

BHARATHIAR UNIVERSITY : COIMBATORE – 641 046**M.Sc BOTANY (School of Distance Education)**(for the students admitted during the academic year
2009-10 batch & onwards – Annual Pattern)**SCHEME OF EXAMINATION**

Year	Sub. Code	Subject Title	Duration of exam.	Max. Marks
1 st	10BOTCO1	Paper 1: Phycology, Mycology, Bacteriology and Virology	3	100
1 st	10BOTCO2	Paper 2: Bryophytes, Pteridophytes and Gymnosperms	3	100
1 st	10BOTCO3	Paper 3: Genetics, Plant Breeding and Biostatistics	3	100
1 st	10BOTCO4	Paper 4: Cell and Molecular Biology	3	100
1 st	10BOTCO5	Paper 5: Anatomy, Embryology and Tissue Culture	3	100
1 st	10BOTP1	PRACTICAL -1: Papers 1 and 2	4	100
1 st	10BOTP2	PRACTICAL -2: Papers 3, 4 and 5	4	100
2 nd	10BOTCO6	Paper 6: Environmental Botany and Conservation Biology	3	100
2 nd	10BOTCO7	Paper 7: Angiosperm Systematics	3	100
2 nd	10BOTCO8	Paper 8: Biotechnology and Genetic Engineering	3	100
2 nd	10BOTCO9	Paper 9: Plant Physiology and Biochemistry	3	100
2 nd	10BOT P3	PRACTICAL -3: Papers 6 and 7	4	100
2 nd	10BOT P4	PRACTICAL -4: Papers 8 and 9	4	100
		CHOOSE ANY ONE OF THE FOLLOWING SPECIAL PAPER (NO PRACTICALS)		
2 nd	10BOT SP1	Food Science and Nutrition	3	100
2 nd	10BOT SP2	Horticulture		
2 nd	10BOT SP3	Forest Botany		
2 nd	10BOT SP4	Ethanobotany		
			Total	1400

Code **10BOTCO1**

PHYCOLOGY, MYCOLOGY, BACTERIOLOGY AND VIROLOGY

UNIT-I:

Classification of Algae (Fritsch, 1945), Comparative studies of range of structure, distribution, reproduction, life cycles, phylogeny and inter relationships of Cyanophyta, Chlorophyta, Phaeophyta and Rhodophyta, Economic Importance of Algae.

UNIT-II:

Classification of Fungi (Alexopoulos and Mims, 1979), Range of structure, distribution, reproduction, Phylogeny and interrelationship of Myxomycetes, Oomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes. Host-Parasite interaction, Heterothallism and economic importance of Fungi.

UNIT-III:

Classification of Lichens (Hale, 1969). Occurrence and interrelationship of phycobionts and mycobionts, structure and reproduction in Ascolichens, Basidiolichens and Deuterolichens. Lichens as indicators of Pollution, Economic importance of Lichens.

UNIT-IV:

Classification of Bacteria (Bergey, 1923), Morphology and ultra structure. Bacterial culture and cultural characteristics. Isolation and maintenance of pure culture. Growth curve of Bacterial population, Industrial uses of Bacterial-Lactic acid, Vinegar and Insulin. Reasons for inclusion of Cyanophyta under Bacteria.

UNIT-V:

History of viruses, classification (Harrison et al., 1971), Structure of Virus, Double stranded DNA Viruses, Double stranded RNA Viruses, Cauliflower Mosaic virus, Wound tumor viruses, Bacteriophages-Morphology, structure and replication, Isolation and purification of Plant viruses. HIV/AIDS.

