOTECHNOLOGY AND BIOINFORMATICS	FD1	6	5
2	BIOCHEMISTRY AND BIOPHYSICS	FD2	6	4

3	PRACTICAL PAPER- IV	FL4	5	4
4	ELECTIVE PAPER - IV APPLIED BOTANY	EFD	5	5
5	PROJECT	FPW	8	4

SEMESTER	CREDITS
1	23
2	22
3	23
4	22
TOTAL	90

Programme : M.Sc **Core Paper I**
Semester : I **Hours : 6 /wk 90Hrs /sem**
Sub. Code : FA1 **Credits :5**

TITLE OF THE PAPER: PLANT DIVERSITY I - ALGAE, FUNGI, LICHENS AND BRYOPHYTES

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	4	-	-	2

PREAMBLE:

- To provide practical training as well as theoretical knowledge about different plant groups**.**
- To improve skills for identifying the various plant groups.
- To create awareness about the different plant groups.
- Students are introduced the applications of algae and fungi to human welfare.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: understand the different systems of algal classification and recognizes the habitat of algae.	1	18
UNIT 2 CO2: realize the application of algae in human welfare.	2	18
UNIT 3 CO3: understand the general features of fungi, its classification and identifies its economic importance.	3	18
UNIT 4 CO4: develop an understanding of the role of lichens in the environment.	4	18
UNIT 5 CO5: analyse the phylogenetic relationship of bryophytes with other higher groups of plant kingdom.	5	18

SYLLABUS

Unit I:

Classification of Algae (F.E.Fritsch 1945, Bold & Wynne 1978). Criteria used for algal classification. Range of thallus structure , Life cycle patterns of algae , Phylogeny & Evolutionary trends in algae. General account on the structure and reproduction of algae belonging to Cyanophyceae, Chlorophyceae, Bacillariophyceae, Phaeophyceae & Rhodophyceae.

Unit II:

Ecology of Algae: Freshwater Algae, Marine Algae, Soil algae, Symbiotic algae & Parasitic algae. Algae as pollution indicators, algal blooms . Algicides. culture and cultivation of fresh water algae and marine algae-sea weed cultivation, processing and its applications. Economic importance of algae: Food & feed. Agar-agar, carragenin and Diatomaceous earth Iodine, Vitamins , medicine Single cell protein, industrial products.

Unit III:

Fungi: General features, occurrence and distribution, Mode of Nutrition in fungi, culture of fungi, classification of fungi (Alexopoulos & Mims,1979), recent trends in the classification of fungi. General characters of major classes: Myxomycetes, Oomycetes, Zygomycetes,

Ascomycetes, Basidiomycetes and Deuteromycetes.(Thallus organisation, cell structure and fruiting bodies). Ecological and Economic importance of fungi.

Unit IV:

Homothallism and Heterothallism in fungi. Homokaryon and Heterokaryon. Sex hormones and pheromones in fungi. Reproduction - Life cycle types, parasexual cycles, reduction in sexuality in fungi. Spore dispersal mechanisms. Lichens: General features, classification of lichens, distribution, thallus organization, vegetative and sexual reproduction. Role of lichens in soil formation, Ecological and economic importance of lichens.

Unit V:

Bryophytes: General features, distribution and classification of Bryophytes (Rothmaler.1955). Structure, reproduction and life cycle of major groups- Marchantiales, Jungermaniales, Anthocerotales and Polytrichales. Range of vegetative structure, Evolution of gametophytes and sporophytes. Spore dispersal mechanisms in bryophytes- spore germination patterns in Bryophytes. Ecological and economic importance of Bryophytes.

REFERENCE BOOKS:

ALGAE

TEXT BOOKS:

1. Sharma, O.P. (2011). Diversity of microbes & Cryptogams – Algae, Tata McGraw Hill Education Private Limited, New Delhi
2. Kumar ,H.D. (1985) . Introductory Phycology - East West press , New Delhi.
3. Kumar, H.D and Singh, H.N. (1982) .A text book of Algae. Affiliated East West Press, New Delhi.

REFERENCE BOOKS:

1. Bold ,H.C and Wyne M.J. (1978). Introduction to algae – Structure & reproduction –Prentice hall , New Jersey
2. Fritsch ,F.E. (1935).The Structure & Reproduction of The Algae (Vol1&2)Cambridge University press ,England
3. Venkataraman G.S *et al.,* (1974). Algae form and Function – Today and Tomorrow publishers, New Delhi.

FUNGI:

TEXT BOOKS:

1. Sharma, O.P. (2011). Fungi and allied microbes The McGraw –Hill companies , New Delhi
2. Alexopoulus, C.J. Mims, CW. (1979). Introductory Mycology , Wiley Eastern ltd., New Delhi
3. Dube, H.C . (1990). An Introduction of Fungi. Vikas Publication House Ltd, New Delhi
4. Sharma, P.D (2003). The Fungi. Rastogi Publications, Meerut

REFERENCE BOOKS:

1. Burnett, J.H. (1971). The fundamentals of Mycology. ELBS Publication, London
2. Sundararajan, S. (2004). Practical manual of fungi , Anmol publications Pvt.ltd., New Delhi

LICHENS:

REFERENCE BOOKS:

1.Muthukumar, S. and Tarar, J.L. (2006).Lichen Flora of Central India, Eastern book Corporation , New Delhi
2. Dharani Dhar Awasthi .(2000). A Handbook of Lichens Vedams eBooks (P) Ltd. New Delhi .
3. Hale, M.E . (1983). The Biology of Lichens. Edward Arnold, London

BRYOPHYTES:

TEXT BOOKS:

1. Rashid, A. (1998). An introduction to bryophyte. Vikas Publishing Co.New Delhi.
2. Vashishta, Sinha A.K, Adarsh Kumar. (2011). Bryophytes, S.Chand &Company ltd.,New Delhi

REFERENCE BOOKS:

1 Chopra, R.N and Kumar P.K. (1988). Biology of Bryophytes, John Wiley, New York.
2. Prem Puri, P. (1990). Bryophytes: Morphology, Growth and Differentiation.Atmaram and Sons.
3. Smith, A.J.E. (1982). Bryophyte Ecology. Chapman and Hall. London
4. Watson, E.V. (1970). Structure and life of Bryophytes. Hutchinson and Co, London.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I (18 hours)			
	Classification of algae,range of thallus structure, lifecycle patterns of algae.	6	ICT
	Phylogeny and evolutionary trends in algae	3	Chalk and talk
	Structure and reproduction of Cyanophyceae, Chlorophyceae	3	Chalk and talk
	Structure and reproduction of Bacillariophyceae, Pheophyceae and Rhodophyceae	6	Chalk and talk
UNIT II(18 hours)			
	Ecology of algae-freshwater,marine,soil,symbiotic and parasitic	3	ICT
	Algae as pollution indicators- algalblooms,algicides.	3	Chalk and talk
	cultivation of freshwater and marine algae,sea weed cultivation,processing and its application.	6	Chalk and talk

	Economic importance of algae-food,feed,agar-agar,carragenin,diatomaceous earth,vitamins,medicine,single cell protein and industrial products.	6	Chalk and talk
UNIT III (18 hours)			
	Fungi- general features,occurrence,nutrition and culture	3	Chalk and talk
	Fungi- classification,ecological and economic importance	3	Chalk and talk
	General characters of myxomycetes,oomycetes and zygomycetes	6	ICT
	General characters of ascomycetes,basidiomycetes and deuteromycetes	6	ICT
UNIT IV (18 hours)			
	Homothallism,heterothallism,homokaryon,heterokaryon,sex hormones and pheromones	3	Chalk and talk
	Reproduction ,lifecycle types,parasexual cycles,reductionin sexuality,spore dispersal mechanisms	6	ICT
	Lichens –classification,thallus organization,reproduction	6	
	Roleof lichen in soil formation, ecological and economic importance of lichens	3	
UNIT V (18 hours)			
	Classification of bryophytes,general features	3	Chalk and talk
	Structure,lifecycle and reproduction of marchantiales and jungermaniales	6	ICT
	Structure,lifecycle and reproduction of anthocerotales and polytrichales	3	ICT
	Evolution of gametophytes and sporophytes,spore dispersal mechanisms	3	Chalk and talk
	ecological and economic importance of bryophytes	3	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	3	3	3	2	3	3	4	3	3	2	3	3	3	4	3.0
CO2	3	3	3	4	3	4	3	4	3	3	3	3	3	4	3.28
CO3	3	3	3	3	3	2	3	4	3	3	3	4	3	3	3.07
CO4	3	3	4	3	3	3	3	3	3	3	4	3	3	4	3.21
CO5	3	3	3	3	3	3	3	3	3	3	3	3	4	4	3.14
Mean Overall Score															3.14

Result: The Score for this Course is 3.14 (High relationship)

Course Designer: Dr.I. Sobha kumari

Programme : M.Sc. **Core Paper II**

Semester : I **Hours : 6 hrs /wk 90 hrs /sem**

Sub. Code : FA2 **Credits : 5**

TITLE OF THE PAPER: PLANT DIVERSITY II - PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	6	3	1	1	1

PREAMBLE:

Pteridophytes and Gymnosperms as early effective colonizers of land have in their fold the secrets and strategies that they have adopted to place and sustain themselves in the newer and harsher geo-climatic situations of the primitive and changing earth. Paleobotany deals with fossils and the fossilization processes that account for species that have gone extinct, for want of adequate adaptations to survive.

In the light of the rapid and rash global climate challenges and the avaricious anthropocentric influences thrown open today, it becomes important that this study on early vascular plants is a must and necessity.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: relate to the forms they study in theory and lab and hence shall be comfortable in describing and adopting strategies in conserving and managing plant resources.	1	20
UNIT 2 CO2: aesthetically connect with the plant group to identify and develop skills in dealing with economically important taxa among this studied plant group subscribing to floristic and horticultural significance.	2	15
UNIT 3 CO3: visualize and gain holistic knowledge of gymnosperms, especially on anatomical aspects of wood and seed development, and appreciate rationalization of using the resource for their own use and commercial purposes	3	20
UNIT 4 CO4: conceive the idea of seeing gymnosperms as dominant elements of biota of the past and capture the inside stories of their survival for analysing	4	15

factors that had led to their depletion and extinction that they may effectively apply the knowledge in current situation to stem the loss of similar and related elements.		
UNIT 5 CO5: comprehensively use the knowledge of handling and studying fossils, entrain with cross disciplinary approaches that shall enable them to go for career opportunities in contemporary avenues in connected fields of geology, earth sciences, geography, sociology and anthropology.	5	20

SYLLABUS

Unit I:

A General account of Pteridophytes and its origin. Classification of Pteridophytes(Smith,1955), Morphology, Anatomy, Reproduction and Evolution of gametophytes and sporophytes of following families: Selaginellaceae, Isoetaceae, Equisetaceae, Marsileaceae, Gleicheniaceae and Azollaceae.

Unit II :

Phylogenetic trends in Pteridophytes, Evolution of stele, Sporangial Organisation, Heterospory and seed habit, Alternation of generation. Affinities of various classes of Pteridophytes. Economic importance of Pteridophytes.

Unit III :

Classification of Gymnosperms (Sporne K.R, 1956) Comparative study of vegetative, anatomical and reproductive characteristics of major Orders : Cycadales, Coniferales and Gnetales. Economic importance of Gymnosperms.

Unit IV :

General Structure and Interrelationship of Pteridospermales and Pentoxylales. Living fossils : Affinities with Angiosperms & Pteridophytes.

Unit V :

Paleobotany: Geological time scale, Fossilization and types of fossils, Carbon dating , Role of fossils in various fields. Fossil Pteridophytes : *Rhynia, Sphenophyllum, Lepidocarpon.* Fossil Gymnosperms: *Lyginopteris and Lagenostoma.*

PTERIDOPHYTES:

TEXT BOOKS:

1. Vashishta , P.C , Sinha and Anilkumar (2010). Pteridophytes, S.Chand & company Ltd, New Delhi

2. Smith,G.M (1955). Cryptogamic Botany Vol. II, Tata Mcgraw Hill Publishing Co., Ltd., New Delhi.

3. Rasheed, A. (1999). An Introduction to Pteridophyta, Vikas Publishing Co., NewDelhi.

REFERENCE BOOKS:

1. Eames, A.J.(1936). Morphology of Vascular Plants - Lower groups, Tata Mcgraw Hill Publishing company Ltd., New Delhi.

2. Sporne,K.R. (1972) . The Morphology of Pteridophytes, B.I. Publications, Madras.

GYMNOSPERMS:

TEXT BOOKS:

1. Sharma, O.P. (1997). Gymnosperms, Pragati Prakashan, Meerut, India.

2. Biswas, C. and Johri, B.M. (2004). The Gymnosperms. Narosa Publishing House, New Delhi.

3. Vashista P.C. (1990) . Gymnosperms, S. Chand & Co. Ltd., New Delhi

REFERENCE BOOKS

1.. Bierhost, D.W. (1971). Morphology of Vascular plants. McMillan Company, NewYork.

2. Chamberlain, C.J. (1934).Gymnosperms: Structure and Evolution. Chicago (Reprinted 1950) NewYork.

PALEOBOTANY

REFERENCE BOOKS:

1. Atchlay W.R & Woodnuff D.S. (1981). Evolution and speciation, Cambridge University Press, Cambridge.

2. Arnold C.I.A – An Introduction to Paleobotany.

3. Kirkaldy, J.E. (1963). The study of Fossils. Hutchinson Educational, London.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING

UNIT 1 : 20 hours			
	A General account of Pteridophytes and its origin. Classification ofpteridophytes (Smith,1955)	2 hours	Chalk–talk techniques to familiarize and internalize terms, definition and key words Use of OHP to present schemes of classification
	Anatomy, Reproduction and Evolution of gametophytes of Selaginellaceae	3 hours	Use of AV aids, animations and short films
	Anatomy, Reproduction and Evolution of gametophytes of Isoetaceae	3 hours	Use of AV aids, animations and short films
	Anatomy, Reproduction and Evolution of gametophytes of Equisetaceae	3 hours	Use of AV aids, animations and short films
	Anatomy, Reproduction and Evolution of gametophytes of Marsileaceae	3 hours	Use of AV aids, animations and short films
	Anatomy, Reproduction and Evolution of gametophytes of Gleicheniaceae	3 hours	Use of AV aids and if there be any need animations and short films
	Anatomy, Reproduction and Evolution of gametophytes of Azollaceae.	3 hours	Use of AV aids, peer teaching techniques, and if there be any need animations
UNIT 11: 15 hours			
	Phylogenetic trends in Pteridophytes, Evolution of stele	5 hours	Blackboard use to familiarize and internalize terms, definitions and key words, Use of OHP to present schemes of classification
	Sporangial Organisation, Heterospory and seed habit	4 hours	Use of POP models to provide a three dimensional perspective

	Alternation of generation, Affinities of various classes of Pteridophytes	4 hours	Power Point Presentation with animations and video clips, Peer teaching .
	Economic importance of Pteridophytes.	2 hours	By way of sensitising students to do surveys and collect appropriate material, products and produce for making display through charts and museum mounts
UNIT III: 20 hours			
	Classification of Gymnosperms (Sporne K.R, 1956)	2 hours	Use of OHP to present schemes of classification and peer participation through GD
	Comparative study of vegetative, anatomical and reproductive characteristics of Cycadales	5 hours	Appraisal through field trips and site study, use of museum mounts and AV aids, Peer teaching
	Comparative study of vegetative, anatomical and reproductive characteristics of Coniferales	5 hours	Appraisal through field trips and site study, use of museum mounts and AV aids, Peer teaching
	Comparative study of vegetative, anatomical and reproductive characteristics of Gnetales	5 hours	Appraisal through field trips and site study, use of museum mounts and AV aids, Peer teaching
	Economic importance of Gymnosperms	3 hours	Market Survey Techniques and collecting inputs and raw materials for display through charts and museum mounts
UNIT IV: 15 hours			
	General Structure and Interrelationship of	5 hours	Use of videos and suitable short films

