NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)
POLLACHI - 642 001

M.Sc., BOTANY
(2017 - 2019 Batch)

SYLLABUS
&
SCHEME OF EXAMINATION

CHOICE BASED CREDITS SYSTEM (CBCS)

[FOR THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2017 - 2019 BATCH & ONWARDS]

(PASSED ON THE BOARD OF STUDIES HELD ON MARCH - 2017)

NGM COLLEGE (AUTONOMOUS), POLLACHI - 01.
M.Sc. BOTANY SYLLABUS
[CHOICE BASED CREDITS SYSTEM] [FOR 2017-2019BATCH & ONWARDS]
SCHEME OF EXAMINATION

Sem	Code	Subject title	Class hours /Week	Exam Hrs	Maximum marks			Credits
					Internal	External	Total	
I	17PBY101	Microbiology	5	3	25	75	100	4
I	17PBY102	Phycology, Mycology, Lichenology and Bryology	5	3	25	75	100	4
I	17PBY103	Pteridophytes, Gymnosperms and Palaeobotany	5	3	25	75	100	4
I	17PBY1E1	**Elective -1** Ecology and Phytogeography	5	3	25	75	100	5
I	17PBY104	**Core Practical-I** (for core papers & elective -1)	5	4	40	60	100	4
II	17PBY205	Anatomy and Embryology	5	3	25	75	100	4
II	17PBY206	Plant physiology	5	3	25	75	100	4
II	17PBY207	Cytogenetics and Plant Breeding	5	3	25	75	100	4
II	17PBY208	**Core Practical- II** (for core papers)	5	4	40	60	100	4
II	17PBY2N1	**Non- Major Elective -1A** Mushroom cultivation	1	3	-	100	100	2
	17PBY2N2	**Non- Major Elective -1B** Herbal Botany						
III	17PBY309	Plant Systematics	5	3	25	75	100	5
III	17PBY310	Plant Biochemistry and Biophysics	5	3	25	75	100	4
III	17PBY311	Molecular Biology and Plant Biotechnology	5	3	25	75	100	4
III	17PBY3E2	**Elective -2** Forest Botany	5	3	25	75	100	5
III	17PBY312	**Core Practical- III** (Plant Systematics & elective -2)	5	4	40	60	100	4
III	17PBY313	**Core Practical –IV** (Plant Biochemistry & Plant Biotechnology)	5	4	40	60	100	4
IV	17PBY414	Research Methodology and Biostatistics	5	3	25	75	100	4
IV	17PBY415	Cyber security and Bioinformatics	5	3	25	75	100	4
IV	17PBY4E3	**Elective -3** Horticulture	5	3	25	75	100	5
IV	17PBY416	**Core Practical -V** (for core papers & elective -3)	5	4	40	60	100	4
IV	17PBY4P1	Project Work and Viva -Voce	6	-	40	160	200	8
		Total					2200	90

SCHEME OF VALUATION

Papers	Credits	Internal	External	Total
Core	4	25	75	100
Core practical	4	40	60	100
Elective	5	25	75	100
Non- major elective	2	-	100	100
Project work	8	40	160	200
viva-voce				

General question paper pattern

Max. Marks:100	Internal : 25	External : 75	
Section	**Pattern**	**Mark**	**Total**
Part A (1 - 10)	One word question/multiple choice/ true/false/ short answer (10 Questions)	10 x 1	10
Part B (11 - 15)	Either (or) choice (5 Questions)	5 x 5	25
Part C (16 - 21)	Answer any four out of six (Sixteenth question is compulsory)	4 x 10	40
		Total :	75

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY101 Title : MICROBIOLOGY		Semester: 1
Hrs/Week :	5	Credits: 4
Objectives	• To define and characterize the microbial diversity • To know the plant pathogen interactions • To introduce the microbial techniques • To highlight their role in the human welfare.	

Unit	Content	Hrs
Unit I	**MICROBIOLOGY:** Scope of Microbiology; Microbial diversity [Bacteria, Fungi, Algae, Mycoplasmas, Viruses and Protozoa] - a general account, classification, growth and reproduction.	13
Unit II	**Microbiological Media:** Types, preparation, methods of sterilization- enumeration of microorganisms in soil, water and air- isolation of microorganisms from environment and infected plant tissue- techniques of pure culture, maintenance and preservation- Staining techniques - **bacterial growth curve - nutritional types of microorganisms.*	13
Unit III	**Pathology**: General account of plant pathogens - diseases caused by plant pathogens - pathogen attack and defense mechanism - physical, physiological, biochemical and molecular aspects - plant disease epidemiology - transmission and spread of plant pathogens - disease cycles - epidemics - modeling and disease forecasting. Plant diseases: symptoms, causative organisms and control measures of following diseases: Blast disease of Paddy - Red rot disease of Sugar cane - Late blight of Potato - Bunchy top of Banana	13
Unit IV	**Food Microbiology:** Fermented foods (pickles, silage, sausages and bread) - microbial spoilage of foods (fresh & canned foods) - food borne infections & intoxication - role of *Staphylococcus aureus,, Clostridium botulinum* & *Salmonella Sp* in food poisoning- preservation of foods - **microbiology of milk and milk products - Single cell protein.*	13
Unit V	**Industrial Microbiology:** Fermenters, batch fermentation vs continuous fermentation, Industrial production of enzymes (cellulase, amylase and protease), amino acids (glutamic acid and L-Lysine), organic acids (lactic acid and citric acid) and biofuels (ethanol) - methods of cell and enzyme immobilization - applications of immobilized cells and enzymes.	13

*Self study topics

TEXT BOOKS

1. Joanne Willey , Linda Sherwood and Chris Woolverton , 2013. Prescott's Microbiology, 9th edition, McGraw-Hill Companies.
2. Gangulee and Kar, 1970. College Botany Vol. II. New Central Book Agency, New Delhi.
3. Rangaswamy, G. and Mahadevan, A. (1999). Diseases of crop plant in India 4th Edition.

REFERENCE BOOKS

1. Power, C.B. and H.F. Daginawala. (1982), General Microbiology.
2. Michael, J. Pelczar, Jr. E.C.S. chan and N.R. Krief. (1995). Microbiology. Tata McGraw-Hill (Ed), New Delhi.
3. Alexopoulos, C.J. and Mims, C.W. 1979. Introductory Mycology. Wiley Eastern Ltd, New Delhi.
4. Steindraus, K.H. (ed.) 1983. Hand Book of Indigenous Fermented Food, Parcel Dekker Inc., New York.
5. Sharma, P.D. 2006. Plant Pathology. Narso Publishing House, New Delhi.
6. Das Cupta M.K. (1958). Principles of Plant Pathology
7. Webster, J. 1970. Introduction to Fungi. Cambridge University Press, UK.
8. Smith, K.M. (1974), Viruses, Cambridge University Press.

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Dr. E. Neelamathi			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY102 Title : PHYCOLOGY, MYCOLOGY, LICHENOLOGY AND BRYOLOGY		Semester: 1
Hrs/Week :	5	Credits: 4
Objectives	• To define and characterize the floral diversity • To understand the range of diversification of species • To realize the fundamental values of diversity • To evolve strategies for diversity conservation and sustainable use.	