PRACTICALS:

1. Phycology: Gloeocapsa, Lyngbya, Pediastrum, Pithophora, Bulbochaete, Nitella, Padina, Turbenaria, Batrachospermum, Ceramium, Amphiroa and Gelidium.
2. Mycology: Albugo, Saprolegnia, Phyllochora, Alternaria and Puccinia. Slide culture technique, fungal spore count using Haemocytometer.
3. Microscopical analysis of a) Spoiled food stuffs b) Spoiled vegetables c) Spoiled fruits
4. Bacteriology, Virology and Lichenology: Bacteriophage-Books / Photographs TMV Viruses-Books/ Photographs. Antibiotic disc assay.
5. Isolation of soil microbes (Bacteria and Fungi) by dilution plating method using selective media and plate counting. Gram staining. Usnea.

REFERENCES:

1. Bold. H.C. and H.J. Wyne (1978) Introduction to the Algal structure and reproduction, Prentice Hall, Englewood Cliffs, New Jersey.
2. Chapman. V.J and P.J. Chapman (1973). The algae. The English language book society and Macmillan.

3. Fritsch, F.E. (1935-1945). Structure and reproduction of the Algae. Vol. II III & I.
4. Smith, G.M. (1971). Cryptogamic Botany Vol. Algae and Fungi.
5. Lee, R.E. (1987), Phycology, Cambridge University, London.
6. Round, F.E. (1973), The Biology of Algae.
7. Kumar, H.D. (1988), Introductory Phycology.
8. Alexopoulos, C.J. and C.W. Mims (1985). Introductory Mycology.
9. Anisworth, S.C., Sparrow, F.E. and A.D. Sussman. The fungi and advanced treatise. Vol. I, II, III, IV A & IV B.
10. Bessey, E.A. (1950), Morphology and Taxonomy of Fungi.
11. Webster, J. (1985), Introduction to Fungi.
12. Smith, K.M. (1974), Viruses, Cambridge University Press.
13. Power, C.B. and H.F. Dagainawala. (1982), General Microbiology.
14. Michael, J. Pelczar, Jr. E.C.S. chan and N.R. Krief. (1995). Microbiology. Tata McGraw-Hill (Ed), New Delhi.
15. Singh, R.S.-Introduction to the Principles of plant pathology.
16. Mehrotra, R.S. (1985). Plant Pathology.
17. Rangaswamy, G. and Mahadevan, A. (1999). Diseases of crop plant in India 4th Edition.
18. Das Gupta M.K. (1958). Principles of Plant Pathology.
19. Hale, M.E. (1961). A Hand Book of Lichens.
20. Hale, M.E. (1970). The Biology of Lichens.

CODE: 10BOTCO2

BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS

UNIT-I:

Classification of Bryophytes (Reimers-1954), Distribution, structure, reproduction and lifecycle of Marchantiales, Jungermanniales, Anthocerotales and Bryopsida. Fossil bryophytes, economic importance.

UNIT-II:

Classification of Pteridophytes (Reimers), Morphology, anatomy and reproduction of Psilophytopsida, Psilotopsida, Lycopsida, Sphenopsida and Pteropsida .

UNIT-III:

Phylogenetic trends-Evolution of stele, sorus evolution, heterospory and seed habit, Affinities of various classes of Pteridophytes.

UNIT-IV:

Classification of Gymnosperms (Pilger and Melchoir) General account of Pteridospermales, Cycadales, Coniferales, Bennettitales, Pentoxylales and Ginkgoales.

UNIT-V:

General account of Cordaitales, Taxales, Gnetales, Phylogenetic trends and affinities of various classes. Evolution of angiosperms.

PRACTICALS:

1. Bryophytes: *Lunularia*, *Reboulia*, *Targonia*, *Aneura*, *Sphagnum*, *Bryum*.
2. Pteridophytes: *Psilotum*, *Selaginella*, *Angiopteris*, *Osmunda*, *Dicranopteris*, *Lygodium*, *Trichomanes*, *Alsophila*, *Nephrolepis*, *Salvinia*, *Azolla*.
3. Gymnosperms: *Cupressus*, *Podocarpus*, *Araucaria*, *Pinus*, *Ephedra*.
4. Fossils: *Rhynia*, *Asteroxylon*, *Sphenophyllum*, *Ankyropteris*, *Botryopteris*, *Heterangium*, *Lagenostoma*, *Pentoxylon*, *Medulosa*, *Cycadeoidea*, *Cordaites*.