	Pteridospermales and Pentoxylales		
	Living fossils : Affinities with Angiosperms	5 hours	ICT techniques for peer interactions
	Living fossils : Affinities with Pteridophytes.	5 hours	Comparative studies with charts and slides
UNIT V: 20 hours			
	Paleobotany: Geological time scale.	2 hours	Use of e-resources, charts, animations and short films
	Fossilization and types of fossils	2 hours	Inspection of fossils Collection and visits to fossil sites
	Carbon Dating, Role of fossils in various fields	2 hours	Use of OHP and Peer participation through GD
	Fossil Pteridophytes : *Rhynia*	2 hours	Use of POP models to provide a three dimensional perspective
	Fossil Pteridophytes : *Sphenophyllum*	3 hours	AV aids, charts and slides
	Fossil Pteridophytes : *Lepidocarpon*	3 hours	AV aids, charts and slides
	Fossil Gymnosperms: *Lyginopteris*	3 hours	AV aids, charts and slides
	Fossil Gymnosperms: *Lagenostoma*	3 hours	AV aids, charts and slides

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	4	4	4	4	4	4	4	3	4	2	4	3.64
CO2	3	4	4	4	4	4	3	4	3	4	4	4	2	3	3.57

CO3	3	4	4	3	4	4	3	3	2	4	3	4	2	3	3.28
CO4	3	4	3	3	3	4	4	4	3	3	3	3	2	3	3.21
CO5	3	3	3	4	4	3	4	3	2	2	2	4	2	3	3.0
Mean Overall Score															3.34

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

Course Designer: Dr.G.Grace Lydial Pushpalatha

Programme : M.Sc.Botany **Core Paper III**
Semester : I **Hours : 5 /wk 75 Hrs /sem**
Sub. Code : FA3 **Credits :5**

TITLE OF THE PAPER: GENETICS AND EVOLUTION

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

PREAMBLE:

- To know about the rationale behind the study of Genetics
- To understand the heredity of life, to have a clear cut knowledge about the functioning of gene ie how it expresses
- To understand the mechanism of sex determination,and to study the efficacy of sex linked genes
- To analyse the difference between chromosomal and extra chromosomal inheritance
- To understand and analyse the cause and effect of mutation and to appreciate the evolution of life on earth

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Point out the rationale behind the study of genetics and understands the heredity of life	1	15
UNIT 2 CO2: differentiate between independent assortment and linkage .	2	15

UNIT 3 CO3: Explain the sex determination in plants	3	15
UNIT 4 CO4: Analyse the cause and effect of mutation	4	15
UNIT 5 CO5: Appreciate the gradual change that took place on earth	5	15

SYLLABUS

UNIT I:

Introduction .Mendelism: Law of dominance,Law of segregation ,Law of independent assortment. Back cross, Test cross. Genetic Interaction: complementary genes, supplementary genes, epistasis, duplicate genes, (lethal genes, complete dominance, incomplete dominance, co dominance). Multiple alleles with reference to skin colour in mice coat colour in Rabbit,wings of Drosophila

UNIT II:

Linkage : Linkage in maize : types, theories related to linkage, linkage groups , factors affecting linkage. Crossing over : significance & mechanism of crossing over theories related to crossing over, factors affecting crossing over, chromosomal map.

UNIT III:

Sex determination in plants : Introduction, sex determination in Melandrium, Sex limited and sex linked inheritance - Colour blindness, Haemophilia. Pedigree analysis Cytoplasmic inheritance - plastid inheritance in Mirablis jalapa,Kappa particles in Paramoecium, Male sterility in Maize and applications

UNIT IV:

Mutation – Types, spontaneous, induced. Mechanism of mutations -Chromosomal and gene mutations. Polyploidy : types, induction and role in plant breeding. Population Genetics – Hardy- Weinberg law.

UNIT V:

Theories of organic evolution : Lamarckism , Neo Lamarckism , Darwinism , Neo Darwinism. Modern synthetic theories – Natural selection and speciation. Role of RNA in organic evolution.

TEXT BOOKS:

1. Dayanasargar, V. R. (1990). Cytology and Genetics. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
2. Sharma, A. K. and Sharma, A. (1985). Advances in Chromosome and Cell Genetics. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

REFERENCE BOOKS :

1. Gardner et al. (2004). Principles of Genetics. John Wiley and Sons Inc., Singapore.
2. Primrose, S. B. and Twyman, R. M. (2006). Principles of Gene Manipulation and Genomics. 7th ed. Blackwell Science, London.
3. Rothwell, N. V. (1983). Genetics. Oxford University Press, London.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1(15 hours)			
	Introduction Mendelism: Law of dominance,Law of segregation ,Law of independent assortment. Back cross, Test cross.	5hrs	Group discussion
	Genetic Interaction: complementary gene supplementary genes, epistasis, duplicate genes, (lethal genes, complete dominance, incomplete dominance, co dominances.	5hrs	Lecture method
	Multiple alleles with reference to skin colour in mice coat colour in Rabbit,wings of Drosophila	5hrs	Videos
UNIT II(15 hours)			
	Linkage : Linkage in maize : types, theories related to linkage, linkage groups ,factors affecting linkage	5hrs	Lecture method
	Crossing over : significance & mechanism of crossing over theories related to crossing over, factors affecting crossing over,	5hrs	ICT
	chromosomal map.	5hrs	ICT
UNIT III(15 hours)			
	Sex determination in plants : Introduction, sex determination in Melandrium	5hrs	Tutorial
	Sex limited and sex linked inheritance - Colour blindness, Haemophilia. Pedigree analysis	5hrs	ICT
	Cytoplasmic inheritance plastid inheritance in Mirablis jalapa,Kappa particlesin Paramoecium, Male sterility in Maize and applications	5hrs	Group discussion
UNIT IV(15 hours)			
	Mutation Types, spontaneous, induced. Mechanism of mutations -Chromosomal and gene mutations	5hrs	Lecture
	Polyploidy : types, induction and role in plant breeding.	5 hrs	Videos
	Population Genetics – Hardy- Weinberg law.	5hrs	

UNIT V(15 hours)			
	Theories of organic evolution : Lamarckism , Neo Lamarckism , Darwinism , Neo Darwinism	5hrs	ICT
	Modern synthetic theories – Natural selection and speciation	5hrs	ICT
	Role of RNA in organic evolution**.**	5hrs	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	4	3	4	3	3	4	3	3	3	3	3	4	3	4	3.3
CO2	4	3	3	3	3	3	3	3	3	3	2	4	3	3	3.1
CO3	4	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO4	4	3	3	3	3	3	3	3	3	2	2	3	3	3	2.9
CO5	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3.1
Mean Overall Score															3.1

Result: The Score for this Course is 3.1high relationship

Course Designer: Mrs.R.Latha.

Programme : M.Sc **Practical Paper-I**
Semester : I **Hours : 8 /wk 120 Hrs /sem**
Sub. Code : FL1 **Credits :4**

TITLE OF THE PAPER: PRACTICAL PAPER -I

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

COURSE OUTCOME

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

- analyse ,characterize and identify the different types of Algae.
- understand to differentiate the types of Fungi
- identify the Lichens.
- identify Bryophytes, Pteridophytes, Gymnosperms & gain knowledge of the fossil forms .
- have problem solving ability in genetics and acquire deep understanding of Mendelian genetics and its application

SYLLABUS:

Study of the Morphology & Anatomy of the vegetative and reproductive parts of the following:

I Algae:

a) Cyanophyceae - *Nostoc, Oscillatoria*
b) Chlorophyceae - *Spirogyra ,Caulerpa,Volvox, Chara.*
c) Bacillariophyceae - *Diatoms*
d) Phaeophyceae - *Sargassum, Ectocarpus, Laminaria.*
e) Rhodophyceae - *Gracilaria, Polysiphonia*

II Fungi:

a) Myxomycetes - *Plasmodiophora*
b) Oomycetes - *Saprolegnia, Albugo*
c) Zygomycetes - *Rhizopus, Mucor*
d) Ascomycetes - *Aspergillus, Penicillium.*
e) Basidiomycetes - *Agaricus, Polyporus, Puccinia.*
f) Deuteromycetes - *Cercospora , Fusarium*

III Lichens: *Usnea*

IV Bryophytes :

a) Marchantiales - *Marchantia, Riccia.*
b) Jungermaniales - *Porella*
c) Anthocerotales - *Anthoceros*
d) Sphagnales - *Sphagnum*
e) Polytrichales - *Polytrichum*

V Pteridophytes :

a) Selaginellaceae - *Selaginella*
b) Isoetaceae - *Isoetes*
c) Equisetaceae - *Equisetum*
d) Marsileaceae - *Marsilea*
e) Gleicheniaceae - *Gleichenia*
g) Azollaceae - *Azolla*

VI Gymnosperms :

a) Cycadaceae -Cycas
b)*Araucariaceae* - *Araucaria*
c) Podocarpaceae - *Podocarpus*
d) Cupressaceae - *Cupressus*
e) Gnetaceae - *Gnetum*

VII Fossil slides observation:

a) Rhynia
b) Lepidocarpon
c) Sphenophyllum
d) Lyginopteris
e) Lagenostoma.

Genetics :

VIII: Genetics: Solving problems in genetics. Mendelian hypothesis. Epistasis, Complementary, Supplementary, Duplicate factor, Interaction of genes , multiple alleles, Linkage and Crossing over and Hardy-Weinberg law. Three point test cross –chromosome mapping.

Evolution :

IX: Only Spotters related to evolution

X: 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	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3	3	4	3	3	3	4	3	3	3	3	3	3	4	3.21
CO2	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3.07
CO3	3	4	3	3	4	3	3	3	3	3	3	3	4	4	3.28
CO4	3	3	3	3	4	3	3	3	3	3	3	3	3	2	3.0
CO5	3	3	4	3	4	3	3	3	3	3	3	3	2	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 : M.Sc., Botany **Elective paper I**
Semester : I **Hours : 5 /wk 75 Hrs /sem**
Sub. Code : EFA **Credits : 5**

TITLE OF THE PAPER: ECOLOGY AND BIODIVERSITY

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

PREAMBLE:

- Understand and appreciate interdependence of life on earth and evaluate and predict changes in environment in future.
- Understanding importance of ecological interactions among community.
- To create awareness about causes , consequences, prevention and remediation of pollution and sustainable use of earth resources ,there by making healthy environment .
- Ability to analyze information from GIS and GPS and evaluate the effects of human on climate management and conservation and sustainable use of biodiversity.
- To trace and examine the evolutionary trends and ecological relationship between various forms.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Understand the ecology and dynamicsof ecosystem elucidate critical connection between living and non living things. Apply knowledge to measure productivity in ecological studies.	1	15
UNIT 2 CO2: Understand the ecological principles and their relationship among population and communities.	2	15
UNIT 3 CO3:Understand geology, differentiate renewable and non renewable resources, assess the importance of forest ,changing climate and loss of biodiversity.	3	15
UNIT 4 CO4:Develop knowledge to use GIS and GPS to study biodiversity in relation to measurements, understanding the value of biodiversity.	4	15
UNIT 5 CO5:Understand the importance of phytogeographical relationship origin and development of species and different types of vegetation in India.	5	15

SYLLABUS

Unit I :

Ecology: Introduction ,Concepts and dynamics of ecosystem. Types of ecosystem, Components of Ecosystem. Food Chain, Food web & energy flow – Tropic levels,ecological pyramids. Biogeochemical cycles (Nitrogen, Phosphorus and Carbon). Productivity Primary and secondary productivity.(GPP & NPP) Methods of measurement of primary productivity.

Unit II:

Basic concepts of Population ecology: Describing a Population size, density, dispersion, age, structure, natality, mortality. Life tables. Population dynamics. Population regulation. Community-Characteristics of a community, composition, structure, origin & development of Community. community dynamics.

Unit III:

Types of forests and forest conservation . Utilization of energy resources- non renewable and renewable, Soil formation, types & profile, erosion & conservation. Water resources-Conservation and management. Environmental Pollution – Air, water,soil, thermal and

radiation , Ecological indicators. Cumulative effect of pollution on global environment. Ozone depletion, Green House effect and their consequences.

Unit IV:

Biodiversity Definition, Types of biodiversity, values of biodiversity-measurements of diversity-remote sensing. Applications of GIS and GPS in environmental studies. Hot spots of biodiversity , Threats to biodiversity -Habitat loss- man & wildlife conflicts. endangered and endemic plant species of India. conservation of biodiversity-*in situ and ex situ* methods.

Unit V

Phytogeography : Principles. Phytogeographical zones of India- Distribution. Continuous, discontinuous-theories of discontinuous distribution, continental drift . Age and area hypothesis. Ecological genetics, Ecotypes, Ecads and Ecolines.

REFERENCES:

ECOLOGY:

TEXT BOOKS:

1. Agrawal, K. C. (1987). Environmental Biology. Agro-botanical Publications, India.
2. Ambasht, R. S. (1974). A Textbook of Plant Ecology. 3rd ed. Students' Friends Co., Varanasi, India.
3. Vashista, P. C. (1974). A Textbook of Plant Ecology. Vishal Publications, Jullunder.

REFERENCE BOOKS:

1. Billings, W. B. (1965). Plants and the Ecosystem. Wardsworth Publishing Co. Inc., Belmont.
2. Jogdand, S. N. (2003). Environmental Biotechnology (Industrial PollutionManagement). Himalaya Publishing House, Delhi.
3. Krishnan Kannan (1997). Fundamentals of Environmental Pollution. S. Chand and Co.Ltd., New Delhi.
4. Odum, E. P. (1971). Fundamentals of Ecology. W. B. Saunders & Co., Philadelphia,USA.
5. Odum, E. P. (1975). Ecology. 2nd ed. Oxford & IBH Publications, New Delhi.
6. Smith, J. M. (1974). Models in Ecology. Cambridge University Press, London.

BIODIVERSITY:

TEXT BOOKS:

1.Krishnamurthy, K. V. (2004). An Advanced Textbook on Biodiversity: Principles and Practice. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

2. Mani, M. S. (1974). Ecology and Biogeography of India. Dr. W. Junk Publishers, The Haque.

REFERENCE BOOKS:

1. Margalef, R. (1968). Perspectives in Ecological Theory. University of Chicago Press, Chicago.
2. Frankel, O. H., Brown, A. H. D. and Burdon, J. J. (1995). The Conservation of Plant Diversity, Cambridge University Press, London.
3. Heywood, V. H. (1995). Global Biodiversity Assessment. UNEP, Cambridge UniversityPress, London.