Unit	Content	Hrs
Unit I	**PHYCOLOGY:** Algae in diverse habitats (Terrestrial, Fresh water, Marine) - Thallus organization (range of thallus) and reproduction (vegetative, asexual, sexual) - Ultra structure of cell, Flagella, Chloroplast, Pyrenoids and Eye Spot in major groups of algae - Principles of classification, classification of Fritsch - Life cycle patterns in Algae and Algal Blooms - **Economic importance of Algae as food - bio-fuels - source of chemicals and drugs - Algal Bioinoculants.*	13
Unit II	Comparative study of classes of Cyanophyceae, Chlorophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae with reference to - Range of structure of plant body including - Ultra structure - Methods of reproduction and Variations in life cycles - Life histories of - *Chlorella, Bulbochaete, Padina, Gelidium, Anabaena,* Diatoms and *Vaucheria*.	13
Unit III	**MYCOLOGY:** General Characteristics of Fungi - Range of thallus Organization - The architecture of fungal cells, cell walls, cell membrane, cell organelles and cytoskeleton - Nutrition and growth in fungi including factors affecting fungal growth - Types of reproduction in fungi - Fungal Classification (Ainsworth, 1971) - Diagnostic features of different classes of fungi - Structure and Life-histories of *Plasmodiophora, Penicillium, Neurospora, Pleurotus, Fusarium* and *Cercospora*.	13
Unit IV	Fungal genetic variation and evolution - Heterothallism, Heterokaryosis and Parasexual cycle - Saprotrophs and Ecosystems - Fungi as Parasitic and Mutualistic Symbionts - **Economic Importance of Fungi.* **LICHENOLOGY:** General characteristics & classification of lichens (Hale, 1969) - occurrence and interrelationship of phycobionts and mycobionts, structure and reproduction - lichens as indicators of pollution - economic importance of lichens.	13
Unit V	**BRYOLOGY:** Classification of Bryophytes - Origin of Bryophyta - evolution (Proskauer, 1957), structural organization of gametophyte and sporophyte in different classes of Bryophytes - life histories of *Marchantia*, *Porella*, *Fossombronia*, *Anthoceros* and *Polytrichum* - **Bryophytes as pollution indicators*.	13

*Self study topics

TEXT BOOKS

1. Gangulee and Kar, 1970. College Botany Vol. II. New Central Book Agency, New Delhi.
2. Smith, G.M. 1938. Cryptogamic Botany. Vol., I. McGraw Hill Book Co., New York.
3. Tridevi, P.C. 2001. Algal Biotechnology, Point Publisher, Jaipur, India.
4. Text Book of Algae O.P. Sharma .Tata McGrow Hill Publication 1986.
5. The Ecology of Algae F.E. Round Cambridge University Press.1981

REFERENCE BOOKS

1. Alexopoulos, C.J. and Mims, C.W. 1979. Introductory Mycology. Wiley Eastern Ltd, New Delhi.
2. Singh, S.K. 2006. Text Book of Bryophyta, Campus Books, New Delhi.
3. Fritsch, F.F. 1972. The Structure and Reproduction of the Algae Vol. II. Cambridge University Press, UK.
4. Kumar, H.D. 1988. Introductory Phycology. Affiliated East-West Press Ltd. New Delhi.
5. Morris, I. 1986. An introduction to the Algae. Cambridge University Press, UK.
6. Beaker, S.W. 1994. Micro Algae Biotechnology and Microbiology. Cambridge University Press.
7. Venkataraman, G.S. 1972. Algal Biofertilizers and rice cultivation. Today and Tomorrows Printers and Publishers, New Delhi.
8. Webster, J. 1970. Introduction to Fungi. Cambridge University Press, UK.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY103 Title : PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY		Semester: I
Hrs/Week :	5	Credits: 4
Objectives	• To define and characterize diversity of lower vascular plants • To understand the dynamics of diversity • To realize the significance of diversity.	

Unit	Content	Hrs
Unit I	**PTERIDOPHYTES:** Introduction - classification of Pteridophytes (Sporne, 1970) - characteristic features and types of life cycles in Pteridophytes - comparative account of sporophytes, gametophytes and embryogeny in Psilotopsida, Lycopsida and Sphenopsida.	13
Unit II	Comparative account of sporophytes - gametophytes and embryogeny in Pteropsida - types of steles and their evolution in Pteridophytes - heterospory and seed habit - apospory, apogamy and parthenogenesis - **economic importance of Pteridophytes - origin and evolution of Pteridophytes.*	13
Unit III	**GYMNOSPERMS:** Introduction - classification of Gymnosperms (Sporne, 1965); characteristic features and life cycles of Gymnosperms. Comparative study of morphology, anatomy, reproduction and phylogeny of Pteridospermales, Bennettitales, Pentoxylales, Cycadales and Cordaitales	13
Unit IV	Comparative study of morphology, anatomy, reproduction and phylogeny of Coniferales, Taxales, Ginkgoales and Gnetales - **economic importance of Gymnosperms. Affinities of Gymnosperms with Angiosperms and Pteridophytes.*	13
Unit V	**PALAEOBOTANY:** Geological time scale, fossils and fossilization- kinds of fossils - Petrifaction, mold, cast, impression and compression. Nomenclature of fossil plants, Indian contribution towards fossil resources; half-life period; radiocarbon dating. Contribution of Prof. Birbal Sahni.	13

*Self study topics

TEXT BOOKS

1. Gangulee and Kar, 1970. College Botany Vol. II. New Central Book Agency, New Delhi.
2. Vashishta, P.C. 1991. Gymnosperms. S. Chand & Company Ltd., Ram Nagar, New Delhi.
3. Vashishta, P.C. 1991. Vascular Cryptogams. S. Chand & Company Ltd., Ram Nagar, New Delhi.

REFERENCE BOOKS

1. Arnold, C.A. 1947. An Introduction to Paleobotany. Academic Press, New York and London
2. Biswas, C. and Johrc, B.M. 1977. The Gymnosperms. Narosa publishing House, New Delhi.
3. Bower, F.O. 1923-28. The ferns. Vol., 1-3; Cambridge University Press, London.
4. Eames, A.J. 1936. Morphology of Vascular Plants. Lower groups, New York and London.
5. Meyen, S.V. 1987. Fundamentals of Paleobotany. Chapman and Hall, New York.
6. Sporne, K.R. 1965. The Morphology of Pteridophytes. Hutchinson & Co., London
7. Sporne, K.R. 1967. The Morphology of Gymnosperms. Hutchinson & Co., London.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY1E1 Title : ECOLOGY AND PHYTOGEOGRAPHY		Semester:1
Hrs/Week :	5	Credits: 5
Objectives	• To exposes the students to the concept of ecology, environmental problems and their consequences. • To understand the basic and applied aspects of environmental botany; and the levels of organization and basic divisions of biology.	

Unit	Content	Hrs
Unit I	History and Scope of Ecology. Concept of Ecosystem, its structure and function, Ecological factors; Edaphic, Climatic, Topographic, Biotic and Abiotic factors. Adaptation of plants, Energetics: Productivity.	13
Unit II	Ecological succession - Seral and Climax communities - Hydrosere, Xerosere. Bog succession, sand dune succession. Plant indicators. Terrestrial ecosystems, Fresh water ecosystem, Marine ecosystem. Biodiversity and Conservation Biology: Types, benefits, and conservation of Biodiversity, **Biodiversity Hotspots*.	13
Unit III	Environmental pollution - Air, Water, Soil, Thermal, Radiation, Noise, E-waste and solid waste; Cumulative effect of Pollution on global environment; **Global warming*, climate change and its consequences.	13
Unit IV	Environmental Impact Assessment (EIA). Scope, importance and application of EIA process - eco-restoration/remediation-ecological foot prints - carbon foot print - ecolabeling - environmental auditing.	13
Unit V	Phytogeography - Principles and importance of plant geography-Phytogeographic regions of India. Theories of present day distribution of plants- Continental drift hypothesis-Factors involved in distribution - Endemism, Age and Area hypothesis; Dispersal and Migration and their aims and methods.	13

*Self study topics

TEXT BOOKS

1. Krishnamoorthy, K.V. 2003. An Advanced Text book on Biodiversity, Oxford & IBH Book Company, New Delhi.
2. Odum, E.P. 1971. Fundamentals of ecology, W.B. Saunders & Co., Philadelphia, USA.

3. Trivedi, R.K. and Goel, P.K. 1986. Chemical and Biological methods for water pollution studies, Environmental publication, India.