REFERENCES:

1. Arnold, C.D. 1947, An introduction to Palaeobotany.
2. Coulter, J.M. and C.J. Chamberlain 1917. Morphology of gymnosperms.
3. Foster, A.S. and E.R. Gifford 1959. Comparative morphology and vascular plants.
4. Parihar, N.S. 1967. An introduction to embryophytes Vol III.
5. Seward, A.C. Fossil plants.
6. Smith, G.M. Cryptogamic Botany II
7. Sporne, K.R. 1966. The morphology of Pteridophytes.
8. Sporne, K.R. 1967. The Morphology of Gymnosperms.
9. Vashishta, P.C. 1971, Botany for degree students.

CODE 10BOTCO3**GENETICS, PLANT BREEDING AND BIOSTATISTICS****UNIT-I:**

Mendel's Law of inheritance-interaction of genes, quantitative inheritance, sex determination in plants, theories of sex determination. Sex linked characters-primary, secondary and permanent, non-disjunction of sex chromosomes in *Drosophila*. Sexes influenced and sex limited characters. Chromosome theory of inheritance. Gene mutation-Detection of mutation CLB Method, Muller 5 method, Biochemical mutants in Bacteria and *Neurospora*. Detection of mutation in Bacteriophages and higher plants. Molecular basis of mutation, physical and chemical mutagens and their mode of action.

UNIT-II:

Multiple alleles and pseudoalleles. Modern concept of genes. Fine structure of the gene IS Element-transposons. Extrachromosomal inheritance, genome of mitochondria and plastids and their role in inheritance. Uniparental inheritance in *Chlamydomonas* and *Paramecium*-Male sterility, Population genetics-gene frequencies, mutation selection, migration, genetic drift, genetics disorder of chromosomal and genic origin. Regulation of gene expression in Eukaryotes and Prokaryotes.

UNIT-III:

Methods of plant breeding self-fertilized, cross fertilized and vegetatively propagated plants. Breeding plants for improving yield and quality and resistant to diseases and pests. Plant

breeding work in India with special reference to Rice, cotton and Sugar cane. Role of polyploidy and distant hybridization in plant improvement. Induced mutations in crop improvement.

UNIT-IV:

World diminishing plant resources threatened and endangered plants. Red Data Books. Plant germplasm resources-plantation, horticultural and field crops. Medicinal plants-germplasm collection and conservation. Germplasm maintenance of Rice and Sugarcane. The role of IBPGR (Rome, Italy) and NBPGR (New Delhi), in germplasm conservation, patent and intellectual properties-Rights of Plant breeders and Biotechnologists.

UNIT-V:

Principle and practice of statistical methods in Biological research. Population and sampling. Data collection & Representation-graph and tabulation. Measures of central tendency-mean (only arithmetic), median and mode. Measures of dispersion-mean, deviation, standard division and standard error. Probability of distribution (binomial, Poisson & normal). Tests of statistical significance-chi-Square test, theories of probabilities. Analysis of variance.

PRACTICALS:

Solving problems involving

1. Dihybrid cross
2. Interactions of factors
3. Incomplete dominance
4. Chromosome mapping from test cross data. Calculation of interference.
5. Multiple alleles and blood group inheritance
6. Sex linked inheritance
7. Quantitative inheritance
8. Population genetics
9. Calculation of gene frequencies
10. Allelomorphic pair, multiple alleles (classical blood Groups), sex linked alleles
11. Training in hybridization techniques.
12. Hi - square test.