4. Good, R. (1953). The Geography of Flowering Plants. 2nd ed. Longmans Green & Co.Inc.,London.			
UNITS	**TOPIC**	**LECTURE HOURS**	**MODE OF TEACHING**
UNIT 1 (15 hours)			
	Ecology:Introduction,Conceptsand dynamics of ecosystem. Types of ecosystem, Components of Ecosystem. Food Chain, Food web & energy flow	7	Lecture Video PPT
	Tropic levels, ecological pyramids. Biogeochemical cycles (Nitrogen, Phosphorus and Carbon). Productivity Primary and secondary productivity.(GPP & NPP) Methods of measurement of primary productivity.	8	Lecture Video PPT
UNIT 11(15 hours)			
	Basic concepts of Population ecology: Describing a Population size, density, dispersion, age, structure, natality, mortality. .	7	Lecture
	Life tables. Population dynamics. Population regulation. Community-Characteristics of a community, composition, structure, origin & development of community. community dynamics	8	Lecture
UNIT III(15 hours)			
	Types of forests and forest conservation . Utilization of energy resources- non renewal and renewable, Soil formation, types & profile, erosion & conservation. Water resources-Conservation and management..	7	Peer Teaching, PPT
	Environmental Pollution – Air, water,soil, thermal and radiation , Ecological indicators. Cumulative effect of pollution on global environment. Ozone depletion, Green House effect and their consequences	8	Video, PPT

UNIT IV(15 hours)			
	Biodiversity Definition, Types of biodiversity, values of biodiversity-measurements of diversity-remote sensing. Applications of GIS and GPS in environmental studies.	7	Lecture PPT **ICT** Video, Peer Teaching
	Hot spots of biodiversity , Threats to biodiversity -Habitat loss- man & wildlife conflicts. endangered and endemic plant species of India. conservation of biodiversity-*in situ and ex situ* methods.	8	Lecture PPT **ICT** Video, Peer Teaching
UNIT V(15 hours)			
	PhytogeographyPrinciples.Phytogeographical zones of India- Distribution. Continuous, discontinuous-theories of discontinuous distribution,	8	PPT Video Lecture
	continental drift . Age and area hypothesis. Ecological genetics, Ecotypes, Ecads and Ecolines.	7	PPT Video Lecture

Course Out comes (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	2	3	4	5	5	4	2	3	4	4	3	3.71
CO2	3	2	3	3	3	3	3	4	2	3	2	3	2	3	2.78
CO3	4	4	4	3	4	4	5	5	3	3	2	4	4	5	3.86
CO4	5	4	4	2	4	5	5	3	4	2	2	4	4	5	3.79
CO5	3	2	3	2	3	3	3	4	2	2	2	3	3	4	2.79
Mean Overall Score															3.39

Result: The Score for this Course is 3.39 (High Relationship)

Course Designer: Dr.V.Pandimadevi

Programme : M.Sc. **Core Paper:**

Semester : II **Hours: 6 hrs / wk 90 hrs/Sem**

Sub. Code : FB1 **Credits : 5**

TITLE OF THE PAPER: PLANT ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	6	3	1	1	1

PREAMBLE:

As a core paper providing for classical aspects of plant development, this course presents a comprehensive outlook on structural components of land plants. The specific patterns in the internal arrangement of tissues forming a base for understanding the varied functions of plant organs are discussed. A glimpse on the early events of development within the ovarian environment and the process of flowering with a special mention on microsporogenesis, megasprogenesis along with pre and post fertilization changes explaining plant development as the orderly progression events controlled by space and time is presented.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: acquire a holistic understanding of plant development that the learner will have skills to experimentally deal with plants and involve in entrepreneurial ventures	1	20
UNIT 2 CO2: understand and appreciate the nuances in internal organization of plant organs that they shall develop perspective to experimentally manipulate growth	2	20
UNIT 3 CO3: gain knowledge to describe and understand microsporogenesis, megasporogenesis and syngamy, and apply the learning to pursue experiments in plant breeding and pomology with a conceptual clarity	3	20
UNIT 4 CO4: understand concealed events like embryogenesis and endoderm formation and in the process hone skills in microscopy and plant microtechnique to turn into a competent technician or an independent researcher	4	15

UNIT 5 CO5: interpret the technical details they had learnt in the course to skilfully manipulate the developmental process for seed and fruit production and preservation	5	15

SYLLABUS

Unit-I:

General account and theories of organisation of apical meristem of shoot apex and root apex, Meristeme d'attente, Quiescent centre. Structural diversity and phylogenetic trends of specialization of xylem and phloem. Cambium:origin, cellular structure, cell division, storied and non-storied types. Role of Cambium in budding, grafting and wound healing. Trichomes, periderm and lenticels.

Unit-II:

Anatomical characteristics and vascular differentiation in primary and secondary structure of root and stem in Dicot and Monocot, Anomalous secondary growth. Origin of lateral roots , Root-stem transition, Anatomy of Dicot and Monocot leaves. Leaf abscission, stomatal types, nodal anatomy, petiole anatomy, vascularisation of flower and seedling.

Unit-III:

Microsporangium : Microsporogenesis, Microspores : arrangement, morphology, ultrastructure. Microgametogenesis. Pollination:Types,methods to overcome self- pollination, pollen storage. Pollen-Stigma Incompatibility, Methods to overcome incompatibility. Megasporangium : Megagametogenesis, Female gametophyte: Monosporic, Bisporic and Tetrasporic

Unit-IV:

Nutrition of embryo sac and fertilization. Endosperm : Types, Cytology and physiology of endosperms, functions of endosperms. Endosperm haustoria. Embryo development in Dicot and Monocot, Nutrition of embryo.

Unit-V:

Polyembryony - Causes, Apomixis - Causes, Apospory - Their role in plant improvement programmes and seed development. Fruit – Biochemical and physical factors in fruit development structure of pericarp. Parthenocarpy. Culture methods: Prospects and significance of embryo and endosperm culture.

REFERENCES :

ANATOMY :

TEXT BOOKS:

1.Easu, K. (1953). Plant Anatomy. John Wiley & Sons Inc., New York.

REFERENCE BOOKS:

1.Fahn, A. (1989). Plant Anatomy. Maxwell Pvt. Ltd., Singapore. 14

2. Metcalfe and Chalk (1950). Anatomy of the Dicotyledons and Monocotyledons. Vol. I and II. Clarendon Press, Oxford, UK.

3. Clowers, F. A. L. (1961). Apical Meristems. Blackwell Scientific Publication, Oxford.

EMBRYOLOGY:

TEXT BOOKS:

1. Agarwal, S. B. (1990). Embryology of Angiosperms - a fundamental approach. Sahitya Bhawan, Agra.
2. Bhojwani, S. S. and Bhatnagar, S. P. (1981). Embryology of Angiosperms. Vikas Publishing House Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. Maheswari, P. (1963). An Introduction to Embryology of Angiosperms. International Society of Plant Morphologies, University of Delhi.

2. Raghavan, V. (1976). Experimental Embryogenesis in Vascular Plants. Academic Press, London.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1: 20 hours			
	General account and theories of organisation of apical meristem of shoot apex, Meristeme d'attente	3 hours	Chalk–talk techniques to familiarize and internalize terms, definitions and key words
	General account and theories of organisation of apical meristem of root apex, Quiescent centre	3 hours	Use of AV aids, charts and OHP to present the concepts and schemes of plant growth and differentiation

	Structural diversity and phylogenetic trends of specialization of xylem	3 hours	Black board techniques and Power Point Presentation
	Structural diversity and phylogenetic trends of specialization of phloem	3 hours	Presenting video clips and explanations through OHP
	Cambium:origin, cellular structure, cell division, storied and non-storied types.	3 hours	Use of power point presentation with animation, Peer teaching
	Role of Cambium in budding, grafting and wound healing	2 hours	Experiential learning with demonstration and hands-on training
	Trichomes, periderm and lenticels	3 hours	Use of AV aids, charts and Peer teaching
UNIT II : 20 hours			
	Anatomical characteristics and vascular differentiation in primary and secondary structure of root in Dicot and Monocot	4 hours	Explanation through animated projections and presentation, Peer teaching
	Anatomical characteristics and vascular differentiation in primary and secondary structure of stem in Dicot and Monocot	4 hours	Personalized learning through sectioning and micropreparations, Peer teaching
	Anomalous secondary growth.	2 hours	Presentation of slides and charts
	Origin of lateral roots, Root-stem transition,	2 hours	Animations and slide shows
	Anatomy of Dicot and Monocot leaves	3 hours	Comparative description with live specimen, Peer teaching
	Leaf abscission, stomatal types	2 hours	Slide show and Animations

	Nodal anatomy, petiole anatomy, vascularisation of flower and seedling	3 hours	Using POP Model and time lapse movie clips
UNIT III : 20 hours			
	Microsporangium : Microsporogenesis, Microspores: arrangement, morphology, ultrastructure.	5 hours	Explanation using 3-D models and Peer teaching
	Microgametogenesis. Pollination:Types,	3 hours	Animated description using ICT
	Methods to overcome self-pollination, pollen storage. Pollen-Stigma Incompatibility, Methods to overcome incompatibility	4 hours	Short movie clips and slide shows
	Megasporangium : Megagametogenesis	4 hours	Explanation with charts and slide, Peer teaching
	Female gametophyte: Monosporic, Bisporic and Tetrasporic	4 hours	Comparative account using models and charts
UNIT IV : 15 hours			
	Nutrition of embryo sac and fertilization	4 hours	Power Point Presentation
	Endosperm : Types, Cytology and physiology of endosperms, functions of endosperms Endosperm haustoria	5 hours	Power Point Presentation with animations and video clips, Peer teaching
	Embryo development in Dicot	3 hours	Short movie clips and ICT tools
	Embryo development in Monocot, Nutrition of embryo.	3 hours	Slide show and Short movie clips

UNIT V : 15 hours			
	Polyembryony - Causes, Apomixis - Causes, Apospory - Their role in plant improvement programmes and seed development.	5 hours	Use of OHP to present schemes of classification and GD
	Fruit – Biochemical and physical factors in fruit development structure of pericarp. Parthenocarpy.	4 hours	AV aids and collection of different types of fruits a d seeds for display and making museum mounts
	Culture methods: Prospects and significance of embryo culture.	3 hours	With the support of hands-on training
	Culture methods: Prospects and significance of endosperm culture.	3 hours	Power Point Presentation Peer teaching

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	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	2	3	3	4	4	3	4	4	4	4	3	4	2	3	3.36
CO2	3	4	3	4	4	4	3	3	4	4	3	4	4	3	3.57
CO3	3	3	4	4	4	4	4	3	2	3	3	3	2	3	3.21
CO4	4	3	4	4	4	4	4	3	4	4	4	4	3	3	3.71
CO5	3	3	4	4	4	4	4	3	4	4	4	4	3	3	3.64
Mean Overall Score															3.50

Result: The Score for this Course is 3.50 (High Relationship)

Course Designer: Dr.G.Grace Lydial Pushpalatha

Programme : M.Sc **Core Paper V**
Semester : II **Hours : 6 hrs/wk 90 Hrs /sem**
Sub. Code :FB2 **Credits :4**

TITLE OF THE PAPER:_CELL AND MOLECULAR BIOLOGY

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/ TUTORIAL	ICT
	6	3	1	-	2

PREAMBLE:

1. To acquaint students with the principles, scientific techniques and applications of cell and molecular biology.
2. To expose students the methodologies of chromosome replication and organelles concerned with it.
3. To introduce students the biological process taking place inside the living cell.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Understand and distinguishes various functions of the cell organelles.	1	18
UNIT 2 CO2: Gain knowledge about chromosomal functions,its replication and its role in heredity.	2	18
UNIT 3 CO3: Understand and pictures the process of transcription in prokaryotes.	3	18
UNIT 4 CO4: Differentiate prokaryotic and eukaryotic transcription and recalls the enzymes involved in transcription.	4	18
UNIT 5 CO5: Analyze the different steps involved in translation and the organelles involved in the process.	5	18

SYLLABUS

UNIT-I

Prokaryotic and Eukaryotic cell., Structural and ultra structural details: Cell wall - primary and secondary . Plasma membrane : structure, models- Fluid mosaic model and functions, membrane transport:Passive transport - simple diffusion, facilitated diffusion. Active transport - ion pump, calcium ATPase, vesicular transport : Receptor mediated endocytosis. Molecular structure of Chloroplast and Mitochondria.

UNIT II.

Structure and variations in Chromosomes and their significance. Special types of chromosomes : Giant chromosomes and super numerary chromosomes. DNA types , Prokaryotic Replication- Rolling circle and Eukaryotic replication-enzymes,DNA super coiling Meselson-stahl experiment, DNA repair mechanisms – Direct repair, Excision Repair, Mismatch repair, Recombinational repair. RNA types and functions . Genetic code.

UNIT III:

Concept of gene.,Transcription in prokaryotes: promoter structure, Initiation **– RNA** polymerase, Elongation – elongation complex, process of RNA synthesis. Termination: rho dependent and rhoIndependent termination, Cell signaling and gene expression Lac operon,Tryp operon

UNIT IV:.

Transcription in eukaryotes: Types, structure and role of RNA polymerases. Structure of Promoter, Enhancers and silencers. General transcription factors and formation of pre-initiation complex, Elongation factors, termination factors, Post-transcriptional events, RNA editing**.**

UNIT V:.

Translation: Important features of mRNA – ORF, RBS. Fine structure, composition and assembly of prokaryotic and eukaryotic ribosomes. Stages in translation: Initiation – formation of initiation complex in prokaryotes and eukaryotes, initiation factors in prokaryotes and eukaryotes. Elongation – process of polypeptide synthesis, active peptidyl transferase, elongation factors. Termination – process of termination, release factors.

REFERENCES :
CELL BIOLOGY :

TEXT BOOKS:

1.Verma, P. S. and Agarwal, V. K. (1998). Concept of Molecular Biology. S. Chand and Co. Ltd., New Delhi.
2.David Freifelder (2000). Molecular Biology. 2nd ed. Narosa Publishing House, New Delhi.

REFERENCE BOOKS:

1.De Robertis, E. D. P. and De Robertis, E. M. F. (1980). Cell and Molecular Biology. Saunders International Education, Philadelphia.
2.Gomperts, B. D. (1976). The Plasma Membrane: Models for its Structure and Function. Academic Press, New York.
3.Leadbetter, M. C. (1970). Introduction to the Fine Structure of Plant Cells. Springer Verlag. 23
4.Rastogi, S. C., Sharma, V. N. and Anuradha Tandon, V. N. (1993). Concepts in Molecular Biology. Wiley Eastern Ltd., New Delhi.
5.Rost, T. L., Gifford, Jr. and Ernest, M. (1977). Mechanism and Control of Cell Division. Academic Press, New York.
6.Segal, H. L. and Doyle, D. J. (1978). Protein Turnover and Lysosomal Functions. Academic Press, New York.

MOLECULAR BIOLOGY
TEXT BOOKS:

1. Rastogi, S. C., Sharma, V. N. and Anuradha Tandon, V. N. (1993). Concepts in Molecular Biology. Wiley Eastern Ltd., New Delhi.

2. Geoffrey M Cooper, Robert E Hausman (2009). *The Cell: A molecular approach* (V Edn). Sinaeur.

REFERENCE BOOKS:

1. Gerald Karp (2008). *Cell and Molecular biology: Concepts and experiments* (V Edn). John Wiley &Sons.
2. Harvey Lodish, Arnold Berk, Lawrence Zipursky, Paul Matsudaira, David Baltimore, James Darnell(2000). *Molecular cell biology* (IV Edn). W H Freeman & Company.
3. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter (2002). *Molecular biology of the cell* (IV Edn). Garland Science, Taylor and Francis group.
4. Robert J Brooker (2009). *Genetics: analysis and principles* (III Edn). McGraw Hill.
5 James D Watson, Tania A Baker, Stephen P Bell, Alexander Gann, Michael Levine, Richard Losick(2009). *Molecular biology of the gene* (V Edn). Pearson.
6. Robert F Weaver (2002). *Molecular biology* (II Edn). McGraw Hill.
7. Bruce Alberts, Dennis Bray, Karen Hopkin, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter (2010). *Essential Cell Biology*. Garland Science.
8. Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Matthew P. Scott, Anthony Bretscher,Hidde Ploegh, Paul Matsudaira (2007). *Molecular cell biology* (VI Edn). W H Freeman & Company.
9. James D. Watson, Amy A. Caudy, Richard M. Myers, Jan A. Witkowski (2007). *Recombinant DNA*(III Edn). W H Freeman.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1(18 hours)			
	Bergey's Bacterial classification Prokaryotic and eukaryotic microbes	5	Chalk and talk ICT
	Classification of viruses, ultrastructure,	5	Chalk and talk
	isolation and purification,chemical nature, replication and transmission of viruses	5	Chalk and talk
	Economic importance of viruses,viroids,prions,phytoplasma	3	Chalk and talk
UNIT II(18 hours)			
	Eubacteria, Archaebacteria, Cyanobacteria and Actinomycetes Bacteria–general account,ultra structure	6	ICT
	Nutrition,growth and reproduction	4	Chalk and talk
	Bacterial culture techniques	5	Chalk and talk
	Economic importance of bacteria	3	Chalk and talk
UNIT III(18 hours)			
	Microbial Food spoilage, Food poisoning	5	Chalk and talk
	Preservation of food	4	Chalk and talk

	Microbial flora,fresh and polluted water,bacteriological examination of water, biological sewage treatment	5	ICT
	Food adulteration –causes,types methods,adulterated foods	4	Chalk and talk
UNIT IV(18 hours)			
	Classification of plant diseases –based on symptoms,causalorganism,host plants affected	3	ICT Chalk and talk
	Defense mechanism –pre existing and post infectional structural barriers	4	Chalk and talk
	Cellular defense,biochemical preexisting defense	4	Chalk and talk
	Post infectional biochemical defense	4	Chalk and talk
UNIT V(18 hours)			
	Symptoms , casual organism , disease cycle of plant diseases	6	ICT
	Prevention and control methods –tikka disease,wheat rust	3	Chalk and talk
	Citrus canker, red rot ofsugarcane	2	Chalk and talk
	TMV,cucumber mosaic	2	Chalk and talk
	Little leaf of brinjal, Sesamum phyllody	2	Chalk and talk

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3	4	3	3	4	3	4	3	3	3	3	3	3	4	3.28
CO2	3	3	4	4	3	3	3	3	3	3	3	3	4	3	3.21
CO3	3	4	4	3	3	3	3	3	3	3	3	3	4	4	3.35
CO4	3	3	3	3	4	3	3	3	3	3	3	3	3	2	3.0
CO5	3	3	3	4	4	3	3	3	3	3	3	3	4	3	3.21
Mean Overall Score															3.21

Result: The Score for this Course is 3.21(High Relationship)

Course Designer: Dr .I. Sobha kumari

Programme : M.Sc **Part III: Core**
Semester : II **Hours : 5 Hrs/wk 75Hrs/sem**

Sub. Code : FB3 **Credits :4**

TITLE OF THE PAPER: MICROBIOLOGY AND PLANT PATHOLOGY

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

preamble:

1. To provide practical training as well as theoretical knowledge of microbiology
2. To improve skills for identifying the various disease causing pathogens .
3. To create awareness about plant diseases and its control measures.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: understand the general characters of microbes and its ultrastructure	1	15
UNIT 2 CO2: understand the bacterial culture techniques and the economic importance	2	15
UNIT 3 CO3: understand the microbes causing food spoilage and water spoilage	3	15
UNIT 4 CO4: know the defense mechanism performed by plants and classifies the plant diseases	4	15
UNIT 5 CO5: identify the plant diseases and understands remedial measures to prevent the disease	5	15

Unit-I:

Bergey's system of Bacterial classification (8thedn.) .Prokaryotic and Eukaryotic microbes . General features of Viruses - Classification and ultrastructure, isolation, purification, chemical nature , replication, transmission, economic importance. viroids and prions, phytoplasma (including mycoplasma).