REFERENCE BOOKS

1. Ambasht, R.S. 1974. A text book of plant ecology (3rd ed.), Students' Friends. & Co., Varanasi, India.
2. Chapman, J.L. and Reiss, M.J. 1999. Ecology; Principles and Applications. I Ed. Cambridge University Press. New York.
3. Chiras, D. D., 2009. Environmental Science, 8th edition, Jones and Bartlett Publishers, Sudbury, Massachusetts (www.jbpub.com).
4. Groombridge, B. (Ed.) 1994. Global Biodiversity status of the Earth's livng resources. C hapman & Hall, London.
5. Melchias, G. 2001. Biodiversity and Conservation. Oxford IBH. New Delhi. 236Pp.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY104 Title : CORE PRACTICAL I		Semester: 1
Hrs/Week :	5	Credits: 4
Objectives	• To get hands on experience on microbes and algal culture techniques • To acquire practical knowledge on thallus organization of lower plants • To understand the structure and organization of diverse forms of plants • To enhance practical knowledge involved in ecology	

Unit	Content	Hrs
Unit I	**MICROBIOLOGY** 1. Preparation of Basic medium – solid agar and broth 2. Preparation of agar plates, agar slants and agar deep tubes. 3. Simple staining of bacteria. 4. Gram's staining of bacteria. 5. Isolation of Bacteria, Fungi, Actinomycetes from soil and water 6. Biochemical tests for bacteria 7. Bacterial growth curve	13
Unit II	8. Isolation of microorganisms from the infected plant tissues. 9. Subculture, pure culture and maintenance of culture. 10. Production of Alcohol. 11. Effect of antibiotics on pathogenic microorganism by Kerby - Bayer method. 12. Testing the milk quality - Methylene Blue Reduction Test (MBRT) 13. Pathology Herbarium Submission: Submission of herbarium from the infected plant specimens (not less than five)	13
Unit III	**PHYCOLOGY, MYCOLOGY, LICHENOLOGY AND BRYOLOGY** 1. Range of thallus structures in algae 2. Reproductive structures in algae 3. Collection of microalgae using phytoplankton net 4. Culturing of microalgae 5. Estimation of primary productivity 6. Culturing of macro algae/seaweed (demo only) 7. Slide culture technique 8. Commercial products from macroalgae 9. Fungal spore count using Haemocytometer. 10. Vegetative and reproductive structures of *Rhizopus, Ascobolus*, *Pleurotus* and *Cercospora*	13

	11. Slide culture technique 12. Fungal spore count using Haemocytometer. 13. Vegetative and reproductive structures of *Rhizopus, Ascobolus*, *Pleurotus* and *Cercospora* 14. Lichen - *usnea* 15. Morphological and anatomical study of bryophytes with reference to the following genera: *Marchantia, Anthoceros, Sphagnam, Funaria* and *Polytrichum*. 16. Field trip for lower plant collection and submission of reports.	
Unit IV	**PTERIDOPHYES, GYMNOSPERMS AND PALAEOBOTANY** Study of morphology, anatomy and reproductive structures of the following genera: 1. Pteridophytes - *Selaginella*, *Equisetum*, *Ophioglossum*, *Adiantum* and *Marsilea*. 2. Gymnosperms - *Pinus*, *Araucaria* and *Gingko.* 3. Paleobotany - *Rhynia, Lepidodendron, Lepidocarpon, Williamsonia, Lagenostoma, Lyngiopteris*.	**13**
Unit V	**ECOLOGY AND PHYTOGEOGRAPHY** 1. Physical and chemical properties of soil 2. Measurement of Chlorides in Water 3. Check list preparation for household hazardous waste audit 4. Determination of Solid Waste Generation 5. Preparation of location maps of Phytogeographic regions of India 6. Preparation of map for biodiversity hotspots in India and to comment on it 7. Preparation of ombrothermic diagram of different locations based on climate data	**13**

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY205 Title : ANATOMY AND EMBRYOLOGY		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To understand the structure of cells in relation to the functional aspects • To study the internal structure of various tissue systems and organs. • To know the mechanisms processes in the reproductive phase of plants	

Unit	Content	Hrs
Unit I	**ANATOMY:** General account and theories of organization of shoot apex and root apex - quiescent centre and modern concept on meristems - structural diversity, functional complexity and phylogenetic trends in specialization of complex permanent tissues (xylem and phloem) - cambium - origin - structure, storied and non-storied types - formation of cork cambium, and periderm - **Anomalous secondary growth in dicot and monocot*.	13
Unit II	Vascular differentiation in primary and secondary structure of root and stem in dicot and monocot - origin of lateral roots - root stem transition - anatomy of dicot and monocot leaves - stomatal types - nodal anatomy - petiole anatomy - trichomes - glands - secretory tissues - nectaries - laticifers and their significance.	13
Unit III	**EMBRYOLOGY:** Microsporangium - microsporogenesis - microspores - arrangement - morphology - ultra structure - microgametogenesis - pollen - stigma - incompatibility - methods to overcome incompatibility.	13
Unit IV	Classification, structure and development of megasporangium, megasporogenesis, female gametophyte - types, ultra structure, and haustorial behavior; Nutrition of embryo sac. Double fertilization and triple fusion - Endosperm - types - endosperm haustoria and functions; ruminate endosperm. **Embryogeny*: *classification, development of monocot (grass) and dicot (crucifer) embryos*.	13
Unit V	Polyembryony - types - classification - causes - induction and practical application. Apomixis and its significance - seed and fruit development and role of growth substances - parthenocarpy and its importance - polyembryony - apomixis - apospory.	13

*Self study topics

TEXT BOOKS

1. Bhojwani, S.S. and Bhatnagar, S.P. 1986. The Embryology and Angiosperms. Vikas publishing house pvt. Ltd, New Delhi.
2. Easu, K. 1985. Plant Anatomy, Wiley Eastern Pvt. Ltd., New Delhi.
3. Johri, B.M. (ed.) 1983. Embryology of Angiosperms, Springer-Verlag, New York.
4. Pandey, B.P. 1993. Plant anatomy, S. Chand & Co, New Delhi.

REFERENCE BOOKS

1. Bierhorst, D.W. 1971. Morphology of vascular plants. Macmillan publishers, New York.
2. Maheshwari, P. 1963. Recent Advances in Embryology of Angiosperms. Intl. Soc. Plant Morphologists, New Delhi.
3. Pullaiah, T., Lakshiminarayana, K. and Hanumantha Rao, B. 2006. Text book of Embryology of Angiosperms. Regency Publications, New Delhi.
4. Swanson, P. and Webster, P. 1977. The Cell. Prentice Hall, Inc. Englewood Cliffs, New Jersey, USA.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY206 Title : PLANT PHYSIOLOGY		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To understand the concepts involved in the functions of plants • To study the recent aspects of various physiological processes in plants.	

Unit	Content	Hrs
Unit I	Plant- water relations: diffusion and osmosis - water potential and chemical potential - absorption of water - water transport through xylem - transpiration and its significance - factors affecting transpiration - physiology of stomatal movement - transport of organic substances - transport of photosynthate - source-sink relationship - the mechanism of translocation in the phloem, assimilate partitioning.	13
Unit II	Signal transduction: overview - receptors and G-proteins - phospholipid signaling, role of cyclic nucleotides - Calcium- cadmium cascade. Mineral nutrition: Criteria of essentiality of elements; macro and micro-nutrients; **role of essential elements; mineral deficiency symptoms and plant disorders,* nutrient uptake and transport mechanism, role of cell membrane, ion pump carrier.	13
Unit III	Photosynthesis: Historical background and significance - photosynthetic pigments - accessory pigments and photoprotective carotenoids - reaction center complexes - photochemical reactions - electron transport pathways in chloroplast membrane - photo phosphorylations - Calvin cycle - the C4 carbon cycle - crassulacean acid metabolism- photorespiration.	13
Unit IV	Respiration: Glycolysis - TCA cycle and its regulation - aerobic and anaerobic respiration - electron transport in mitochondria - redox potential - oxidative phosphorylations - pentose phosphate pathway. Nitrogen metabolism: Importance of Nitrogen to plants - Nitrogen cycle - biological nitrogen fixation - nif gene - nitrate assimilation GDH and GS/GOGAT pathway - Integration of Nitrogen and Carbohydrate metabolisms.	13
Unit V	Growth and development: Kinetics of growth - seed dormancy - seed germination and influencing factors of their regulation - the concept of photoperiodism - physiology of flowering - florigen concept - vernalization - biological clocks - physiology of senescence - fruit ripening. Plant hormones - auxins, gibberellins, cytokinins, abscisic acid ethylene, history of their discovery, role and mechanism of action. Photomorphogenesis: phytochromes and cytochromes, their discovery - physiological role and mechanism of action. **Stress physiology: Plant responses to biotic and abiotic stress,* mechanism of biotic and abiotic stress tolerance.	13

*Self study topics

TEXT BOOKS

1. Jain, V.K. 2000. Fundamentals of Plant Physiology (5th ed.), S. Chand & Co Ltd; New Delhi.
2. Pandey, S.N. and Sinha, B.K. 2010. Plant Physiology, Vikas Publishing, New Delhi.