REFERENCES:

1. Gardener, E.J. (1975). 5th Ed. Principles of Genetics, Johanwiley, New York.
2. Gilber, N.W. (1978). Organellar Heredity, Revan Press, New York.
3. Gupta, P.K. (1994). Genetics. Rastogi Publication, Meerut, India.
4. King, R.C. (1975). A Hand book of Genetics, Plenium Press, New York.
5. Strickboarger, M.V. (1977). Genetics, Mac Milian, New York.
6. Arnold, R.W. (1960). Principles of Plant Breeding. Jolin Wily & Sons, Inc, New York.
7. Sing, D.D. Plant Breeding: Principles and Methods. Kalyani Publishers, New Delhi.
8. Swaminathan, M.S. And Jana.S (1992). Biodiversity. Mac Millan, India Press, Madras.
9. Palanichami, S. and Manokaran, M. (1994), Statistical Methods for Biologists.
10. Khan, J.D and Khanum, A. (1994), Fundamentals of Biostatistics.
11. Zar, J.K. 1984, Biostatistical analysis, Prentice-Hall International, INC, Engleword chiffs, New Jersey.

CODE: 10BOTCO4

CELL AND MOLECULAR BIOLOGY

UNIT- I:

Cell ultra structure and detailed study of cytoplasmic organelles. Cytoplasm – structure, physiochemical properties and chemical composition. Mitochondria-origin, structure and functions. Golgi apparatus-origin, structure and function. Plastids-proplastids and development of plastids, classification, morphology, structure, chemistry and functions. Structure and functions of Ribosome, Dictyosome, Lysosome, Sphaerosome, Glyoxisome and peroxisome.

UNIT- II:

Plasma membrane- Molecular structure, chemical nature and functions. Cell wall-primary, secondary and tertiary at microscopic, submicroscopic and molecular levels. Chemistry of cell wall-different polysaccharides, lignin, chitin, suberin, cutin and wax. Structure and functions of nucleus, nuclear envelope and nucleolus.

UNIT- III:

Chromosomes-general account only. Cell divisions: Mitosis-mitotic apparatus and its physiochemical characteristics and biochemical composition. Meiosis- process of meiosis in detail, theories on crossing over and chiasma formation and significance. Chromosomal aberration-causes autonomous and induced deficiencies, duplications, inversions (paracentric and pericentric) and translocation.

UNIT-IV:

Macromolecules- Classification. Nucleic acid- physical and chemical structure of DNA, Types of DNA, Watson and crick model of DNA, viral DNA, bacterial DNA, Mitochondrial and chloroplast DNA. DNA as genetic material, DNA synthesis and replication, termination of replication, Enzymes of DNA replication, Methylation of DNA and mismatch repair.

UNIT-VI:

Synthesis of RNA, different types of RNA, DNA dependent RNA, and polymerize. Initiation of transcription, post transcriptional changes in RNA, Genetic code. Working principles of Electron, Scanning, Transmission and Fluorescence Microscopy.

PRACTICALS:

1. Study of mitosis and meiosis using squashes and smears.
2. Interpretation of micrographs from standard purchased materials or from transparencies.
3. Karyotyping and chromosome banding technique.

REFERENCES:

1. Freifelder, D. (1983). 2nd Ed. Marosa publishing house
2. C.P. Swanson, T.Merz, W.J. Young. (1988). Cytogenetics. 2nd Ed. Prentice hall India. Pvt. Ltd.,
3. J.D. Watson and W.A. Benjamine. 3rd Ed. Molecular Biology of the genes.
4. Archana Sharma. (1985). 2nd Ed. Chromosomes. Oxford and IBH Publishing Company.
5. Arthur korengel, W.H.DNA Synthesis. Freeman and Company.

CODE: 10BOTCO5

ANATOMY, EMBRYOLOGY AND TISSUE CULTURE.

UNIT – I:

Meristems (general account, vascular cambium – origin, types, structure and etiology. Cambium in wound healing, various types of Anomalous secondary thickening (different positions and activity of cambium). Leaf ontogeny of monocots and dicots.