Unit-II:

Eubacteria, Archaebacteria, Cyanobacteria and Actinomycetes. Bacteria- General account, ultrastructure, nutrition, growth, reproduction, bacterial culture techniques and economic importance.

Unit-III:

Microbial spoilage of food : meat, fruits, vegetables, egg, milk . food poisoning, preservation of food,. microbial flora: fresh and polluted water , bacteriological examination of water , biological sewage treatment, Food adulteration-causes,types , methods and some commonly adulterated foods in the market.

Unit-IV:

Plant pathology: Classification of plant diseases – based on symptoms ,causal organism and host plants affected. Infection process: entry of pathogens ,establishment of pathogen , defense mechanisms –pre-existing structural defense mechanisms-waxes,thick cuticle,and epidermal cell wall –structure and natural openings,internal structural barriers-post infectional structural defense –histological defense(cork layer ,abscission layer,tyloses and gum deposition),cellular defense structures,biochemical defense-preexistingbiochemical defense-inhibitors released by plantin its environment(protocatechuic acid,catechol)and inhibitors present in plant

cells-phenolic compounds-chlorogenic acid),post inflectional defense mechanism-phytoalexins,hypersensitive reactions-defense through antibodies, Antibiosis.

Unit-V:

Plant diseases : symptoms , casual organism , disease cycle and prevention and control methods for the following plant diseases: Fungal disease –Tikka disease of groundnut and wheat rust.Bacterial disease – Red rot of sugarcane and citrus canker. Viral disease – TMV and cucumber mosaic. Phytoplasma disease – Little leaf of brinjal and sesamum phyllody.

REFERENCES:

MICROBIOLOGY:

TEXT BOOKS:

1. Dubey, R. C. and Maheshwari, D. K. (2007). A Textbook of Microbiology. S. Chand and Co. Ltd., New Delhi.
2. Pelczar, M. J., Chan, E. C. S. and Krieg, N. R. (1993). Microbiology. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
3. Sharma, P. D. (1992). Microbiology. Rastogi & Co., Meerut.

REFERENCE BOOKS:

1.Staley, J. T. et al.. (1991). Bergey's Manual of Systematic Bacteriology. Vol. I to IV. Williams & Wilkins, London.

2.Darnell, J., Lodish, H., Baltimore, D., 1990, Molecular Cell Biology, Scientific American Books, New York.

3. Freifelder, D., Malacinski, G.M., 1987, Essentials of Molecular Biology, John and Bartle Publishers, London.

PLANT PATHOLOGY :

TEXT BOOKS:

1. Bilgrami, K. S. and Dube, H. C. (1990). A Textbook of Modern Plant Pathology. Vikas Publishing House Pvt. Ltd., New Delhi.
2. Pandey, B. P. (1982). A Textbook of Plant Pathology, Pathogen and Plant Diseases. S. Chand and Co. Ltd., New Delhi.

REFERENCE BOOKS:

1. Rangaswamy, G. (1972). Diseases of Crop Plants in India. Prentice Hall of India Pvt. Ltd.
2. Smith, K. M. (1957). A Textbook of Plant Virus Diseases. Little Borwn & Co., Boston.
3. Cooper, J. I. (1995). Viruses and the Environment. 2nd ed. Chapman & Hall, London.
4. Mehrota, R. S. (1994). Plant Pathology. Tata McGraw Hill Publishing Co. Ltd., New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1(15 hours)			
	Ultrastructure of prokaryotic and eukaryotic cell, transduction in prokaryote,cellwall-primary, secondary	5	Chalk and talk ICT
	Plasma membrane structure,fluid mosaic model, functions,passive transport,active transport	5	Peer discussion Chalk and talk

	Molecular structure of chloroplast and mitochondria	5	ICT Chalk and talk
UNIT II(15 hours)			
	Structure and variations in chromosomes,significance, special types of chromosomes	5	Chalk and talk ICT
	DNA types,prokaryotic and eukaryotic replication	5	ICT
	DNA supercoiling,meselson-stahl experiment DNA repair mechanisms RNA types, functions, genetic code.	5	Chalk and talk
UNIT III(15 hours)			
	Transcription in prokaryotes,initiation, elongation,process of RNA synthesis Termination,Rho dependent and Rho independent	6 2	ICT Chalk and talk Chalk and talk
	Cell signalling	4	ICT
	Gene expression,Lac operonTry operon.	5	Chalk and talk ICT
UNIT IV(15 hours)			
	Transcription in eukaryotes, types, structure, role of RNA polymerase	6	Chalk and talk
	Structure of promoter,enhancers,silencers	3	ICT Chalk and talk
	Transcription factors,formation of initiation complex, elongation and termination factors. Post transcriptional events, RNA editing.	6	Chalk and talk
UNIT V(15 hours)			
	Translation, Fine structure, composition and assembly of prokaryotic and eukaryotic ribosomes.	5	ICT Chalk and talk

	Stages in translation- initiation and elongation factors in prokaryotes ,eukaryotes	5	Chalk and talk Chalk and talk
	Elongation –elongation factors, termination-termination factors.	5	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	3	3	2	3	3	3	4	3	3	3	3	2	3	4	3.0
CO2	3	3	3	4	3	4	3	3	4	3	3	3	3	4	3.28
CO3	3	3	3	3	3	2	3	4	3	3	3	4	3	3	3.07
CO4	3	4	3	3	3	3	3	3	3	3	3	4	3	4	3.21
CO5	3	3	3	3	3	3	3	3	3	3	3	3	4	4	3.14
Mean Overall Score															3.14

Result: The Score for this Course is 3.14 (High relationship)

Course Designer: Dr.I.Sobha kumari

Programme : M.Sc **Practical paper : II**

Hours : 8 Hrs/wk 120 Hrs /sem

Sub. Code : FL2 **Credits :4**

TITLE OF THE PAPER: PRACTICAL PAPER –II

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

PREAMBLE:

The main objective is to provide basic knowledge of Anatomy,Embryology,Cellbiology,Microbiology and Plant Pathology techniques.

COURSE OUTCOME

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

1.analyse ,characterize and identify Dicot and Monocot primary and secondary structures.

2.understand to differentiate the stages of embryo .

3. identify the cell division stages.

4. handle microbiological techniques

5. develop the ability to analyze plant diseases and identify remedial measures.

Syllabus:

Plant anatomy and Embryology of Angiosperms:

1. Internal morphology of Monocot and Dicot root and stem

2. Investigation of secondary growth and anomalous secondary growth. (Boerhaavia, Nyctanthus)

3. Study of leaf anatomy (measurement of stomatal size).

4. Nodal anatomy (Justicea, Neem, Dracaena)

5. Study of plant tissues – Tracheids, Vessels and fibres (Cucurbita and Bombax)

5. Study of pollen morphology and germination.

6. Isolation of plant embryos. Identification of stages – Globular and heart shaped.

(Cucurbitaceae,Brassicaceae)

Cell Biology :

1. Cell biology: squash and smear techniques-Onion root tip(mitosis), Rheo flower buds (meiosis)

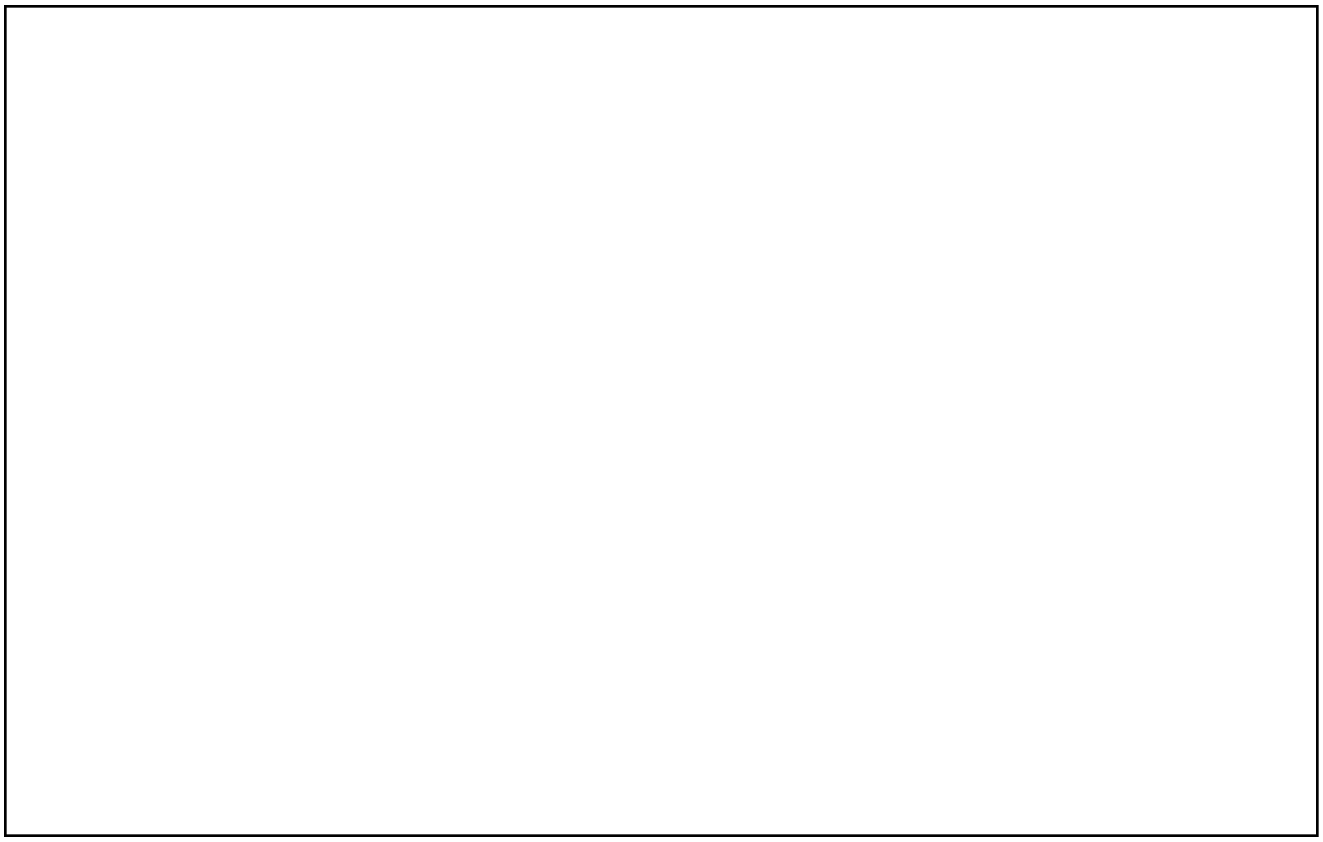
2. Microscopic view of cell components in plant cells-viewing cystolith & Raphides, Chloroplast (Hydrilla leaf).

Microbiology :

1. Sterilization and culture media preparation.
2. Isolation of microbes from soil / milk /food
3. Serial dilution and Plating
4. Identification by Simple staining and Grams staining and Biochemical tests(bacteria)
5. Hanging drop.
6. Coliform Test.
7. Microbial analysis of milk by methylene - blue reduction test.

Plant Pathology :

1. Tikka disease of ground nut.
2. Citrus canker.
3. Tobacco mosaic / Cucumber mosaic.
4. Little leaf of brinjal.
4. Red rot of sugarcane.
5. Section cutting of specimens showing fungal diseases.
6. Submission of five Herbarium sheets.
7. Campus Walk.



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	4	3	3	4	3	3	3	3	3	3	4	3.21
CO2	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3.07
CO3	3	3	4	3	4	3	3	3	3	3	3	3	4	4	3.28
CO4	3	3	3	3	4	3	3	3	3	3	3	3	3	2	3.0
CO5	3	3	3	4	4	3	3	3	3	3	3	3	2	3	3.07
Mean Overall Score															3.12

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

Course Designer :Dr. I.Sobha kumari

Programme : M.Sc., Botany **Elective Paper II**
Semester : I **Hours : 5 P/W 75 Hrs P/S**
Sub. Code : EFB **Credits : 5**

TITLE OF THE PAPER: HORTICULTURE AND PLANT BREEDING

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

PREAMBLE:

- Acquire sufficient practical knowledge on plant propagation techniques and plant nursery establishment.
- Discover Theoretical knowledge of Horticulture to establish home garden scientifically.
- Develop entrepreneurial skills in Pomeculture, Olericulture and Floriculture.
- Understand the fundamental mechanisms and principles of plant breeding and heredity and gene expression and regulations.
- Acquire knowledge on hybridization techniques and methods involved in improvement of crop plants.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Identify various plants and tools used in horticulture and comprehend vegetative propagation techniques.	1	15
UNIT 2 CO2: Understand the Greenhouse farming methods and indoor and outdoor gardening.	2	15
UNIT 3 CO3: Appreciate the art of flower arrangement and cultivation of flower, vegetables and fruit crops.	3	15
UNIT 4 CO4: To Understand the concepts of plant breeding and crop improvement.	4	15
UNIT 5 CO5: Develop knowledge on Hybridization techniques Heterosis and Mutation breeding.	5	15

SYLLABUS

Unit-I:

Importance and scope of horticulture. Divisions of horticulture. irrigation methods. Plant propagation methods : Cutting- Root, Stem, Leaf cuttings. Layering – Simple, Compound Mound and Air Layering. Grafting – Approach, Tongue, Cleft grafting. budding. T and Chip cutting. Transplanting, potting, Repotting. Containers and tools used in gardening. Irrigation – surface, Spray, Drip irrigation. Training and pruning.

Unit-II:

Principles and methods of designing, outdoor garden: hedges, edges, fences, trees, climbers, rockeries, arches, Lawn making and maintenance. Water garden - cultivation of water plants. Indoor gardening : hanging basket, bottle garden and Bonsai. Establishment of kitchen garden – principles, selection of crops, basic techniques involved in layout. terrace garden – organic

farming – organic manures (farmyard manure, vermi compost, panchakavya) – biopesticides, hydroponics, soilless culture - aeroponics.

Unit-III:

Floriculture: Cultivation of commercial flower crops – Rose and Jasmine. Hi tech horticultural practices – Green House Types Shadenet, Polyhouse Cultivation, Conditioning of cut flowers, Packing. Flower arrangement – Principles and types, Preparation of Bouquet, Dry flower arrangement – Methods of drying, Pressing, Use of dried pressed plant materials. Cultivation of important vegetables - Tomato, Onion and snake gourd. Cultivation of important fruit crops - Mango, Grapes and Guava.