REFERENCE BOOKS

1. Devlin, R.M. and Baker, N.R. 1973. Photosynthesis, Reinhold Affiliated East-West Press Pvt. Ltd, New Delhi.
2. Moore, T.C. 1979. Biochemistry and physiology of plant hormones. Narosa book Distributors, New Delhi.
3. Roberts, E.A. 1987. Plant growth regulators. Kluwer Academic publishers, London.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY207 Title : CYTOGENETICS AND PLANT BREEDING		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To understand the heredity and the variation of inherited characteristics • To study the gene behavior its distribution and mutations • To acquire knowledge on various breeding methods • To learn the applications of induced mutations	

Unit	Content	Hrs
Unit I	Chromosome: Structure and nomenclature, centromere and telomere- Chromosome labeling and cell cycle analysis - overview of mitosis and meiosis - chromosome movement at anaphase - chromosomal aberrations- applications of molecular cytogenetics.	13
Unit II	Mendelian genetics - Mendelian principles - dominance, segregation, independent assortment; Co-dominance, incomplete dominance- extensions of Mendelian principles - gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over - theories of sex determination - sex linkage - sex limited and sex influenced characters.	13
Unit III	Classification of mutations - gene mutations - spontaneous and induced mutations – physical and chemical mutagens - molecular basis of gene mutation - point and frame shift and suppressor mutation - DNA as a genetic material. - gene regulatory mechanisms (prokaryotes & eukaryotes)	13
Unit IV	Modern Genetics: Gene mapping methods based on test-cross (two point cross and three point cross) - LOD score analysis - tetrad analysis and its significance - principles and methods of QTL mapping - RNAi microarrays.	13
Unit V	**Plant Breeding**: Introduction to breeding of cultivated plants - objectives of breeding - polyploidy and haploids in plant breeding –Selection – mass selection: pureline selection, clonal selection merits and demerits, their application– **Improvement of crop plants by pedigree method, bulk method, backcross method* - Intervarietal, interspecific and intergeneric hybridization - heterosis - hybrid vigour - marker assisted breeding - **national and international organizations for crop improvement*	13

*Self study topics

TEXT BOOKS

1. Gardener, E.J. 1975. Principles of Genetics (5th ed.), John wiley, New York.
2. Gupta, P.K. 1994. Genetics, Rashtogi Publication, Meerut, India
3. Singh, E.D. 1990. Plant Breeding. Kalyani Publishers, New Delhi.

REFERENCE BOOKS

1. Allard, R.W. 1960. Principles of Plant Breeding, John Wiley and Sons, Inc. New York.
2. Gilber, N.W. 1978. Organellar heredity, Revan press, New York.
3. King, R.C. 1975. A Hand book of Genetics, Plenum Press, New York.
4. Simmonds, N.W. 1979. Principles of Crop improvement. Longman, London.
5. Strickberger, M.V. 1977. Genetics, Macmillan publishers, New York.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY208 Title : CORE PRACTICAL II		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To study the physiological processes in the plant system • To understand the cell and tissue development and organization • To know the inheritance in plants and breeding techniques.	

Unit	Content	Hrs
Unit I	**ANATOMY** 1. Staining of various plant tissues 2. Primary structure of dicot and monocot stem (*Helianthus annus, Zea mays*) 3. Normal secondary thickening of dicot stem 4. Anomalous secondary thickening Multiple and successive cambial rings - *Boerhaavia* Included or interxylary phloem - *Leptadaenia, Achyranthes* Intraxylary phloem/Ridged xylem - *Bignonia* Inverted cortical bundles - *Nyctanthes* 5. Secondary growth in monocot stem - *Dracaena*	**13**
Unit II	1. Stomatal types 2. T.S of Dicot leaf - Dorsiventral & Isobilateral (*Nerium*) 3. T. S. of monocot leaf - Bamboo 4. Maceration of plant tissues 5. Microtomy 6. Slide submission (Microtomy - 5 Free hand section – 5)	**13**
Unit III	**EMBRYOLOGY** 1. Study of pollen morphology 2. Pollen germination 3. Test for pollen viability 4. Types of ovules 5. Mature embryo sac 6. Observation of endosperm types 7. Dissection of embryos – Dicot, Monocot and Polyembryony	**13**
Unit IV	**PLANT PHYSIOLOGY** 1. Determination of DPD of plant tissues by plasmolytic method 2. Extraction and estimation of chlorophyll. 3. Separation of chlorophyll pigments using paper chromatography. 4. Determination of stomatal frequency and stomatal index. 5. Effect of light intensity on the rate of photosynthesis.	**13**

	6. Effect of quality of light on the rate of photosynthesis. 7. Effect of varying concentrations of CO2 on the rate of photosynthesis. 8. Measurement of respiration by simple respiroscope. 9. Hill reaction by isolated chloroplasts (demonstration). 10. Rate of transpiration under varying climatic factors	
Unit V	**CYTOGENETICS AND PLANT BREEDING** 1. Mitosis and meiosis 2. Problems in Mendelian and Non - Mendelian inheritance 3. Mutation 4. Charts on Plant breeding techniques	**13**

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Dr. E. Neelamathi	Dr. E. Neelamathi		
Dr. R. Rakkimuthu			
Dr. P. Sathishkumar			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY2N1 Title : MUSHROOM CULTIVATION		Semester: 2
Hrs/Week :	1	Credits: 2
Objectives	• To impart skills on mushroom cultivation, an agro based industry • To have an idea on the intricacies of mushroom cultivation	

Unit	Content	Hrs
Unit I	Introduction - morphology - types of mushroom - identification of edible and poisonous mushroom - nutritive and medicinal values - life cycle of common edible mushrooms.	3
Unit II	Methods of mushroom cultivation (Hanging bag, bed and rack method) - prospects and scope of mushroom cultivation in small scale industry.	3
Unit III	Life cycle of *Pleurotus, Agaricus*, *Volvariella, Calocybe* and *Lentinus* - breeding and genetic improvement of mushroom strains.	2
Unit IV	Cultivation - conditions for tropical and temperate countries, isolation - spawn production - growth media - spawn running and harvesting of mushrooms.	2
Unit V	Diseases and post harvest technology - harvesting - freezing, dry freezing, drying, **packaging and marketing* - **recipes from mushrooms.*	2

*Self study topics

TEXT BOOKS

1. Hand book of mushroom cultivation, 1999, TNAU publication.
2. Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Tripathi, D. P. (2005). Mushroom Cultivation. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

REFERENCE BOOKS

1. Alice, D., Muthusamy and Yesuraja, M. (1999). Mushroom Culture. Agricultural College, Research Institute Publications, Madurai.
2. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
3. Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY2N2 Title : HERBAL BOTANY		Semester: 2
Hrs/Week :	5	Credits: 4
Objectives	• To study the habit and habitat of medicinal plants and know their scientific names • To understand the medicinal value of plants and their use in various components of Ayurvedic, Siddha, Homeopathy and Unani systems of medicine • To understand their importance in commercial market.	