UNIT-II:

Secondary xylem – Ontogeny, structure and function – Diffuse and porous wood growth layers, sap wood and heart wood. Arrangement of vessels in secondary xylem of Dicots. Structure of rays – types and evolution of rays. Dendrochronology – Compression wood and Tension wood. Phylogenetic trends and specialization of Primary xylem and Primary Phloem – nodals types and evolution.

UNIT-III:

Development of anther, physiology and etiology of anther tapetum, pollen wall morphogenesis. Pollen stigma compatibility, Megasporogenesis and female gametophyte, nutrition of the embryosac.

UNIT-IV:

Fertilization, control of fertilization, apomixes, parthenocarpy, etiology and physiology of endosperm Haustoria, Development of dicot and Monocot embryos and classification. Embryology in relation to taxonomy.

UNIT-V:

Choice of explant, inoculation, protoplast culture, somatic hybridization, meristem culture for virus free clones, cryopreservation – tissues culture in plant improvement, Role of growth promoting substances.

PRACTICALS:

- 1. Anatomy:** Study of suitable examples to illustrate features in Anatomy theory syllabus, with the help of section, peelings and mace rations. Submission of double stained 5 hand section slides. Micrometry.
- 2. Embryology:** stages in the development of microsporangium and male gametophyte. Configuration of ovules, 2,4 nucleate embryosac, mature embryosac. Types of endosperm. Stages in embryogeny globular proembryos. Mature embryos of monocot and dicot. Interpretation of embryological drawings. In vitro pollen germination.
- 3. Tissues culture:** Preparation of stock solution, sterilization, inoculation, nutrient media, organ culture, Morphogenesis, Induction of callus, embryoids.

REFERENCES:

1. Eames, A.J and M.C.Daniel 1976. An introduction to plant Anatomy.
2. Elizabeth, G.Cutter 1978. Plant anatomy part I & II ELBS AND Eclivand Arnald Ltd.
3. Esau, K. 1977. Anatomy of seed plants. Willy
4. Esau, k. 1965. Vascular differentiation in plants. Rirehant and Winston. Inc.
5. Fahn, A. 1967. Plant anatomy Channel and Company.

6. Shewin Carlquist 1962. Comparative plant anatomy. Haif, Rein hart and Wonsten. Pandey, B.P. 1978. Plant anatomy Channel and Company.
7. Bhojwani, S.S and Bhatnagar S.P. 1978. The embryology of angiosperms – Vikas – new Delhi.
8. Johansen, D.A. 1950. Plant embryology.
9. Maheswari, P. 1950. Introduction to embryology of angiosperms McGraw Hill.
10. Maheswari, P. 1963. Recent advances in the embryology of Angiosperms.
11. Reinert Bajaj, 1977. Plant cell, Tissue & Organ culture.
12. Krube Jr. P.J. and Jr. M.K. Petterson 1973. Tissue culture methods and application.
13. Thorpe T.A. 1981. Plant tissue culture methods and application in agriculture.
14. Raghavan. V. 1976. Experimental embryogenesis in vascular plants. Academic press London.
15. Pullaiah, T., Naidu, K.C., Lakshminarayana, K. and Hanumatha Rao, B. 2007. Plant Development. Regency Publications, New Delhi.
16. Pullaiah, T., Lakshminarayana, K. and Hanumatha Rao, B. 2000. Text Book of Embryology of Angiosperms. Regency Publications, New Delhi.

CODE: 10BOTP1

PRACTICAL 1:

Phycology, Mycology, Bacteriology, Virology; Bryophytes, Pteridophytes and Gymnosperms

CODE: 10BOTP2

PRACTICAL 2:

Genetics, Plant Breeding and Biostatistics; Cell and Molecular Biology; Anatomy, Embryology and Tissue Culture

CODE: 10BOTCO6

ENVIRONMENTAL BOTANY AND CONSERVATION BIOLOGY

UNIT-I:

History and scope of ecology, Concept of ecosystem. Synecology – Basic concept of population ecology. Modern concept of biotic community. Major and Minor communities. Methods of studying plant community.