Unit-IV:

Aim, objectives, scope and importance of plant breeding, methods of crop improvement. Centers of Origin Introduction, acclimatization. Mass, Pure line and Clonal selection. Advantages, disadvantages and achievements.

Unit-V:

Hybridization: Objectives, achievements, types and techniques, advantages and disadvantages. Heterosis: effect of hybrid vigour, causes and achievements. Mutation breeding and its applications.

REFERENCES :

TEXT BOOKS:
1. Arora, J. S. (1992). Introductory Ornamental Horticulture. Kalyani Publishers, New Delhi.
2. Chowdry R.C. (1991) Introduction to plant breeding. Oxford & IBH publishing house, New Delhi.
3. Edmond, J. B. *et al*. (1977). Fundamentals of Horticulture. Tata McGraw Hill Publishers Co. Ltd., New Delhi.

REFERENCE BOOKS:
1. George Acquaah (2004). Horticulture Principles & practices. Prentice hall of India Pvt. Ltd., New Delhi.
2. Kumar N (1977). Introduction to Horticulture. Rajalakshmi Publications. Nagercoil, India.
3. Manibushan Rao, K. (1991). Textbook of Horticulture. Macmillan Publishing Co., New York.
4. Randhawa (1997) Ornamental Horticulture in India. Today & Tomorrow Publishers, New Delhi.
5 Rao, K. M. (2000). Text Book of Horticulture. Macmillan India Ltd., New Delhi.
6 .Singh B.D (1999) Plant Breeding : Principles & Methods. Kalyani Publishers, Nagercoil, India.
7.Vijendra Das L.D (1998) Plant Breeding : Theory & Practice, Oxford & IBH Publishing house, New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1(15 hours)			
	Importance and scope of horticulture. Divisions of horticulture. irrigation methods. Plant	7	Lecture ICT

	propagation methods : Cutting- Root, Stem, Leaf cuttings. Layering – Simple, Compound Mound and Air Layering.		PPT
	Grafting – Approach, Tongue, Cleft grafting. budding. T and Chip cutting. Transplanting, potting, Repotting. Containers and tools used in gardening. Irrigation – surface, Spray, Drip irrigation. Training and pruning.	8	Lecture ICT PPT
UNIT II(15 hours)			
	Principles and methods of designing, outdoor garden: hedges, edges, fences, trees, climbers, rockeries, arches, Lawn making and maintenance. Water garden - cultivation of water plants. Indoor gardening : hanging basket, bottle garden and Bonsai.	7	PPT Lecture
	Establishment of kitchen garden – principles, selection of crops, basic techniques involved in layout. terrace garden – organic farming – organic manures (farmyard manure, vermi compost, panchakavya) – biopesticides, hydroponics, soilless culture - aeroponics.	8	PPT Lecture
UNIT III(15 hours)			
	Floriculture: Cultivation of commercial flower crops – Rose and Jasmine. Hi tech horticultural practices – Green House Types Shadenet, Polyhouse Cultivation, Conditioning of cut flowers, Packing.	7	Lecture Video
	Flower arrangement – Principles and types, Preparation of Bouquet, Dry flower arrangement – Methods of drying, Pressing, Use of dried pressed plant materials. Cultivation of important vegetables - Tomato, Onion and snake gourd. Cultivation of important fruit crops - Mango, Grapes and Guava.	8	Lecture Video
UNIT IV(15 hours)			

	Aim, objectives, scope and importance of plant breeding, Centers of Origin, methods of crop improvement Introduction, acclimatization.,	7	Lecture PPT
	Mass,Pureline and Clonal selection. Advantages, disadvantages and achievements.	8	Lecture PPT
UNIT V(15 hours)			
	Hybridization: Objectives, achievements, types and techniques, advantages and disadvantages.	8	ICT Lecture
	Heterosis: effect of hybrid vigour, causes and achievements. Mutation breeding and its applications.	7	ICT 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	3	4	3	5	4	4	4	5	5	2	5	3	2	2	3.57
CO2	3	5	3	2	3	4	4	5	5	2	5	5	2	3	3.64
CO3	3	5	4	2	3	5	5	4	5	2	5	5	2	2	3.71
CO4	2	3	3	3	4	3	3	5	4	5	3	4	3	4	3.5
CO5	3	3	3	3	4	4	4	5	2	4	2	4	4	4	3.5
Mean Overall Score															3.58

Result: The Score for this Course is 3.58 (High Relationship)

Course Designer: Dr. V. Pandimadevi

Programme : M.Sc.Botany **Core Paper VII**
Semester : III **Hours : 5Hrs/wk 75 Hrs /sem**
Sub. Code : FC1 **Credits :4**

TITLE OF THE PAPER: TAXONOMY OF ANGIOSPERMS

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

PREAMBLE:

- To know the etymology of Taxonomy as a science of identifying naming and classifying the plants and understands the history of taxonomy
- To categorize the organisms that enables easy biological communication
- To make them understand the evolution of taxonomy from alpha level to omega level
- To evluvate taxonomy as a tool to study the evolutionary relationship
- To analyse the differences between familiesof different classes and their economic values.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Define the term taxonomy and understands the history of taxonomy .	1	16/S
UNIT 2 CO2: know about the various taxonomic resources and Develops an aesthetic sense to appreciate the various botanical gardens (Royal botanical garden Kew)	2	16/S
UNIT 3 CO3: appreciate how the various branches of botany help in solving taxonomical problems	3	16/S
UNIT 4 CO4: Correlate the evolutionary relationship between various groups of plants	4	13/S
UNIT 5 CO5: Develop practical knowledge about phytochemical analysis and economically important plants	5	14/S

SYLLABUS

UNIT I: (16hrs)

A brief historical account on the classification of angiosperms up to the present day. Systems of classification: Detailed study of classification of Linnaeus, Bentham and Hooker, Engler and Prantl, Cronquist, APG III system – Merits and demerits. International Code for Botanical Nomenclature, Typification, Principles of priority and their limitations, Effective and valid publication, Author citation,retention, choice and rejection of names.Identification of plants –Dichotomous key(Bracted Key Indented Key)Web identification

UNIT II: (16hrs)

Sources of Taxonomic information : Herbarium, Flora, Monograph and Botanical gardens. Sources of Taxonomic information : Herbarium, Flora, Monograph and Botanical gardens

Modern trends - Anatomy, Embryology, Palynology, Cytology and Phytochemistry in relation to taxonomy.

UNIT III: (16hrs)

Biosystematics its aim and scope, biosystematic categories, Phenotypic plasticity, Phylogeny terms and concept (Mono, Para, Polyphyly) Turresons work, Taxonomic Hierarchy, Species concept, Numerical Taxonomy, Sero Taxonomy, and Molecular systematics.

UNIT IV: (13hrs)

Salient features and Economic importance of the following families: Polypetalae - Magnoliaceae,Portulacaceae, Oxalidaceae, Rosaceae, Combretaceae, Lythraceae. Gamopetalae – Oleaceae, Asclepiadaceae, Bignoniaceae,Pedaliaceae, Acanthaceae, Verbenaceae.

UNIT V: (14hrs)

Salient features and economic importance of the following families : Monochlamydeae – Nyctaginaceae ,Amaranthaceae. Monocotyledon - Liliaceae , Commelinaceae, and Cyperaceae.

TEXT BOOKS:

1. Pandey, B.P.(1997).Taxonomy of Angiosperms , S.Chand & Co., New Delhi.
2. Singh, V. & Jain, K.K. (1989). Taxonomy of Angiosperms – Rastogi, Meerut
3. Vashista, P.C. (1990). Taxonomy of Angiosperms – S.Chand & Co., New Delhi

REFERENCE BOOKS:

1. Lawrence, GHM. (1995). The Taxonomy of vascular Plants (Vol I-IV) ,Central Book, Dept., Allahabad
2. Heywood VH. (1967). Plant Taxonomy , Edward Arnold , London
3. Jeffery C. (1982). An introduction to Plant Taxonomy, J& A Churchill Ltd., London
4. Mathew, K.M. (1983). The Flora of Tamil Nadu Carnatic, The Rapinat Herbarium, Trichy
5. Sivarajan ,V.V.(1989). Introduction to Principle of Plant Taxonomy, Oxford and IBH, New Delhi.
6. Hutchinson, J. (1973). The Families of Flowering plants , Oxford University press,London
7. Gamble,J.S , Fisher,L.E.F .(1967). The Flora of The presidency of madras (Vol-III) BSI, Calcutta
8. Davis , P.H and Heywood ,V.M. (1965). Principles of Angiosperm Taxonomy ,Oliver and Boyd ,Edinburgh.
9. Kress J.W, Wurdack, K.J., E.A C., Zimmer, L.A .Weigt and Janzen D.H. (2005). Use of DNA bar codes to identify flowering plants. Proc. Natl. Acad .Sci USA 102, 8369- 374.
10. Stoeckle , M.(2003).Taxonomy ,DNA and the bard code of life .bioscience 53: 796- 797.
11. Simpson M.G.(2006). Plant systematics , Elsevier Academic Press,USA
12. Takhtajan, A.L. (1969). Flowering Plants – Origin and dispersal – Oliver & Boyed
13. Takhtajan A. (1991). Evolutionary trends in flowering plants , Bishen Singh Mahendra Pal Singh, Dehradun.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1(16 hours)			
	A brief historical account on the classification of angiosperms up to the present day. Systems of classification: Detailed study of lassification of Linnaeus, Bentham and Hooker, Engler and Prantl, Cronquist, APG III system – Merits and demerits	8hrs	Group discussion
	International Code for Botanical Nomenclature, Typification, Principles of priorityandtheir limitations**,** Effectiveandvalid Publication	4hrs	Lecture
	Author citation,retention,choice and rejection of names Identification of plants –Dichotomous key(Bracted Key, Indented Key)Web identification	4hrs	Group discussion
UNIT II(16 hours)			
	Sources of Taxonomic information : Herbarium, Flora, Monograph and Botanical gardens	7hrs	ICT
	Modern trends - Anatomy, Embryology, Palynology, Cytology and Phytochemistry in relation to taxonomy.	9hrs	Lecture
UNIT III(16 hours)			
	Biosystematics its aim and scope, biosystematic categories, Phenotypic plasticity, Phylogeny terms and concept (Mono, Para, Polyphyly)	8hrs	Tutorial
	Turresons work, Taxonomic Hierarchy, Species concept, Numerical Taxonomy, Sero Taxonomy, and Molecular systematics.	8hrs	ICT

UNIT IV (13 hours)			
	Salient features and Economic importance of the following families: Polypetalae - Magnoliaceae,Portulacaceae, Oxalidaceae, Rosaceae, Combretaceae, Lythraceae	6hrs	Lecture
	Oleaceae, Asclepiadaceae, Bignoniaceae,Pedaliaceae, Acanthaceae, Verbenaceae.	7hrs	Lecture
UNIT V(14 hours)			
	Salient features and economic importance of the following families : Monochlamydeae – Nyctaginaceae ,Amaranthaceae.	7hrs	Lecture
	Monocotyledon - Liliaceae, Commelinaceae, and Cyperaceae.	7hrs	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	4	3	4	3	4	3	3	4	4	4	3	3	3	3	3.4
CO2	3	3	3	2	4	3	3	4	4	4	3	3	3	3	3.2
CO3	3	3	3	3	3	3	3	4	4	4	3	4	3	3	3.2
CO4	4	3	3	3	4	3	3	3	4	4	3	2	3	3	3.2
CO5	4	3	3	3	3	4	3	4	4	4	4	4	4	3	3.5

Result: The Score for this Course is 3.3 (High relationship)

Course Designer Mrs.R.Latha,

Programme : Botany **Core Paper VIII**
Semester : IV **Hours : 5 Hrs/wk 75 Hrs/sem**
Sub. Code : FC2 **Credits : 4**

TITLE OF THE PAPER: PLANT PHYSIOLOGY

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

PREAMBLE:

- To understand plant physiological processes and metabolism.
- To explain the role of micro nutrients in plant growth and development.
- To relate photosynthesis with the formation of primary and secondary metabolites.
- To clarify the mechanism of respiratory activity in plants.
- To know the methods used for the bio-production of plant secondary metabolites.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: impart an insight into the various water relationship in plants.	1	15
UNIT 2 CO2: Take students to higher levels of learning about the mineral nutrition in plants and mechanism of nitrogen fixation in plants.	2	15
UNIT 3 CO3: Understand the mechanism of photosynthetic process in plants and various metabolic activities in Plants.	3	15
UNIT 4 CO4: Acquire basic knowledge about growth and respiratory pathways in plants	4	15
UNIT 5 CO5: Gain knowledge in biochemical activities of plants.	5	15

SYLLABUS

UNIT I:

Water relations of plants : Physicochemical properties of water, chemical potential and water potential in the plant, bulk movement of water, soil-plant atmosphere continuum.

Transpiration : Types, cuticular, lenticular and stomatal. Factors affecting transpiration. Stomatal physiology and regulation. Ascent of Sap.

UNIT II:

Mineral nutrition : Macronutrients and Micronutrients. Modern concepts of mineral salt absorption and translocation. Active and passive absorption of minerals. Mechanism of nitrogen fixation, Physiological role, Nitrogen uptake and assimilation.

UNIT III:

Photosynthesis: Photophysical and photochemical phase : Light reactions, sequence of photosynthetic pathway - Electron Transport Chain, Photophosphorylation. Pathways of CO_2 fixation in C3,C4-(NAD-ME and NADP-ME) plants and CAM pathway. Factors affecting photosynthesis.

UNIT IV:

Respiration: Aerobic and Anaerobic, fermentation, respiratory quotient, Glycolysis, Kreb's cycle, Oxidative phosphorylation. Factors affecting respiration. Photorespiration .HMP Pathway. Cyanide Resistant Respiration.

UNIT V:

Plant growth regulators: Auxin ,Gibberellin, Cytokinin, Ethylene and Abscisic acid their physiological role and mode of action. Flowering: Photoperiodism -. Short day plants, Long day plants and Day neutral plants. Role of phytochrome in flowering. Seed dormancy , causes and methods of breaking dormancy .Programmed cell death -Physiological and biochemical changes. Physiological stress-Water and salt-Physiological role and adaptive mechanism.

REFERENCES:

TEXT BOOKS:

1. Devlin, R. M. (1969). Plant Physiology. Van Nostrand, Reinhold Co., New York.
2. Fang, F. K. (1982). Light Reaction Path of Photosynthesis. Vol. 35. Molecular Biology, Biochemistry and Biophysics. Springer Verlag.
3.Jain, V. K. (2007). Fundamentals of Plant Physiology. S. Chand & Co., New Delhi.

REFERENCE BOOKS:

1. Leopold, A. C. (1973). Plant Growth and Development. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
2. Meyer, Anderson and Bonning (1965). Introduction to Plant Physiology. D. Van Nostrand.
3. Noggle, R. and Fritz, G. I. (1989). Introductory Plant Physiology. 2nd ed. Prentice Hall, New Delhi
4. Norton, G. (1978). Plant Proteins. Butterworth, London.