Unit	Content	Hrs
Unit I	Plants in 'allopathic' and 'herbal medicines'; historical account of medicinal plants in India and their availability in the past, cultivation, medicinal plant gardens, sacred plants for medicine, trade in raw drugs, local health traditions and household remedies.	13
Unit II	Distribution of Indian medicinal plants; Eco-distribution, mapping distribution in different bio-geographic zones, natural distribution of Indian medicinal plants included in the CITES' appendices.	13
Unit III	Industrial uses of medicinal plants; Processing of medicinal plants, constraints associated with medicinal plants; process technology [modern and traditional], value added products.	13
Unit IV	Trade in Medicinal plants: Medicinal Plants demand and supply, channels of supply, *major importing countries and regions**.	13
Unit V	Protection of plant varieties bill [PPV bill]; The provisions of PPV bill, suggestions for the proposed PPV bill, elements of PPV bill, community based enterprise in medicinal plants sector-*medicinal plant enterprise for the benefit of the stakeholders**.	13

*Self study topics

TEXT BOOKS

1. Joshi, S.G. 2000. Medicinal Plants. Oxford and IBH publishing company Pvt. Ltd., New Delhi.
2. Lindley, J. 1984. Medical and Economical Botany. Bishen Singh Mahendra Pal Singh publisher, 23-A New Connaught Place, India.
3. Pal, D.C. and Jain, S.K. 1998. Tribal Medicine, Naya Prokash, Calcutta.

4. Sharma, O.P. 1996. Hill's Economic Botany. Tata McGraw Hill Publishing Company Ltd., New Delhi.

REFERENCE BOOKS

1. Nayar, M.P., Ramamurthy, K. and Agarwal, V.S. 1989. (eds.). Economic Plants of India. Botanical Survey of India, Calcutta.
2. Rastogi, R.P. and Mehrotra, B. M. 1990 Compendium of Indian Medicinal Plants Vol. 1. Central Drug Research Institute, Lucknow, Publications and Information Directorate, New Delhi.
3. Singh, R. 1998. Vedic Medicine, Anmol Publications Pvt. Ltd, New Delhi.
4. Warrier, P.K., Nambiar, V.P.K. and Ramankutty, C. (eds.) 1996. Indian Medicinal Plants Vol. 1-5, Orient Longman Ltd, Hyderabad.
5. Pullaiah, T. 2005. Medicinal plants in India. Regency Publications, New Delhi.
6. Pullaiah, T. 2006. Encyclopedia of World Medicinal Plants. Regency Publications, New Delhi.

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Dr. E. Neelamathi	Dr. E. Neelamathi		

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY309 Title : PLANT SYSTEMATICS		Semester: 3
Hrs/Week :	5	Credits: 5
Objectives	• To learn nomenclature systems and to identify the plants • To introduce modern trends in taxonomy • To know the economic uses of plants	

Unit	Content	Hrs
Unit I	History of classification - Detailed study of Bentham & Hooker, Engler & Prantl and Hutchinson - Merits and demerits of the systems - ICBN - typification, principles of priority, effective and valid publication, citation, and retention - APG System of classification.	13
Unit II	Biosystematics - aim and scope - biosystematic categories - phenotypic plasticity - Herbarium technique, **major herbaria in India and World, floras*, * monograph and revision*.	13
Unit III	Vegetative, floral characters and economic importance of the following families: Polypetalae: Magnoliaceae, Portulacaceae, Caryophyllaceae, Zygophyllaceae, Oxalidaceae, Tiliaceae, Aizoaceae, Lythraceae, Rhamnaceae, Sapindaceae and Combretaceae.	13
Unit IV	Gamopetalae: Oleaceae, Verbenaceae, Gentianaceae, Boraginaceae, Pedaliaceae and Bignoniaceae. Monochlamydeae: Moraceae, Loranthaceae, Nyctaginaceae and Chenopodiaceae. Monocots: Commelinaceae, Liliaceae, Aroideae and Cyperaceae.	13
Unit V	Modern trends in taxonomy: Anatomical, embryological, cytological, chemical characters and their use in taxonomy. Molecular taxonomy and its applications - numerical taxonomy. Computer aided taxonomy - taxonomy softwares - DELTA, GRIN, IPNI. Biodiversity portal. GIS in taxonomy.	13

*Self study topics

TEXT BOOKS

1. A classification of flowering plants Vol. I & II Rendle A.R. Cambridge University press.
2. Taxonomy of vascular plants. Lawerance. H.M. Mac Millan & Co.
3. Principles of Numerical Taxonomy. Sokal, S.R and Sneath P.H, N.H Fremen & co.
4. Taxonomy of Angiosperms. Pandey, S. N. and S. P. Misra, 2009. Ane Books Pvt. Ltd, New Delhi.

REFERENCE BOOKS

1. New concepts in flowering plants taxonomy. Heslop. J. Herrison.
2. Plant Taxonomy - Hey wood, V.H. English hand book society
3. Principles and methods of Plant Biosystematics-solbrig. The Mac Millian Company.
4. An introduction to plant Nomenclature. S.S.R. Bennet international Book distribution India.
5. An aid to the International code of Botanical. Hentry A.N. Today & Tomorrow Pvt. Ltd.
6. Principles of angiosperm Taxonomy. Devis & Hey wood Krieger publication Co.
7. Introduction to Principles of Plant Taxonomy Sivarajan Oxford & IBH Pvt. Company.
8. A hand book of field and Herbarium methods Jain S.K. and Rao R.R. Today and Tomorrow Publications.
9. Plant Taxonomy and Biosystematics. Staceclive. A Edward Arnold.
10. An update of the Angiosperm Phylogeny Group Classification for the Orders and Families of Flowering Plants: APG III. Bot. J. Linn. Soc. 161: 105-121.

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Dr. P. Sathishkumar	Dr. E. Neelamathi		

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY310 Title : PLANT BIOCHEMISTRY AND BIOPHYSICS		Semester:3
Hrs/Week :	5	Credits: 4
Objectives	• To know the biochemical molecules of life • To understand the biophysical laws governing universe • To expose the students to the biophysical methods used to study the biomolecules.	

Unit	Content	Hrs
Unit I	**PHYTOCHEMISTRY:** pH and its significance - pH scale - Henderson-Hasselbalch equation - isoelectric point - buffers - definition, chemical composition, characteristics of buffer, buffer action, buffer capacity - **biological role of buffer system*.	13
Unit II	Plant secondary metabolites: Shikimate, acetate and mevolonate pathway of secondary metabolites - Structure, classification and biological significances of alkaloids, terpenoids and polyphenolic compounds - extraction, isolation and identification of alkaloids, phenols, flavonoids, polysaccharides and terpenoids.	13
Unit III	Enzymes: Nomenclature, classification and properties. Mechanism of enzyme action (Lock and key & induced fit model) and factors affecting enzyme activity (substrate, pH and temperature) - Michaelis - Menton kinetics - enzyme inhibition and its types - enzyme utilization in industry - enzymes and rDNA technology-* *enzymes applications in medicine*.	13
Unit IV	**BIOPHYSICS:** Chemical bonds - ionic bond - covalent bond, Vander Vaal's forces, hydrogen bonding and hydrophobic interactions - Energy flow - Laws of thermodynamics - concept of free energy - energy transfer and redox potential - Radio labeling techniques: properties of different types of radioisotopes normally used in biology, their detection and measurement- incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material safety guidelines	13
Unit V	Analysis of biomolecules using electrophoresis - AGE, NATIVE PAGE, SDS PAGE - UV visible spectrophotometer- principle and biological applications of chromatography: paper chromatography, column chromatography, TLC, HPLC, GCMS, LCMS - NMR and Ramachandran plot.	13

*Self study topics

TEXT BOOKS

1. Satyanarayana, U. 2005. Biochemistry. Books and Allied (P) Ltd. Calcutta.
2. Lehninger, A.I. 1987. Biochemistry, Kalyani Publishers, New Delhi
3. Veerakumari, I. 2004. Biochemistry, MJP Publishers, Chennai.

REFERENCE BOOKS

1. Campbell, M.K. 1999. Biochemistry, Saunders College Publishing, New York. Harborne, J.B. 1999.Plant Biochemistry. Chapman & Hall, New Delhi. Jain, J.L. 2005. Fundamentals of Biochemistry. S. Chand & Co. New Delhi.
2. Plummer, D.T. 1996. An introduction to practical biochemistry. McGraw Hill.
3. Conn E.E. and P.K. Stumpf. 1987. - Outlines of Biochemistry, Wiley Eastern Ltd, Chennai.
4. Lubert Stryer. 1986. Biochemistry, CBS Publishers, New Delhi.