UNIT-II:

Biogeochemical cycling. Reserve and cycling pattern in tropical and temperate regions. Ecological indicators.

UNIT-III:

Environmental pollution. Scope, sources of air, water, soil. Radiation and noise pollution-effects and control measures. Environmental management and legislation (Broad outline).

UNIT-IV:

Environmental education- Principles, Environmental education programmes. Environmental education in India. Environmental organization and agencies, MAB- national organization. Indian forests and wild life.

UNIT-V:

Conservation – Principles and applications, *ex situ* and *in situ* preservation of natural resources, strategy to demand agroforestry and social forestry, Forest conservation through laws, world conservation strategy (WCS) and national conservation strategy (NCS).

PRACTICALS:

1. Determination of linear changes in vegetation by using line and Belt transect methods.
2. Determination of frequency, density abundance, dominance, FICC, dominance index. Similarity index & diversity index by using quadrat frame.
3. Description of community structure by using the units, conservation and association.
4. Estimation of total biomass and herbage yield by harvest method.
5. Description of zonation in a pond and stratification in a forest
6. Soil and water
 - i. Garden soil experiment to make texture.
 - ii. Capillary water.
 - iii. Field capacity.
 - iv. Witing coefficient.
 - v. PH of the soil.
 - vi. Chemistry of the soil (NO_3 PO_4 & SO_3)
 - vii. Water analysis for dissolved oxygen and carbon-di-oxide.

REFERENCES:

1. Ambasht, R.S. (1988). A text books of plant ecology. Students, Friends & Co., Varanasi.
2. Edward J. Kormondy, (1996). Concept of Ecology, Prentice Hill of India Pvt, Ltd. New Delhi.

3. Emil T. Charlett. Environmental protection Tata Mc graw Hill New Delhi.
4. George L. Clarke (1954). Elements of Ecology. John Wiley & sons. Inc.,
5. New york.
6. Joseph M. Moran, Micheal D. Morgan and jances H. Wiersing. Introduction to environmental science W.H. Freemar & Sam Francisco. U.S.A.
7. Misra K.C. (1980). Manual of plant ecology (second edition) Oxford and IBH Publishing Co., New Delhi.
8. Odum E.P. (1971). Fundamentals of ecology, W.B. Saunders Co., Philadephia, London.
9. Perkins H.C. (1974). Air pollution, Mc Graw Hill Kongotusta Ltd, Tokyo.
10. Robert Smith, (1977). Elements of ecology and field biology, Harper and Raw Publishers, New York, London.
11. Sharma, P.D. (1991). Ecology and Environment, Rastogi Publishers, Meerut.
12. Micheal. P. (1984). Ecological methods for field and laboratory investigations, Tata Mc Graw Hill publishing company Ltd., New Delhi.
13. Misra, R. (1986). Ecology work book, Oxford and IBH publishing company, New Delhi.
14. Mc. Coull J. Crostant (1974). Water pollution. Hancount Pracojavanocichetne, New york, Atlanta.

CODE: 10BOTCO7

ANGIOSPERM SYSTEMATICS

UNIT-I:

A brief historical account of the classification of angiosperms up to the present day. Systems of classification: Detailed study of Bentham and Hooker, Engler and Prantl, Bessy, Hutchinson, Takhtajan, Cronquist – Merits and demerits. International code of Botanical Nomenclature, Typification, Principles of priority and their limitations, Effective and valid publication, citation, retention, choice and rejection of names.

UNIT-II:

Menispermaceae. Polygalaceae, Caryophyllaceae. Portulacaceae, Oxalidaceae, Tiliaceae. Combretaceae. Onagraceae, Lythraceae, Aizoaceae.