5 Palmer, J. M. (ed.). (1984). The Physiology and Biochemistry of Plant Respiration. Cambridge University Press,UK.
6. Salisbury, F. B. and Ross, E. (1992). Plant Physiology. Wadsworth, Belmont, California, USA.
7.Verma, S. K. (1999). Plant Physiology. S. Chand & Co., New Delhi.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I(15 hours)			
	Water relations of plants Physicochemical properties of water, chemical potential and water potential in the plant, bulk movement of water, soil-plant atmosphere continuum.	7	Lecture
	Transpiration : Types, cuticular, lenticular and stomatal.	1	ICT
	Factors affecting transpiration. Stomatal physiology and regulation. Ascent of Sap.	7	Lecture
UNIT II(15 hours)			
	Mineral nutrition : Macronutrients and Micronutrients. Modern concepts of mineral salt absorption and translocation.	7	Lecture
	Active and passive absorption of minerals.	1	ICT
	Mechanism of nitrogen fixation, Physiological role, Nitrogen uptake and assimilation.	7	Lecture
UNIT III(15 hours)			
	Photosynthesis: Photophysical and photochemical phase : Light reactions, sequence of photosynthetic pathway - Electron Transport Chain, photophosphorylation	7	Lecture
	. Pathways of CO_2 fixation in C3,C4-(NAD-ME and NADP-ME) plants and Factors affecting photosynthesis.	7	Lecture
	CAM pathway.	1	ICT
UNIT IV(15 hours)			
	Respiration: Aerobic and Anaerobic, fermentation, respiratory quotient,	7	Lecture
	Glycolysis, Kreb's cycle, Oxidative phosphorylation. Factors affecting respiration. Photorespiration .	7	Lecture
	HMP Pathway. Cyanide Resistant Respiration.	1	ICT
UNIT V(15 hours)			

	Plant growth regulators: Auxin ,Gibberellin, Cytokinin, Ethylene and Abscisic acid their physiological role and mode of action.	7	Lecture
	Flowering: Photoperiodism -. Short day plants, Long day plants and Day neutral plants.	1	ICT
	Role of phytochrome in flowering. Seed dormancy causes and methods of breaking dormancy .Programmed cell death -Physiological and biochemical changes. Physiological stress-Water and salt-Physiological role and adaptive mechanism.	7	Lecture

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3	3	2	3	4	2	5	2	2	4	3	4	4	4	3.21
CO2	3	3	4	4	4	3	5	4	4	2	3	3	2	2	3.28
CO3	3	3	3	4	4	4	4	3	3	3	4	3	3	3	3.35
CO4	2	2	3	3	3	3	3	5	5	4	4	2	2	3	3.14
CO5	3	3	3	3	3	3	4	5	3	4	4	4	4	3	3.5
Mean Overall Score															3.29

Result: The Score for this Course is 3.29 (High Relationship)

Course Designer : Dr.S.M.Jenette Nithia

Programme : M.Sc. **Core Paper IX**

Semester : III **Hours : 5 hrs/wk 75 hrs/sem**

Sub. Code : FC3 **Credits : 4**

TITLE OF THE PAPER: **BIOINSTRUMENTATION AND BIOSTATISTICS**

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

PREAMBLE:

- To enable the students to uunderstand the working principles and applications of instruments used in various disciplines of biological sciences.
- To study the concepts of various spectroscopic techniques and its instrumentation.
- To learn the basic concepts of separation techniques and its applications.
- To acquire basic information regarding radiochemical analysis along with industrial analyzers.
- To understand the scope & importance of Biostatistics.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Understand and analyze the principle, operation and applications of various instrumentation techniques used in the field of biological research.	1	15
UNIT 2 CO2: Differentiate the principle, instrumentation and working mechanism of chromatographic and spectroscopic instruments.	2	15
UNIT 3 CO3: Elucidate the various separation techniques, its instrumentation and applications in biology.	3	15
UNIT 4 CO4: Describe the principle and working mechanism of various radiation detectors and gas analyzers.	4	15
UNIT 5 CO5: Apply statistical tools and techniques to biological data for testing different hypothesis in their research works and understand the technical experimental statistics.	5	15

SYLLABUS

Unit I:

Microscopy- Resolving power, types: Electron microscope : TEM, SEM, Phase contrast microscope. pH metry- pH concept, Conductivity meter standardization .Buffers – acetate, Phosphate,Tris,Glycine, pKa value. Camera Lucida.

Unit II:

Centrifugation: Principle, types of rotors, types of centrifuges – Clinical, refrigerated and Ultra centrifuge and their applications. Chromatography: Principles (absorption ,partition ,ion exchange ,affinity), components, methodology and applications of TLC,GC, HPLC.

Unit III:

Spectroscopy: Principles, components and working mechanism of Colorimetry, Spectrophometer,UV visible and Infra Red (IR), nuclear magnetic resonance (NMR), electron paramagnetic resonance (EPR) and atomic absorption spectroscopy (AAS).

Unit IV:

Electrophoresis: Principles, procedure and applications: AGE, SDS- PAGE, 2 D Electrophoresis , isoelectrofocusing. Radiometry: Isotopes, measurement of radioactivity: Radioactive counters (Scintillation counter, GM counter), Autoradiography and its applications.

Unit V:

Biostatistics : Scope .Collection , classification, tabulation and presentation of data –Diagramatic and Graphical, measures of central tendency :mean, median and mode. Standard deviation ,standard error probability analysis , test of significance : 'T' test , Chi-square test . permutation and combination , correlation and Regression analysis, ANOVA,Usage of SPSS.

REFERENCES:

TEXT BOOKS:

1. N. Gurumani 2010. Research Methodology for Biological Sciences. MJP Publishers, Chennai.
2. David T. Plummer 1988. An introduction to practical biochemistry, Tata Mc Graw Hill pub. Co. Ltd, New Delhi.
3.. J. Jeyaraman 1981. Laboratory Manual in Biochemistry. New Age International publishers, New Delhi.
4. S. Palanichamy and M. Shunmugavelu 2009. Research methods in biological sciences. Palani paramout publications, Palani.

REFERENCE BOOKS :

1. Marimuthu, R. (2008). Microscopy and Microtechnique. MJP Publishers,Chennai
2. Wilson K, Walker, J. (1994). Principle and techniques of practical biochemistry,4thed) Cambridge university press, Cambridge
3. Khan, I.A., and Khannum, A., (1994).Fundamentals of Biostatistics, Vikas Pub., Hyderabad
4. Sree Ramulu, V.S., (1988). Thesis Writing, Oxford & IBH Pub., New Delhi.
5. Bryan Bergeron, M.D. (2006). Bioinformatics Computing, Prentice – Hall of India. New Delhi.
6. Stephen Misener and Stephen A. Krawetz. (2000). Bioinfromatics-Methods and Protocols. Humana Press, Totowa, New Jersey.
7. Kothari, C.R.,(1991).Research Methodology – Methods and Techniques, Wiley Eastern Ltd.,New Delhi.
8. Zar, J.H. (1984). Biostatistics Analysis, Prentice Hall International, England Cliffs, New Jersey.

UNITS	**TOPIC**	**LECTURE HOURS**	**MODE OF TEACHING**
UNIT 1 : (15 hours)			
	Microscopy- Resolving power, types: Electron microscope : TEM, SEM, Phase contrast microscope. Camera Lucida.	6 hours	Chalk–talk method; Use of AV aids and videos.
	pH metry- pH concept, Conductivity meter	4 hours	Peer teaching techniques, Power Point Presentation with animations and video and

			demonstration of the instruments.
	standardization of Buffers – acetate, phosphate, Tris,Glycine, pKa value**.**	5 hours	Use of AV aids and chalk-talk method.
UNIT II : (15 hours)			
	Centrifugation: Principle, types of rotors, types of centrifuges – Clinical, refrigerated and Ultra centrifuge and their applications.	6 hours	Use of Blackboard and Use of AV aids
	Chromatography: Principles (absorption ,partition ,ion exchange ,affinity),	3 hours	Peer teaching techniques and Power Point Presentation
	Components, methodology and applications of TLC,GC, HPLC.	6 hours	Use of AV aids, use of Power Point Presentation with videos and Peer teaching techniques
UNIT III: (15 hours)			
	Spectroscopy: Principles, components and	4 hours	Chalk–talk method and discussion by forming groups.

	working mechanism of Colorimetry,		
	Spectrophometer-UV visible and Infra Red (IR**).**	5 hours	Lecture method and use of AV aids, Peer teaching.
	nuclear magnetic resonance (NMR), electron paramagnetic resonance (EPR) and atomic absorption spectroscopy (AAS**).**	6 hours	AV aids, Video animations and Peer teaching techniques.
UNIT IV: (15 hours)			
	Electrophoresis: Principles, procedure and applications: AGE, SDS- PAGE.	5 hours	Lecture method and use of videos.
	2 D Electrophoresis , isoelectrofocusing	2 hours	AV aids and chalk-talk method.
	Radiometry: Isotopes, measurement of radioactivity:	5 hours	ICT enabled techniques, peer interactions

	Radioactive counters (Scintillation counter, GM counter).		
	Autoradiography and its applications.	3 hours	chalk-talk technique and use of AV aids.
UNIT V: (15 hours)			
	Biostatistics:Scope. Collection, classification,tabulation and presentation of data –Diagramatic and Graphical.	3 hours	Lecture method,Use of OHP and Peer participation through GD
	measures of central tendency :mean, median and mode.	2 hours	Lecture method,GD
	Standard deviation ,standard error	2 hours	Use of AV aids and Peer participation techniques.
	Test of significance : 'T' test , Chi-square test .	2 hours	Lecture method and problem solving methods
	probability analysis , permutation and combination	2 hours	AV aids.
	correlation and Regression analysis	2 hours	AV aids.

	ANOVA,Usage of SPSS.	2 hours	GD through peer group techniques and 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	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	4	3	3	4	4	3	4	3	4	4	3	3	3	4	3.50
CO2	3	4	4	4	4	4	3	3	3	4	4	4	3	3	3.57
CO3	3	4	3	3	4	4	3	3	3	4	3	3	3	3	3.28
CO4	3	4	3	3	3	4	4	3	3	4	3	3	3	3	3.28
CO5	4	3	4	3	3	3	4	3	2	2	3	4	2	3	3.07
Mean Overall Score															3.34

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

Course Designer: Mrs.M.P. Sivasankari.

Programme : M.Sc Botany | **Practical Paper III**
Semester : III | **Hours : 8 Hrs/wk 120 Hrs /sem**
Sub. Code : FL3 | **Credits : 4**

TITLE OF THE PAPER: PRACTICAL PAPER - III

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

PREAMBLE:

- To Acquire skills in carrying out experiments related to taxonomy,biochemistry and biophysics and bioinstrumentation and biostatistics.
- To provide hands on experience in plant identification techniques.
- To learn the analytical techniques used in the study of biomolecules and experimentally study the enzyme activities.
- To enable the students to gain a comprehensive understanding of various concepts used in plant physiological systems through simple experiments.
- To train the students to gain knowledge about the principles of instrumentation in biological research.

COURSE OUTCOME

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

CO1: understand technical description of plants and construct and use keys for identification of the respective plant groups.

CO2: identify common plant families based on the morphological features.

CO3: independently work on various instruments by understanding its principle and apply statistical tools in their research.

CO4: analyze biochemical and physiological phenomenon and carry out experiments in biological research pertaining to physiology.

CO5:impart skill to students to be able to work in R & D and quality control laboratories and to to use modern instrumentation and classical techniques.

Syllabus:

1. Morphology of flowering plants: General description and traits of taxonomic interest.
2. Studying phenology of selected tree species in the campus.
3.. Herbarium preparation of plants -
4. Analysis of plant characters- polypetalae- gamopetalae, monochlamydeae and monocot
5. Field Trip.
6. Dichotomous Key
7. Verification of Beer's Law.
8.Chromatography-TLC
9. Absorption Spectrum of Chlorophyll pigment.
10. Preparation of buffer – Acetate buffer and Phosphate buffer.
11. pH – Titration curve.
12. Estimation of proline and phenol in plant tissues under different environmental and physiological stress.
13. Chlorophyll Estimation.
14. Isolation of chloroplast and Estimation of Photosystem II activity.
15. Measurement of Water Potential.
16. Problems related to chi square ,correlation, regression and ANOVA.

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	2	3	4	5	3	3	4	4	4	3	2	3.4
CO2	4	3	4	3	5	5	3	3	4	3	4	4	4	3	3.7
CO3	4	3	4	4	3	4	3	3	3	3	3	3	3	3	3.3
CO4	2	4	4	3	3	3	3	4	4	4	4	4	4	4	3.6
CO5	3	3	3	4	3	3	3	2	2	3	3	3	2	3	2.9

Mean Overall Score	3.38

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

Course Designer: Mrs.M.P.Sivasankari

Programme : M.Sc
Semester : III
Sub. Code : EFC

Elective Paper III
Hours : 5 Hrs/wk 75 Hrs /sem
Credits :5

TITLE OF THE PAPER:_PLANT TISSUE CULTURE

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

PREAMBLE:

1. To acquaint students with the principles, technical requirement, scientific and commercial applications of plant tissue and cell culture.
2. To expose students to supporting methodologies of plant tissue and cell culture, micropropagation techniques,
3. To introduce students the applications of tissue and cell culture to plant improvement.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Understand the basic knowledge about tissue culture techniques, medium, sterilization and able to analyse the requisite for tissue culture Laboratory organization.	1	15
UNIT 2 CO2: isolate single cells from plant tissue and and gain knowledge to grow single cells by various techniques based on the requirement.	2	15
UNIT 3 CO3: Understand the fundamentals of totipotency plant tissue culture techniques and apply the technique of micropropagation such as somatic embryogenesis, organogenesis and the production of synthetic seeds and its significance	3	15
UNIT 4 CO4: gain theoretical and practical knowledge about invitro production of plants	4	15
UNIT 5 CO5: design and develop the protocols for enhanced production of bioactive compounds in cell suspension culture	5	15

SYLLABUS

UNIT I:

Introduction: History and Scope .Concepts of basic techniques in plant tissue culture: Laboratory requirements and organization, Sterilization methods -filter, heat and chemical. Media preparationinorganic nutrients, organic supplements, carbon source, gelling agents growth regulators Composition of important culture media (MS, Whites and Gamborg's media**).**

UNIT II:

Cell, tissue and organ culture : Isolation of single cells, selection and types of cells, tissue explants and organs for culture - Paper raft nurse technique, Plating method, Microchamber techniques, cell suspension cultures : batch, continuous, chemostat culture . Synchronization of suspension culture, cellular totipotency, Totipotency of epidermal and crown gall cells.

UNIT III

Micropropagation - Clonal propagation of elite germplasm, organogenesis -formation of shoots and root Role of growth regulators and other factors, somaclonal and gametoclonal variations. Somatic embryogenesis – Process of somatic embryogenesis, structure, factors affecting embryogenesis, synthetic seeds

UNIT IV:

Haploid production : Androgenesis, gynogenesis . Techniques of anther culture , diploidisation , factorsinfluencing androgenesis, utilization of haploids in plant breeding. In vitro pollination - ovule and ovaryculture, importance, techniques overcoming incompatibility barriers, embryo rescue. Protoplast culture:Isolation of protoplasts - mechanical and enzymatic, culture of protoplasts. Protoplast fusion: Methods and selection of somatic hybrids, cybrids.

UNIT V:

Classification of secondary metabolites, in vitro production of secondary metabolites. Immobilized cellcultures and biotransformation, elicitors and hairy root culture. Cryopreservation and gene bank : Modes ofpreservation, application and limitations. Application of tissue culture in forestry, Horticulture, Agriculture.

TEXT BOOKS:.

1.Kalyan Kumar, De. (1992). An Introduction to Plant Tissue Culture. New Central Book Agency, Calcutta.

2.Ramawat, K. G. (2000). Plant Biotechnology. S. Chand & Co., New Delhi.