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Dr. E. Neelamathi	Dr. E. Neelamathi		
Dr. R. Rakkimuthu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY311 Title : MOLECULAR BIOLOGY AND PLANT BIOTECHNOLOGY		Semester:3
Hrs/Week :	5	Credits: 4
Objectives	• To provide a platform for molecular understanding of the structure function relations in DNA/RNA/Proteins. • To acquire knowledge on plant tissue culture techniques • To cover information about the biotechnology to agriculture, in raising transgenic plants	

Unit	Content	Hrs
Unit I	**MOLECULAR BIOLOGY:** Plant Genome - Organization, important plant gene and gene families and stress related genes - isolation of genomic DNA from plant - protein targeting - heat shock proteins - principles of RNA interference and gene silencing - molecular markers in plants - **vectors involved in plant transformation and its components*	13
Unit II	Replication of Eukaryotic chromosome: Replication origin, replication fork, terminals, replication apparatus - replication of RNA genome (replicase and reverse transcriptase) - semi conservative mode of DNA replication - Transcription: RNA polymerase - signals - chemistry and process, translation - mechanism of initiation - elongation and termination of protein synthesis.	13
Unit III	**PLANT BIOTECHNOLOGY:** History, Laboratory organization, Sterilization methods - media preparation - micropropagation - meristem culture - callus culture - suspension culture- organogenesis - somatic embryogenesis - artificial seed preparation- cryopreservation. Haploid production - protoplast isolation and culture- somatic hybridization - cybrids - somoclonal variation.	13
Unit IV	Development of plant transformation cassettes - Structure and function of Ti plasmid of *Agrobacterium* - mechanism of T-DNA transfer to plants - Ti plasmid vectors for plant transformation - promoter and marker genes in plant transformation - **physical , chemical and biological method for plant gene transfer* - transgenic plants for viral resistance - herbicide tolerance - delay of fruit ripening - resistance to insects, pests and pathogens - ethics in plant biotechnology - IPR	13
Unit V	Types of nanomaterials: nano rods, nanowires, nanoparticles, nanocapsules, nano membranes, nano meshe, nano fibres, nano catalysts,	

	and carbon nano tubes - methods of preparation of nanomaterial: top down and bottom up approaches- emulsifiers, homogenizers, MOCVD etc. Environmental applications: Nano clays, nano adsorbents, zeolites, release of nutrients and pesticides, biosensors - green technologies - treatment of industrial waste waters using nano-particles.	**13**

*Self study topics

TEXT BOOKS

1. Slater A. Scott N. and Fowler M. 2008. Plant Biotechnology: The Genetic Manipulation of Plants. Oxford University Press Inc.
2. Satyanarayanan U. 2007.Biotechnology.Books and Allied (P) Ltd., Kolkata.

REFERENCE BOOKS

1. Lea, P.J, Leegood, R.C. 1993. Plant Biochemistry and Molecular Biology. eds. John Wiley and Sons, Chichester and New York.
2. Mahesh S. 2008 Plant Molecular Biotechnology. New Age International Publishers.
3. Ramavat K.G. 2006 Plant Biotechnology S. Chand and Co. Ltd., New Delhi
4. Trivedi P.C. 2000 Plant Biotechnology – Recent Advances. Panima Publication Corporation, New Delhi
5. Ignacimuthu S. 1998 Plant Biotechnology. Oxford and IBH
6. Reynolds P.H.S 1999. Inducible Gene Expression in Plants. CABI Publishing, U.K.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY3E3 Title : FOREST BOTANY		Semester: 3
Hrs/Week :	5	Credits: 5
Objectives	• To study the forest ecosystem and associated components • To study the parameters to measure the forest cover • To import knowledge on conservation measures for forest • To know the economic uses of plants	

Unit	Content	Hrs
Unit I	General introduction to forests - Natural and Manmade; Tropical, temperate, evergreen, semi evergreen, deciduous; Monoculture, multipurpose, social and industrial. Forest and gene conservation; **Forest types in South India with special emphasis to Tamil Nadu.*	13
Unit II	Silviculture - regeneration of forests. Clear felling, uniform shelter, wood selection, coppice and conservation systems. Silviculture of some of the economically important species *Azadirachta indica, Tectona grandis, Eucalyptus,* Mahogany (*Swietenia mahagoni*), *Dalbergia sissoo* and *Santalum album*, jack wood (*Cryptocarya glaucescens*), Rubber (*Hevea brasiliensis*), Sal (*Shorea robusta*), Paduok (*Pterocarpus*). Wood: Homogenous and heterogenous- spring and autumn wood- porous and non porous wood- heart and sap wood. Relevance of wood anatomical studies - Identification of wood - preparation of key and their uses.	13
Unit III	Social and agro forestry: Selection of species and role of multipurpose trees. Food, fodder and energy. Social forest- Avenue plantation. Sacred plants- definition, importance of sacred trees like *Ficus religiosa*, *Emblica officinalis*, *Aegle marmelos*. Seed orchards, seed dormancy - Types of dormancy, physical and chemical methods to overcome seed dormancy. Forest laws- necessity, General principles, Indian forest act 1927 and their amendment.	13
Unit IV	Forest resources and utilization: timber, pulp wood, secondary timbers, non timber forest products (NTFPs). Gums, resins, fibers, oil seeds, nuts, rubber, canes and bamboos, medicinal plants, charcoal, Lac. Forest conservation and management - strategies for conservation - *In situ* - *ex situ* - laws - the biological diversity act (2002 in force) - World Conservation Strategy (WCS) and National Biodiversity Strategy and Action Plan (NBSAP).	13

Unit V	Origin and History, Botanical description, Cultivation, Harvesting and uses of cereals and legumes - vegetables and fruits - spices and condiments - beverages - fibres and timber - fats and oils - medicinal plants. Ethnobotany - definition - sub divisions - methodology - major tribes in Southern India - regional studies - ethnobotany in human welfare - food-medicine. Role of tribes in medicinal plants conservation - *role of NMPB, FRLHT, AYUSH in medicinal plant conservation** - MPCA sites.	**13**

*Self study topics

TEXT BOOKS

1. Dhiman, A.K. 2003. Sacred plants and their medicinal uses. Daya publishing house, New Delhi.
2. Jain S.K. Mudgal V. 1999. A Handbook of Ethnobotany. BSMPS, Dehradun.
3. Avery, T.E. 1967. Forest Measurements. Mc Grand Hill Book Company, Newyork.
4. Ramprakash (1986). Forest management. IBD Publishers, Debra Dun.
5. Chundawat, B.S. and Gautham, S.K. 1996. Text book of Agroforestry. Oxford and IBH publisher, New Delhi
6. Rao, K.R. and Juneja, J.D. 1971. A handbook for field identification of fifty important timbers of India. The Manager of Publications, Govt. of India, New Delhi.
7. WWF. 2007. Timber identification manual. TRAFFIC, New Delhi.

REFERENCE BOOK

1. Jain S.K., Philipps R.D. 1991. Medicinal Plants of India. Ref. Publ. Algonac, U.S.A. Vol. 2 1-849.
2. Saklani A., Jain S.K.1994. Cross Cultural Ethnobotany of Northeast India. Deep Publ. Delhi 1-453
3. Sagreiya, K.P. Forests and Forestry, 1997. National Book Trust India.
4. Mehta, T. 1981. A handbook of forest utilization. Periodical Expert Book Agency, Delhi. 298 p.
5. Rao, K.R. and Juneja, K.B.S. 1992. Field identification of 50 important timbers of India. ICFRE Publi. Dehradun 123 p.
6. Gupta, T. and Guleria, A. 1982. Non-wood forest products in India: Economic potential. Oxford and IBH Publication, New Delhi. 147 p.
7. Sagreiya, K.P. 1994. Forests and Forestry (Revised by S.S. Negi). National Book Trust. New Delhi.

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY312 Title : CORE PRACTICAL - III		Semester:3
Hrs/Week :	5	Credits: 4
Objectives	• To know the vegetative and floral characters of angiosperms. • To understand the techniques of herbarium • To learn forest vegetational units	

Unit	Content	Hrs
Unit I	**PLANT SYSTEMATICS** 1. Terminologies related to taxonomy. 2. Identification and description of families belongs to Polypetalae (Magnoliaceae, Portulacaceae, Caryophyllaceae, Zygophyllaceae, Oxalidaceae, Tiliaceae, Aizoaceae, Lythraceae, Rhamnaceae, Sapindaceae and Combretaceae) 3. Identification and description of families belongs to Gamopetalae (Oleaceae, Verbenaceae, Gentianaceae, Boraginaceae, Pedaliaceae and Bignoniaceae).	13
Unit II	1. Identification and description of families belongs to Monochlamydeae (Moraceae, Loranthaceae, Nyctaginaceae and Chenopodiaceae) 2. Identification and description of families for Monocots (Commelinaceae, Liliaceae, Aroideae and Cyperaceae) 3. Preparation of artificial keys at generic level by locating key characters. 4. Preparation of artificial keys at species level by locating key characters.	13
Unit III	1. Herbarium techniques 2. Preparation of herbarium sheets - 50. 3. Botanical excursion to any vegetation rich places.	13
Unit IV	**FOREST BOTANY** 1. Charts on different forest types (Evergreen, deciduous, scrub and mangrove) 2. Study of vegetation by belt transect method 3. Study of vegetation by point centre quadrat method 4. Identification of spring and autumn wood, Porous and non porous wood, Heart and sap wood. 5. Identification of wood - preparation of key and their uses. 6. Estimation of tree age	13

Unit V	1. Silviculture techniques 2. Seed viability testing 3. Treatments to overcome seed dormancy (physical and chemical) 4. Ethnobotanical description of medicinal plants. 5. Forest products 6. Spotters on economic botany	**13**

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Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY313 Title : CORE PRACTICAL - IV		Semester: 3
Hrs/Week :	5	Credits: 4
Objectives	• To understand the techniques of biomolecular estimation • To tests qualitatively the bioactive compounds • To get a hands on experience on micropropagation techniques	

Unit	Content	Hrs
Unit I	**PLANT BIOCHEMISTRY:** 1. Estimation of Carbohydrates (Anthrone method) 2. Estimation of Proteins (Lowry & Bradford). 3. Quantification of total free amino acids. 4. Estimation of free fatty acids. 5. Separation of plant pigments by column chromatography.	13
Unit II	1. Plant extraction by soxhelt apparatus. 2. Phytochemical screening of plant extract 3. Qualitative estimation of phenols, flavonoids and alkaloids. 4. Determination of enzyme activities – catalase, ascorbic acid oxidase and polyphenoloxidase.	13
Unit III	**BIOPHYSICS** 1. Protein separation by SDS-PAGE 2. Agarose gel electrophoresis 3. Qualitative and quantitative analysis of plant genomic DNA using spectrophotometer	13
Unit IV	**MOLECULAR BIOLOGY AND PLANT BIOTECHNOLOGY** DNA Replication, protein targeting, structure of m - RNA charts 1. Isolation of plasmid DNA from bacteria 2. Isolation of genomic DNA from plants 4. Estimation of RNA by orcinol method 3. Amplification of a plant gene using PCR 4. Synthesis of silver nano particles from plant extracts	13
Unit V	5. Preparation of MS Medium 6. Meristem culture 7. Callus induction 8. Organogenesis 9. Somatic embryogenesis 10. Anther culture 11. Synthetic seeds 12. Hardening	13

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Dr. E. Neelamathi	Dr. E. Neelamathi		
Dr. R. Rakkimuthu			

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY414 Title : RESEARCH METHODOLOGY & BIOSTATISTICS		Semester:4
Hrs/Week :	5	Credits: 4
Objectives	• To equip students with the knowledge of scientific data analysis and presentation. • To teach the skills to write research documents • To provide the knowledge on handling softwares in research analysis	

Unit	Content	Hrs
Unit I	**RESEARCH METHODOLOGY:** Literature collection and citation: Bibliography - bibliometrics (scientometrics): definition-laws - citations and bibliography - **biblioscape* - *pliagrism* - Dissertation writing – objectives and planning of study, review of literature, presentation and interpretation of results; *paper presentation (oral/poster)* - **Types of research and report writing*.	13
Unit II	Basic principles and applications of pH meter, UV-visible spectrophotometer, Centrifuge, Lyophilizer, Chromatography - TLC, GLC and HPLC, Electrophoresis - Agarose gel electrophoresis and Polyacrylamide gel electrophoresis.	13
Unit III	**BIOSTATISTICS**: General description and theories of various biostatistical methods: Data collection & representation: graph and tabulation - measures of central tendency - mean (arithmetic) - median and mode - measures of dispersion: standard deviation - standard error - co-efficient of variation.	13
Unit IV	Tools and application of Excel: Measures of significance: Chi-Square test - F-test - t-test - correlation - scatter diagram - Spearman's rank correlation coefficient - regression coefficients - lines of regression & their properties - analysis of variance (ANOVA-single factor).	13
Unit V	Tools and applications of SPSS: measures of central tendency and dispersion - measures of significance - analysis of variance (ANOVA-single factor) - multivariate analysis - probability of distribution (binomial, poisson and normal) - Cluster analysis.	13

*Self study topics

TEXT BOOKS

1. Mount, D. W. 2004. *Bioinformatics*: sequence and genome analysis. *Cold Spring Harbour Laboratory Press.*
2. Kothari, C.R. Research Methodology: Methods and Techniques (2nd revised edition). 2008. *New Age International.*

REFERENCE BOOKS

1. M.H. Cordon and R. Macrae, 1987. Instrumental analysis in the Biological Science, Blackie and Son Limited, London.
2. Sadasivan and Manickam, Biochemical Methods.
3. Jayaraman, J. Laboratory Manual of Biochemistry.
4. Harborne, Phytochemical methods.
5. Prasad and Prasad, Micro technique.
6. Rajiv, K. Sinha and Shweta Sinha, 2005. Ethno biology, Surabi Publications, Jaipur.
7. Garry D Christian, James E O'reilvy (1986). Instrumentation analysis. Alien and Bacon, Inc.
8. Wilson, K. and Walker, J. 2006. Principles and techniques of Biochemistry and molecular Biology, Cambridge University Press, Cambridge, UK.
9. Sadasivam, S. and Manickam, A. 2008. Biochemical Methods. New Age International Publishers, New Delhi.
10. Khan, I.A. and Khannum, A. 1994. Fundamentals of Biostatistics. Vikas Publishing, Hyderabad.

Journals:

1. *Journal* of Mixed *Methods Research*.
2. *Journal of Research Methods* and Methodological Issues.

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Dr. R. Rakkimuthu	Dr. E. Neelamathi		

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY415 Title : CYBERSECURITY AND BIOINFORMATICS		Semester:4
Hrs/Week :	5	Credits: 5
Objectives	• To detail the various web based resources for biological information. • To provide a platform for molecular understanding of the structure-function relations in DNA/RNA/Proteins.	