3. Razdan, M. K. (2004). Introduction to Plant Tissue Culture. 2nd ed. Oxford & IBH Publishing Co. Pvt. Ltd.,

REFERENCE BOOKS:

1. Reinert, J. and Bajaj, Y. P. S. (1977). Plant Cell Tissue and Organ Culture: A 2Laboratory Manual, Narosa Publishing House, New Delhi. 3.Vasil, I. K. (1986). Cell Culture and somatic Cell Genetics of Plants. 3 Volumes. Academic Press Inc.			
UNITS	**TOPIC**	**LECTURE HOURS**	**MODE OF TEACHING**
UNIT 1(15 hours)			
	History and Scope .Concepts of basic techniques in plant tissue culture	3	Chalk and talk
	Sterilization methods -filter, heat and chemical. Media preparation inorganic nutrients, organic supplements, carbon source, gelling agents growth regulators	4 4	ICT Chalk and talk
	Composition of important culture media (MS, Whites and Gamborg's media).	4	Peer discussion Chalk and talk
UNIT II(15 hours)			
	Isolation of single cells, selection and types of cells, tissue explants and organs for culture -	4	Chalk and talk
	Paper raft nurse technique, Plating method, Microchamber techniques, cell	3	ICT
	suspension cultures : batch, continuous, chemostat culture. Synchronization of suspension culture cellular totipotency, Totipotency of epidermal and crown gall cells.	2 2 4	Chalk and talk Chalk and talk Chalk and talk
UNIT III(15 hours)			
	Clonal propagation of elite germplasm, organogenesis -formation of shoots and root Role of growth regulators and other factors	2 2	Chalk and talk
	somaclonal and gametoclonal variations	4	ICT
	Somatic embryogenesis – Process of somatic embryogenesis, structure factors affecting embryogenesis, synthetic seeds	4 3	Chalk and talk ICT Chalk and talk
UNIT IV(15 hours)			

	Androgenesis, gynogenesis . Techniques of anther culture , diploidisation , factors influencing androgenesis, utilization of haploids in plant breeding.	4	ICT Chalk and talk
	In vitro pollination - ovule and ovaryculture, importance, techniques overcoming incompatibility barriers, embryo rescue.	4	Chalk and talk
	Protoplast culture:Isolation of protoplasts - mechanical and enzymatic, culture of protoplasts. Protoplast fusion: Methods and selection of somatic hybrids, cybrids	3 4	Chalk and talk ICT
UNIT V			
	Classification of secondary metabolites, in vitro production of secondary metabolites	4	Chalk and talk
	Immobilized cellcultures and biotransformation, elicitors and hairy root culture.	3 3	Chalk and talk Chalk and talk
	.Cryopreservation and gene bank : Modes ofpreservation, application and limitations. Application of tissue culture in forestry, Horticulture, Agriculture.	2 3	Chalk and talk Chalk and talk

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							
	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO7	Mean scores of Cos
CO1	3	4	4	3	3	3	4	3	3	3	3	3	3	4	3.28
CO2	3	3	4	4	3	3	3	3	3	3	3	3	4	3	3.21
CO3	3	4	3	3	4	3	3	3	3	3	3	3	4	4	3.35
CO4	3	3	3	3	4	3	3	3	3	3	3	3	3	2	3.0
CO5	3	3	4	3	4	3	3	3	3	3	3	3	4	3	3.21
													Mean Overall Score		3.21

Result: The Score for this Course is 3.21(High Relationship)

Course Designer: Dr.G.Mangai kasthuri

Programme : M.Sc **Non major Elective Paper**
Semester : III **Hours : 2 Hrs/wk 30Hrs /sem**
Sub. Code : NMPF **Credits : 2**

TITLE OF THE PAPER:_GARDENING

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

PREAMBLE:

- To provide practical training as well as theoretical knowledge about garden and maintenance.
- To improve skills for growing fresh vegetables without use of any pesticide.
- To create awareness about kitchen gardening.
- Students are introduced to the methods of plant propagation ,preparation of soil ,landscape construction

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: understand the concept of gardening ,knowledge ,different features and techniques of gardening (types ,methods and tools)	1	6
UNIT 2 CO2: perceive the gardening skills , as well as personal, social and work-related skills	2	6
UNIT 3 CO3: understand the various methods of propagation of plants and appreciates the development of self confidence	3	6
UNIT 4 CO4: develop a keen understanding of home garden , growing fresh and vegetables without use of any pesticide.	4	6

UNIT 5 CO5: appreciate the importance of embarking on employment, create awareness to the society about the role of organic farming	5	6

SYLLABUS

UNIT I:

Introduction – History of gardening . Types of gardens :Outdoor gardening – design and preparation of garden **-** Containers, suitable soil, transplanting, potting, repotting, setting out**.** Irrigation – Surface, Drip.

UNIT II:

Ornamental Gardening : garden components – Lawns, Topiary, Rockery, Hedges. Pruning – objectives and types of pruning (pinching, heading back) – thinning out. Indoor gardening – hanging basket terrarium, bonsai

UNIT III:

Propagation – by seeds (brief), Vegetative propagation : Cuttage – root, stem, leaf. Layerage – Simple,Compound, and Air layering. Budding - T and Patch budding. Grafting – Tongue, Cleft grafting

UNIT IV:

Terrace Garden – Importance, Containers commonly used, suitable plants. Kitchen gardening :importance, layout, suitable plants and cropping patterns.

UNIT V:

Manures – Types, FYM, Panchakavya, Fish Gunabajalam, Management of Garden waste – Composting, importance. Women Enterpreneurship and value addition.

TEXT BOOKS:

1.Manibhushan Rao K. (1991) Text book of Horticulture. University of Madras, Madras.

2. Kumar Dr. N. (2010) Introduction to Horticulture. New Delhi

REFERENCE BOOKS:

1. Sheela V. L. (1959) Horticulture .College of Agriculture, Thiruvananthapuram

2. Hudson T. Hartmann, Dale E. Kester, Fred T. Davies, Jr, Robert L. Geneve (2002) Plant Propagation : Principles and Practices.

UNITS	**TOPIC**	**LECTURE HOURS**	**MODE OF TEACHING**
UNIT I(6hours)			
	History of gardening Types of gardens :Outdoor gardening – design and preparation of garden **-** Containers	3	Chalk and talk

	suitable soil, transplanting, potting, repotting, setting out	2	ICT
	Irrigation – Surface, Drip.	1	Chalk and talk
UNIT II(6hours)			
	Ornamental Gardening : garden components – Lawns, Topiary, Rockery, Hedges	3	Chalk and talk ICT
	Pruning –objectives and types of pruning (pinching, heading back) – thinning out.	2	Chalk and talk
	Indoor gardening – hanging basket terrarium, bonsai	1	Chalk and talk
UNIT III(6hours)			
	Propagation – by seeds (brief), Vegetative propagation : Cuttage – root, stem, leaf.	2	ICT
	Layerage - Simple,Compound, and Air layering**.**	2	ICT
	Budding - T and Patch budding. Grafting – Tongue, Cleft grafting	2	Chalk and talk ICT
UNIT IV(6hours)			
	Terrace Garden – Importance, Containers commonly used, suitable plants	2	Chalk and talk
	Kitchen gardening :importance, layout, suitable plants and cropping patterns	4	ICT
UNIT V(6hours)			
	Types, FYM, Panchakavya, Fish Gunabajalam	1	Chalk and talk
	Management of Garden waste - Composting, importance.	2	Chalk and talk
	Women Enterpreneurship and value addition	3	ICT

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3	3	3	2	3	3	4	3	3	3	3	2	3	4	3.0
CO2	3	3	3	4	3	4	3	4	3	3	3	3	3	4	3.28
CO3	3	3	3	3	3	2	3	4	3	3	3	4	3	3	3.07
CO4	4	3	3	3	3	3	3	3	3	3	4	3	3	4	3.21
CO5	3	3	3	3	3	3	3	3	3	3	3	3	4	4	3.14
Mean Overall Score															3.14

Result: The Score for this Course is 3.14 (High relationship)

Course Designer: Dr.G.Mangai kasthuri

Programme : M.Sc Botany **Core Paper X**
Semester : IV **Hours : 6 Hrs/wk 90Hrs/sem**
Sub. Code : FD1 **Credits :5**

TITLE OF THE PAPER: PLANT BIOTECHNOLOGY AND BIOINFORMATICS

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	6	4	-	-	2

PREAMBLE:

- To familiarize the students with the inter disciplinary and multidisciplinary approach in biotechnology at molecular level.
- To familiarize the students on various different types of vectors used in genetic engineering and transformation.
- Understanding the molecular techniques involved in structure and functions of nano-biomolecules in eukaryotes .

- Intended to provide an overview and current developments in different areas of gene cloning in eukaryotes.
- To discuss the application of various bioinformatics tool.

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: understand different tools in biotechnology.	1	18
UNIT 2 CO2: know various types of vector used during gene transfer in plants.	2	18
UNIT 3 CO3: Understand the processes involved in plant genome organization.	3	18
UNIT 4 CO4: Understand Gene cloning in eukaryotes and cloning strategies .	4	18
UNIT 5 CO5: Understand and explain about databases and bioinformatics tools.	5	18

SYLLABUS

UNIT I:

Biotechnology : Interdisciplinary and multidisciplinary approach. Tools of Genetic Engineering- restriction enzymes – types – exonuclease and endonuclease – S1 nuclease, ligase, alkaline phosphatase, reverse transcriptase, DNA polymerase, T4 kinase, terminal transferase, adaptors and linkers.

UNIT II:

Vectors : plasmid – types, properties, uses of plasmids, pBR322, PUC vectors, organization of Ti plasmid in Agrobacterium tumifaciens , Ti plasmid mediated gene transfer**,** bacteriophage vector-phage insertion vector, replacement vector (EMBL3) M13, cosmids, phagemids, BAC, YAC , CaMV, shuttle and expression vectors.

UNIT III:

Gene cloning in eukaryotes –Gene transfer mechanism : particle bombardment, liposome mediated gene transfer, electroporation, microinjection.Nucleotide sequencing : Maxam Gilbert and Sanger method. Cloning strategies: Basic methods , rDNA technology , Genomic and cDNA library, transfer of recombinant DNA into bacterial cell. Hybridization techniques: PCR, RAPD,RFLP. Blotting techniques. Southern, Northern and Western - rocedure and applications.

UNIT IV:

Plant genome organization: Structural features of plant genome, organisation of chloroplast genome, mitochondrial genome, heat shock proteins, cytoplasmic male sterility, regulation of gene expression in plant development, reporter gene, selectable markers.

UNIT V:

Introduction to bioinformatics: Databases and bioinformatic tools .Classification of

biological data bases: Nucleic acid sequence databases: GeneBank, EMBL. Protein sequence databases: SWISS-PROT, PDB. Genome Databases at NCBI. Sequence analysis: Basic concepts of sequence similarity, identity and homology. Sequence-based Database Searches: BLAST and FASTA algorithms. Pairwise and Multiple sequence alignments- Applications. Bibliographic data bases: PubMed, Medline.

REFERENCES:
PLANT BIOTECHNOLOGY
TEXT BOOKS:

1. Robert F Weaver (2002). *Molecular biology* (II Edn). McGraw Hill.
2. S S Bhojwani, M K Razdan (1996*). Plant tissue culture: Theory and Practice*. Elsevier.

REFERENCE BOOKS:

1. William J Thieman, Michael A Palladino (2009). *Introduction to biotechnology* (II Edn). Pearson.
2. T A Brown (2002). *Genomes* (II Edn). Bios.
3. R A Dixon, R A Gonzales (2004). *Plant cell culture, a practical approach* (II Edn). Oxford University Press.
4. T A Brown (1995). *Gene cloning: an introduction* (III Edn). Stanley Thomas (Publishers) Ltd.
5. S B Primrose (1999). *Molecular biotechnology* (II Edn). Panima Publishing Corporation.
6. Bernard R Glick, Jack J Pasternak, Cheryl L Pattein (2010). *Molecular biotechnology, principlesand applications of recombinant DNA*. ASM press.

BIOINFORMATICS:
TEXT BOOKS:

1. Introduction to Bioinformatics - T.K. Attwood, D.J.P. Smith and S. Phukan, Pearson Education
2. Trends in Bioinformatics – P. Shanmughavel, Scientific Book Center.

REFERENCE BOOKS:

1. David W Mount (2001). *Bioinformatics: Sequence and genome analysis*. CBS publishers & Distributors.
2. Paul G Higgs, Teresa K Attwood (2005). *Bioinformatics and molecular evolution*. Blackwell Publishing
3. C W Sensen (2002). *Genomics and Bioinformatics*. Wiley – VCH.
4. Orpita Bosu, Simminder Kaur Thukral (2007). *Bioinformatics: Databases tools and algorithms*.Oxford University press.
5. Teresa K Attwood, David J Parry-Smith, Simiron Phukan (2007). *Introduction to Bioinformatics*.Pearson Education.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I(18 hours)			
	Interdisciplinary and multidisciplinary approach. Tools of Genetic Engineering	6	Lecture

	restriction enzymes – types – exonuclease and endonuclease – S1 nuclease, ligase, alkaline phosphatase, reverse transcriptase, DNA polymerase, T4 kinase, terminal transferase,	8	ICT
	adaptors and linkers	4	Lecture
UNIT II(18 hours)			
	Vectors : plasmid – types, properties, uses of plasmids, pBR322, PUC vectors, organization of Ti plasmid in Agrobacterium tumifaciens	6	Lecture
	Ti plasmid mediated gene transfer, bacteriophage vector-phage insertion vector, replacement vector (EMBL3) M13, cosmids,	6	Lecture
	cosmids, phagemids, BAC, YAC , CaMV, shuttle and expression vectors.	6	Lecture
UNIT III(18 hours)			
	Gene cloning in eukaryotes –Gene transfer mechanism : particle bombardment, liposome mediated gene transfer, electroporation, microinjection.Nucleotide sequencing : Maxam Gilbert and Sanger method. Cloning strategies: Basic methods ,	6	Lecture
	rDNA technology , Genomic and cDNA library, transfer of recombinant DNA into bacterial cell.	4	ICT
	Hybridization techniques: PCR, RAPD,RFLP. Blotting techniques. Southern, Northern and Western -procedure and applications.	8	Lecture
UNIT IV(18 hours)			
	Plant genome organization: Structural features of plant genome, organisation of chloroplast genome, mitochondrial genome,	8	Lecture
	Heat shock proteins, cytoplasmic male sterility, regulation of gene expression in plant development,	6	Lecture
	Reporter gene, selectable markers	4	Lecture
UNIT V(18 hours)			
	Introduction to bioinformatics: Databases and bioinformatic tools .Classification of biological data bases: Nucleic acid sequence databases: GeneBank, EMBL	7	Lecture
	GeneBank, EMBL. Protein sequence databases: SWISS-PROT, PDB. Genome Databases at	8	Lecture

	NCBI. Sequence analysis: Basic concepts of sequence similarity, identity and homology.		
	Sequence-based Database Searches: BLAST and FASTA algorithms. Pairwise and Multiple sequence alignments- Applications. Bibliographic data bases: PubMed, Medline.	3	ICT

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5.	PSO 6.	PSO 7	
CO1	5	4	5	4	2	5	5	4	4	4	4	5	3	3	4.07
CO2	3	4	3	3	3	3	3	4	4	5	3	3	3	3	3.35
CO3	3	3	3	3	4	4	5	5	5	2	3	2	3	3	3.42
CO4	4	4	4	2	2	3	3	4	5	4	3	2	4	5	3.50
CO5	3	4	5	3	4	3	3	3	3	4	4	2	2	2	3.21
Mean Overall Score															3.51

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

Course Designer : Dr.S.M.Janetta Nithia

Programme : M.Sc.Botany **Core Paper XI**
Semester : IV **Hours : 6 Hrs/wk 90 Hrs /sem**
Sub. Code : FD2 **Credits :5**

TITLE OF THE PAPER: BIOCHEMISTRY AND BIOPHYSICS

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	6	2	1	1	2

PREAMBLE:

- To know about the various kinds of bonds that hold the atoms together and identifies the five classes of polymeric biomolecules and their monomeric building blocks.

- List and name the 20 amino acids that commonly occur in proteins and classify them. Describe the various bonds and forces that contribute to the conformation of proteins.
- To understand the structure and functions of fats and process of metabolism.
- Understands how an enzyme functions as a catalyst Explain Michaelis-Menton kinetics.
- To analyse the principles of bioenergetics; define and explain briefly the role of entropy, and enthalpy in biochemical reactions. Define and explain gibbs free energy, standard free energy .

COURSE OUTCOME At the end of the Semester, the Students will be able to	Unit	Hrs P/S
UNIT 1 CO1: mention the five classes of polymeric biomolecules and their building blocks,able to differentiate various kinds of bonds.	1	18/S
UNIT 2 CO2 : list and name the 20 amino acids that commonly occur in proteins and classify them. Describe the various bonds and forces that contribute to the conformation of proteins.	2	18/S
UNIT 3 CO3: explain the structure of lipids and how they are metabolized.	3	18/S
UNIT 4 CO4: explain Michaelis-Menton kinetics and be able to apply the Michaelis-Menton equation to calculate velocity, maximum velocity (Vmax) and the Michaelis-Menton constant Km.	4	18/S
UNIT 5 CO5: define and explain briefly the role of entropy, and enthalpy in biochemical reactions demonstrate knowledge and understanding of the molecular machinery of living cells.	5	18/S

SYLLABUS

UNIT I:

Structure of atoms, molecules and chemical bonds. Chemistry of biological molecules.Carbohydrates: Classification . Structure and properties of mono, di, oligo and polysaccharides. Amino acids – general structure , properties and classification. Non protein amino acids and nonstandard amino acids. Essential and non essential amino acids.