Unit	Content	Hrs
Unit I	**CYBERSECURITY:** Overview of cyber security - confidentiality, integrity and availability - Threats - malicious software (viruses, Trojans, rootkits, worms, botnets) - memory exploits (buffer overflow, heap overflow. Integer overflow, format string) - cryptography - authentication - password system - windows security.	13
Unit II	Network security - network intrusion detection and prevention systems - firewalls - software security - vulnerability auditing, penetration testing, sandboxing, control flow integrity - web security - user authentication - legal and ethical issues - cyber crime, **intellectual property rights, copyright, patent, trade secret, hacking and intrusion, privacy, identity threat*.	13
Unit III	**BIOINFORMATICS:** Definition and Scope. Biological databases - Primary and secondary. Genomics: Definition - Gen Bank, DDBJ - Sequence and molecular file formats. Biological information portal: NCBI AND EMB net. BLAST- An overview of BLAST tools available with NCBI - conserved domains - CpG islands.	13
Unit IV	Gene prediction methods (Homology, *ab initio,* and comparative method). Pair wise and multiple sequence alignment, scoring matrices (PAM and BLOSUM). Molecular phylogeny (Cladistics and phenetic methods) CLUSTAL and PHYLIP.	13
Unit V	Proteomics: Definition, Levels of protein structure, Protein secondary structure prediction (SOPMA and JPRED). Molecular visualization tool - Rasmol and Swiss PDB Viewer. Protein modeling methods - Comparative and *De novo* methods. Model refinement and evaluation of model. Over view of SWISS PROT. Outline of computer aided drug designing. **Systems biology - concept and applications.*	13

*Self study topics (Study material for cyber security is available in college website in the form of e-book)

TEXT BOOKS

1. Arthur Conklin W.M., and Greg White, Principles of computer security. TMH.
2. Rastogi, S. C., N. Mendiratta, and P. Rastogi (2008), Bioinformatics - Methods and applications, Genomics, Proteomics and Drug discovery, PHI Learning pvt Ltd., New Delhi.
3. Baxevanis and Quellette (1998). Bioinformatics. A practical guide to analysis of genes and proteins.
4. Arthur M. Lesk (2002) Introduction to Bioinformatics.

REFERENCE BOOKS

1. Stuart M. Brown. 2000. Bioinformatics: A biologist's guide to biocomputing and the internet.
2. T. K. Attwood and Parry-Smith, 1999. Introduction to Bioinformatics.
3. S. Sundararajan and R. Balaji, 2002. Introduction to Bioinformatics.
4. David W. Mount, 2001. Bioinformatics: Sequence and genome analysis. SEM.IV
5. Chwan-Hwa (John) Wu, J. David Irwin, Computer networks and cyber security. 2016. CRC press.
6. Mike O'Leary, Cyber O. 2016. Apress publications.
7. Matt Bishop, Computer security art and science, second edn., Pearson/PHI.
8. Atul Kahate, Cryptography and Network security. Mc Graw Hill, 2nd edn.
9. Yang Xiao. Frank H Li, Hui Chen. Handbook of security networks, World scientific.

Compiled by Name with Signature	Verified by HOD Name with Signature	CDC	COE
Dr. E. Neelamathi	Dr. E. Neelamathi		

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY4E3 Title : HORTICULTURE		Semester: 4
Hrs/Week :	5	Credits: 4
Objectives	• Understanding the principles, theoretical aspects and developing skills in horticultural crops. • To develop understanding about the impact and management of climate in horticultural production. • To develop understanding of growth and development of horticultural crops. • To promote the importance of horticulture in food and ornamental plant production	

Unit	Content	Hrs
Unit I	Definition; Brief history; Scope and importance and divisions of Horticulture; Classification of horticultural plants; Plant growth Environment: Abiotic factors; Soil - Profile structure.	13
Unit II	Primary and Secondary nutrients and their functions; Organic matter; Fertilizers - organic, inorganic and potting media; Bioinoculants; methods of fertilizer application; Directing plant growth - Training - pruning and thinning.	13
Unit III	Plant propagation: Seeds - advantages, viability, mechanism of dormancy and dormancy breaking: Methods of direct and indirect seedling production in nurseries and transplantation.	13
Unit IV	Propagation through specialized underground structures - Corm, Tuber, Sucker, Bulb, Bulbil, Rhizome; Vegetative propagation - Cutting, Layering, Grafting and Budding. Soil-less production of Horticultural crops - Hydroponics, sand culture, gravel culture, terrace garden, rockery, vertical garden.	13
Unit V	Esthetics of Horticulture - Design; Elements and principles of design; Flower arrangement - cut flowers - Significance of cut flower industry in India; Terrarium culture; Bonsai; Growing plants indoors; Turf production; Landscaping- Principles, Types of parks; Xeriscaping. Post harvest handling of Horticultural products - Harvesting; **Storage; Processing; *Elements of Marketing.*	13

*Self study topics

Text books

1. Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth –Heinemam, Oxford University Press.
2. Bansil. P.C. 2008. Horticulture in India. CBS Publishers and Distributors, New Delhi.
3. Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.

Reference Books:

1. Bose T. K and Yadav L. P Commercial Flowers Naya Prokash
2. Bose, T.K., Maiti, R.G., Dhua, R.S. and Das, P. 1999. Floriculture and Landscaping. Naya Prokash, Calcutta.
3. Denisen, E.L. 1979. Principles of Horticulture. MacMillan Publishing co, Inc. New York.
4. Janik, J. 1972. Horticultural Science. W.H. Freeman & Company, San Francisco.
5. Kumar, N. 1994. Introduction to Horticulture, Rajalakshmi Publication, India.
6. Tolanus, S. 2006. Soil fertility, Fertilizer and Integrated Nutrient management. International Book Distributory Co.

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Dr. P. Sathishkumar	Dr. E. Neelamathi		

Department	Botany	
Course	M.Sc., Botany	Effective from the Year: 2017
Subject Code : 17PBY416 Title : CORE PRACTICAL-V		Semester:4
Hrs/Week :	5	Credits: 4
Objectives	• To understand the concepts of research • To solve biostatistical problems using tools • To acquire knowledge on bioinformatics tools • To understand the practical knowledge of horticultural techniques	

Unit	Content	Hrs
Unit I	**RESEARCH METHODOLOGY** 1. Citation styles (Modern language association, American psychological association, Chicago manual of style, Harvard styles, Vancover styles) 2. Instrumentation: pH meter, UV-visible spectrophotometer, centrifuge, lyophilizer, chromatography - TLC, GLC and HPLC, electrophoresis - AGE and PAGE.	13
Unit II	**BIOSTATISTICS** 1. Problems in measures of central tendency, measures of dispersion, tests for significance. 2. General Introduction for Excel 3. Calculating the measures of central tendency & dispersion, correlation and ANOVA in MS- Excel 4. General Introduction for SPSS 5. Calculating the measures of central tendency & dispersion, correlation, regression, paired sample 'T' test, One way & multi variate ANOVA in SPSS	13
Unit III	**CYBER SECURITY & BIOINFORMATICS** 1. Observation and analysis of biological databases 2. Data mining -sequence and structure retrieval 3. FASTA format 4. Pair wise alignment using BLAST 5. Multiple sequence alignment using CLUSTAL X 6. Construction of phylogenetic tree using CLUSTAL W and PHYLIP 7. Gene finding using Gen Mark Hmm.	13
Unit IV	1. Conserved domain search 2. Motifs search 3. CpG islands	

	4. Protein primary structure prediction using PROTPARAM 5. Protein secondary structure prediction using GOR 6. Protein translation using TRANSLATE 7. Protein structure visualization with Rasmol and Swiss PDB Viewer	**13**
Unit V	**HORTICULTURE** 1. Preparation of nursery beds and raising of nursery seedlings 2. Preparation of fertilizer mixtures and method of application 3. Study of different methods of cutting, grafting and layering 4. Identification and description of species/ varieties of any two fruit and vegetable plants with respect to propagation, cultural practices and irrigation 5. Techniques on hydroponics, sand culture, gravel culture, terrace garden, rockery and vertical garden 6. Bonsai techniques 7. Preparation of cut flowers and description of species/varieties, propagation, planting and pruning management 8. Visit to plant Horticulture Nursery/ Greenhouse/ Polyhouse/ Cut flowers/Floriculture industry	**13**

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Dr. E. Neelamathi	Dr. E. Neelamathi		
Dr. R. Rakkimuthu			
Dr. P. Sathishkumar			

Department	**Botany**	
Course	**M.Sc., Botany**	**Effective from the Year: 2017**
Subject Code : 17PBY4P1 **Title : PROJECT**		**Semester:4**
Hrs/Week :	**5**	**Credits: 4**
Objectives	• To get a hands on experience on biological applications • To understand the research process • To identify and create innovative modules in research • To develop the thesis writing skills	

Unit	Content	Hrs
Unit I	1. Selection of title 2. Literature collection	**13**
Unit II	Experimental techniques	**13**
Unit III	Observations and results	**13**
Unit IV	Summarizing and conclusion of project	**13**
Unit V	Preparation of thesis and presentation for project viva voce	**13**

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