UNIT II:

General structure of protein – classification – chemical bonds involved in protein structure -primary secondary , tertiary , quaternary structure.. Ramachandran Plot.

UNIT III:

Lipids : Classification, general structure and properties of acyl lipids and phosphates. Saturated fatty acids, unsaturated fatty acids. Biosynthesis of fatty acids. Phytochemical analysis. A general account of alkaloids and flavonoids.

UNIT IV:

Enzymes- Nomenclature , classification ,mode of action, Energy kinetics-km value, coenzymes & isoenzymes.

UNIT V:

Bioenergetics, Energy and work. Laws of Thermodynamics. Energy transductions in biological systems. Redox potential, Redox couples, ATP bioenergetics, Order of

reactions. Photobiology: Dual nature of light, characteristics of solar radiation, solar energy - Efficiency of atoms - Absorption spectra in molecules, energy states, De- excitation.

REFERENCES:

BIOCHEMISTRY:

TEXT BOOKS:

1.Cohn, E. E. and Stumpf, P. K. (1994). Outlines of Biochemistry. Wiley Eastern Ltd., New Delhi.

2.Keshav Trehan (1987). Biochemistry. Wiley Eastern Ltd., New Delhi.

REFERENCE BOOKS:

1. Blonstein, A. B. and King, P. J. (1987). A Genetic Approach to Plant Biochemistry. Narosa, New Delhi.

2. Brett, C. T. and Hillman, J. R. (ed.) (1985). Biochemistry of Plant Cells Walls. Cambridge University Press, UK.

3. Goodwin, F. W. and Mercer, F. I. (1983). Introduction to Plant Biochemistry. 2nd ed. Pergamon Press, New York.

4. Lehinger, A. L. *et al.* (1993). Principles of Biochemistry. CBS Publishers, New Delhi.

5. Stryer, L. (1995). Biochemistry. 4th ed. W. H. Freeman Co., New York.

BIOPHYSICS:

TEXT BOOKS:

1.Casey, E. J. (1962). Biophysics: Concepts and Mechanics. Van Nostrand Reinhold Co. and East-West Press, New Delhi.

2. Salil Bose, S. (1982). Elementary Biophysics. Vijaya Printers, Madurai.

REFERENCE BOOKS:

1. Lehinger, A. L. (1971). Bioenergetics: The Molecular Basis of Biological Energy Transformation. Addison Wiley.

2.Stryer, L. (1995). Biochemistry. 4th ed. W. H. Freeman Co., New York.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT I (18 hours)			
	Structure of atoms, molecules and chemical bonds, Chemistry of biological molecules.	6hrs	Group discussion
	Carbohydrates: Classification . Structure and properties of mono, di, oligo and polysaccharides.	6hrs	Lecture method

	Amino acids – general structure , properties and classification. Non protein amino acids and nonstandard amino acids. Essential and non essential amino acids.	6hrs	ICT
UNIT II(18 hours)			
	General structure of protein – classification – chemical bonds involved in protein structure.	9hrs	ICT
	primary secondary , tertiary , quaternary structure, Ramachandran Plot.	9hrs	Lecture method
UNIT III (18 hours)			
	Lipids : Classification, general structure and properties of acyl lipids and phosphates.	6hrs	Tutorial
	Saturated fatty acids, unsaturated fatty acids. Biosynthesis of fatty acids	6hrs	ICT
	Phytochemical analysis. A general account of alkaloids and flavonoids.	6hrs	Group discussion
UNIT IV (18 hours)			
	Enzymes- Nomenclature , classification.	6hrs	Lecture method
	mode of action, Energy kinetics-km value,	6 hrs	ICT
	coenzymes & isoenzymes.	6hrs	ICT
UNIT V (18 hours)			
	Bioenergetics, Energy and work. Laws of Thermodynamics. Energy transductions in biological systems. Redox potential, Redox couples	6hrs	ICT
	ATP bioenergetics, Order of reactions. Photobiology: Dual nature of light, characteristics of solar radiation, solar energy	6hrs	ICT
	- Efficiency of atoms - Absorption spectra in molecules, energy states, De- excitation.	6hrs	ICT

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3.1
CO2	3	3	3	3	3	3	3	3	3	3	3	3	4	4	3.1
CO3	4	3	3	3	3	3	3	3	3	4	3	3	3	3	3.1
CO4	4	3	3	3	3	3	2	2	3	3	3	3	3	4	3.0
CO5	3	3	3	4	3	3	3	2	3	3	3	3	3	3	3.0
															3.1

Result: The Score for this Course is 3.1 (Moderate Relationship)

Course Designer: Mrs.R.Latha

Programme : M.Sc Botany | **Practical paper IV**
Semester : IV | **Hours : 5 Hrs/wk 75 Hrs/sem**
Sub. Code : FL4 | **Credits : 4**

TITLE OF THE PAPER: PRACTICAL PAPER - IV

Pedagogy	Hours	Lab experimentation	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	5	5	-	-	-

PREAMBLE:

1. To provide practical, "hands-on" experience in some of the techniques of cell culture, that are fundamental to many areas of biotechnology
2. To gain experience in critical thinking and experimental design to address interesting problems in biology or biotechnology.
3. Develop an information strategy on new technologies on biotechnology.
4. Students should be able to use basic laboratory skills and apparatus to obtain reproducible data from biochemical experiments.
5. Provide and demonstrate knowledge and understanding of the principles and basic mechanisms of metabolic control and enzymatic activity.

COURSE OUTCOME

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

CO1: analyze structural-functional relationships of tissue culture lab techniques that are basic fundamentals to biotechnology.

CO2: develop analytical and critical thinking skills in biological phenomena through scientific methods.

CO3: acquire advanced knowledge in biotechnological experiments.

CO4: use current biochemical and molecular techniques to plan and carry out experiments

CO5: Understand quantification and estimation of carbohydrates, Proteins and Fats.

SYLLABUS

1. Organizing Plant Tissue Culture Lab.
2. Preparation of Tissue Culture Media
3. Callus initiation using different explants viz, leaf, shoot, node.
4. Separation of Protein by PAGE.
5. Isolation of Genomic DNA and separation using Agarose Gel.

6. Protein visualization using Rasmol (supply structure of a few proteins downloaded from PDB).
7. Multiple sequence alignment using CLUSTAL X (give DNA or protein sequence).
8. Phylogenetic analysis by Phylip (give some protein or DNA sequence data).
9. Exploring NCBI database system, querying the PUBMED and GenBank databases ,EBI. server and searching the EMBL Nucleotide database, Exploring & Querying SWISSPROT.
10. Measurement of enzyme activity – Amylase,Peroxidase.
11. Factors affecting enzyme activity- substrate concentration, pH and temperature.
12. Quantitative and Qualitative estimation of carbohydrates, Proteins and Fats.

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3	3	3	2	3	4	5	3	3	4	4	4	4	2	3.35
CO2	4	4	4	3	5	5	3	3	3	3	4	4	4	3	3.71
CO3	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3.42
CO4	2	4	4	3	3	3	3	4	4	4	4	4	4	4	3.57
CO5	3	3	3	3	3	3	3	2	2	3	3	3	2	3	2.78
Mean Overall Score															3.36

Result: The Score for this Course is 3.36 (High Relationship)

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

Programme : Botany **Elective Paper IV**
Semester : IV **Hours : 5 Hrs/wk 75 Hrs /sem**
Sub. Code : EFD **Credits : 5**

TITLE OF THE PAPER: APPLIED BOTANY

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

PREAMBLE:

- To enable the students to know about the various microbes used as biofertilizers
- To emphasize the importance and application of various bioinoculants.
- To help to understand the symbiotic and non-symbiotic association of plant –microbe interaction
- To help the students to acquire the basic knowledge, develop suitable skills involved in mushroom cultivation and motivates entrepreneurship in an individual.
- To enable the students to acquire knowledge on biopesticides used in the management of plant pathogens.

COURSE OUTCOME At the end of the Semester, the students will be able to	Unit	Hrs P/S
UNIT 1 CO1: Learn the scope and importance of various biofertilizers.	1	15
UNIT 2 CO2: Recognise the characteristics, identification, cultural methods and maintenance of Rhizobium,Azospirillum, Azotobacter and Phosphobacter.	2	15
UNIT 3 CO3: Know about Mycorrhiza – VAM association, types, occurrence, collection, isolation and inoculum production.	3	15
UNIT 4 CO4: Gain knowledge about the nutritional ,medicinal and cultivation aspects of edible mushrooms.	4	15
UNIT 5 CO5: Get acquainted with method of large scale production of biopesticides and its importance.	5	15

SYLLABUS

Unit-I:

Biofertilizers : Introduction, scope**.** General account of Biofertilizer organisms - Cyanobacteria (BGA), Bacteria and Mycorrhizae. Cyanobacteria (BGA) as biofertilizers – *Anabaena and Nostoc. Azolla – Anabaena as* biofertilizers, Isolation of cyanobacteria, Mass cultivation , Field application.

Unit-II:

Bacterial biofertilizers: Introduction and scope. Isolation, characterization, mass

production and application of *Azospirillum, Azotobacter, Phosphobacteria* and *Rhizobium*. Phosphate solubilization and application.

Unit-III:

Mycorrhizal fungi as biofertilizers : general account of Ecto, Endo and Arbuscular mycorrhizae (AM). Methods of collection, preparation of inoculums, Culture of mycorrhizae in Modified Melin - Norkrans(MMN) agar medium,Cultural characteristics of Ecto mycorrhizal fungi. Techniques of Ectomycorrhizal inoculum**,** Endo mycorrohizae of orchids. Isolation and method of inoculation of Arbuscular mycorrhizae (AM), Legume - AM interactions.

Unit-IV:

Mushroom Technology - Scope and importance - Edible and Poisonous Mushrooms. Nutritive value of edible mushrooms, Structure of basidiocarp - *Agaricus.* Recipes- soup, cutlet, vegetable curry, samosa, omlette and pickle. Cultivation of button mushroom (*Agaricus bisporus*) and oyster mushroom (*Pleurotus sajorcaju*) by Polythene bag method. Preparation of mother spawn, Cultivation technology – Substrates, composting technology, bed & polythene bag preparation, spawning - casing - Cropping -Mushroom production – Harvest, Storage and preservation.

Unit-V:

Definition, scope and importance of biopesticides – types and applications. Plant incorporated protectants, Herbal- Azdirachtine, Pyrethrin ; Bacteria- *Bacillus thuringiensis* ; Virus- Nuclear polyhedrosis virus; Fungi – Trichoderma, Beauveriana bassiana - isolation, mass production and applications.

REFERENCES:

TEXT BOOKS:

1. Dubey, R. C. (2008). A Textbook of Biotechnology. S. Chand & Co., New Delhi.
2. Subba Rao, N. S. (1982). Advances in Agricultural Microbiology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Subba Rao, N. S. (2002). Soil Microbiology. 4th ed. Soil Microorganisms and Plant Growth. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. Publishing Co. Pvt. Ltd., New Delhi.
4. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
5. Tripathi, D. P. (2005). Mushroom Cultivation. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. Schwintzer, C. R. and Tjepkema, J. D. (1990). The Biology of *Frankia* and *Actinorhizal* Plants. Academic Press Inc., San Diego, USA.
2. Stewart, W. D. P. and Gallon, J. R. (1980). Nitrogen Fixation. Academic Press, New York.
3. Subba Rao, N. S. and Dommergues, Y. R. (1998). Microbial Interactions in Agriculture

and Forestry. Vol. I, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Verma, A. (1999). Mycorrhiza. Springer Verlag, Berlin.
5. Wallanda, T. *et al*. (1997). Mycorrhizae. Backley's Publishers, The Netherlands.
6. Alice, D., Muthusamy and Yesuraja, M. (1999). Mushroom Culture. Agricultural College, Research Institute Publications, Madurai.
7. Marimuthu, T. *et al*. (1991). Oster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
8. Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH
9. Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.

UNITS	**TOPIC**	**LECTURE HOURS**	**MODE OF TEACHING**
UNIT I (15 hours)			
	Biofertilizers : Introduction, scope. General account of Biofertilizer organisms - Cyanobacteria (BGA), Bacteria and Mycorrhizae.	6	Lecture method, Use of AV aids.
	Cyanobacteria (BGA) as biofertilizers – *Anabaena and Nostoc. Azolla – Anabaena as* biofertilizers	6	Chalk and Talk technique, Peer teaching techniques.
	Isolation of cyanobacteria, Mass cultivation, Field application	3	Lecture method and PPT.
UNIT II(15 hours)			
	Bacterial biofertilizers: Introduction and scope. Isolation, characterization, mass production and application of *Azospirillum.*	5	Lecture method and PPT.
	Isolation, characterization, mass production and application of *Azotobacter.*	4	Lecture method, Use of AV aids.
	Isolation, characterization, mass production and application of *Phosphobacteria* and	6	Chalk and Talk technique, Peer teaching techniques.

	Rhizobium. Phosphate solubilization and application.		
UNIT III (15 hours)			
	Mycorrhizal fungi as biofertilizers : general account of Ecto, Endo and Arbuscular mycorrhizae (AM).	4	Lecture method, Use of AV aids.
	Methods of collection, preparation of inoculums, Culture of mycorrhizae in Modified Melin - Norkrans(MMN) agar medium,Cultural characteristics of Ecto mycorrhizal fungi.	5	Chalk and Talk technique, Peer teaching techniques.
	Techniques of Ectomycorrhizal inoculum, Endo mycorrohizae of orchids. Isolation and method of inoculation of Arbuscular mycorrhizae (AM), Legume - AM interactions.	6	Lecture method , Use of AV aids and PPT.
UNIT IV (15 hours)			
	Mushroom Technology - Scope and importance - Edible and Poisonous Mushrooms. Nutritive value of edible mushrooms, Structure of basidiocarp - *Agaricus.*	5	Lecture method, peer teaching techniques and PPT.
	Recipies-soup, cutlet, vegetable curry, samosa, omlette and pickle. Cultivation of button mushroom (*Agaricus bisporus*) and oyster mushroom (*Pleurotus sajorcaju*) by Polythene bag method.	5	Lecture method, Use of AV aids.
	Preparation of mother spawn, Cultivation technology – Substrates, composting	5	Chalk and Talk technique, Peer teaching techniques.

	technology, bed & polythene bag preparation, spawning - casing - Cropping -Mushroom production – Harvest, Storage and preservation		
UNIT V (15 hours)			
	Definition, scope and importance of biopesticides – types and applications. Plant incorporated protectants.	5	Lecture method, peer teaching techniques and PPT.
	Herbal- Azdirachtine, Pyrethrin ; Bacteria- *Bacillus thuringiensis* ; Virus- Nuclear polyhedrosis virus;	5	Lecture method, Use of AV aids.
	Fungi – Trichoderma, Beauveriana bassiana - isolation, mass production and applications.	5	Chalk and Talk technique, Peer teaching techniques.

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	2	3	4	3	5	2	2	4	3	4	4	4	3.36
CO2	3	3	4	4	4	3	5	4	3	2	3	3	2	3	3.29
CO3	3	3	3	4	4	4	4	3	3	3	4	3	3	3	3.36
CO4	3	2	4	3	4	3	3	5	5	3	4	2	3	3	3.36
CO5	4	3	4	3	3	3	4	5	3	4	4	4	4	3	3.64
Mean Overall Score															3.40

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

Course Designer: Mrs.M.P. Sivasankari

Programme : Botany
Semester : IV **Hours : 8 P/W 120 Hrs P/S**
Sub. Code : FPW **Credits : 4**

TITLE OF THE PAPER: PROJECT

The project needs to be completed by working across the regular teaching hours and under the supervision of the faculty .Students may also be allowed to do their project work in a research or industrial organization on recommendation. The Final evaluation of the Project work is based on submission of the dissertation and Viva-voice. At the end , student may be in a position to design a minor project.