UNIT-III:

Oleaceae, Gentianaceae, Apocynaceae, Boraginaceae, Bignoniaceae, Pedaliaceae, Nyctaginaceae, Chenopodiaceae, Loranthaceae, Commelinaceae, Aroideae, Cyperaceae, Economic importance of families mentioned.

UNIT-IV:

Flora, Monograph, Keys, Botanical gardens. Source of taxonomic information, Anatomy, Embroyology, Palynology, Cytology and Ultra structure and phyto chemistry.

UNIT-V:

Biosystematic- its aim and scope. Biosystematic categories, Phenotypic plasticity. Turrreson's work. Population concept. Species and genus concepts, Genecology, ecological differentiation, Numerical taxonomy.

PRACTICALS:

Study of the characters of the above-mentioned families, Economic importance, Preparation of artificial key and submission of herbarium sheets – 50.

REFERENCES:

1. A classification of flowering plants Vol. I & II Rendle A.R. Cambridge University press.
2. Taxonomy of vascular plants. Lawrance.H.M. Mac Millan & Co.
3. Principles of Numerical Taxonomy. Sokal, S.R and Sneath P.H, N.H Fremen & co.
4. New concepts in flowering plants taxonomy. Heslop. J. Herrison.
5. Plant Taxonomy – Hey wood, V.H. English hand book society
6. Principles and methods of Plant Biosystematics-solbrig. The Mac Millian Company.
7. An introduction to plant Nomenclature. S.S.R. Bennet international Book distribution India.
8. An aid to the International code of Botanical. Hentry A.N. Today & Tomorrow Pvt. Ltd.
9. Principles of angiosperm Taxonomy. Devis & Hey wood Krieger publication Co.
10. Introduction to Principles of Plant Taxonomy Sivarajan Oxford & IBH Pvt. Company.
11. A hand book of field and Herbarium methods Jain S.K. and Rao R.R. Today and Tomorrow Publications.
12. Plant Taxonomy and Biosystematics. Stace clive. A Edward Arnold.

CODE: 10BOTCO8

BIOTECHNOLOGY AND GENETIC ENGINEERING

UNIT-I:

Scope and importance of Biotechnology. Tools of genetic engineering; Enzymes and cloning vectors, Recombinant DNA and gene cloning. Polymerase Chain Reaction (PCR) and Gene amplification. Isolation, sequencing and synthesis of genes.

UNIT-II:

Gene transfer methods in plants. Transgenic plants. Chloroplast and Mitochondrion engineering maps of plant genomes.

UNIT-III:

Transfer of nif genes to Eukaryotes, Genetics of Diazotrophs (Nod gene, nif gene cloning and Hup genes). Protein engineering- rationale, assumptions , steps involved, modeling and methods. Production of encapsulated seeds.

UNIT-IV:

Isolation and culturing of microorganisms for the production of organic acid (ethanol), enzyme (Alpha amylase) and antibiotics (penicillin) by microbial fermentation. Biotechnology in paper industry, biohydro- metallurgy and biomineralisation, biofertilizers, bioinsecticides and application of genetically engineered bacteria.

UNIT-V:

Current levels of biodiversity, alpha (α) and beta (β) biodiversity, extinction and endangered species, steps to preserve biodiversity, in situ and ex situ conservation- gene banks, species conservation. Intellectual Property Rights (IPR), Intellectual Property Protection (IPP) and patenting of biological material.

PRACTICALS:

1. Demonstration of techniques of in vitro culture of various explants.
2. Isolation in plant protoplasts (e.g. Tobacco, Petunia) using enzyme available commercially and estimation of their yield and viability.
3. Isolation of plant genomic DNA and checking its purity (Onion).
4. Isolation of chloroplast by using column chromatography.
5. Isolation of plasmid from microbes.
6. Production of ethanol using microbes.
7. Biodegradation of paper and pulp industry effluent.
8. Absorption of metals by using microbes.
9. Culture and isolation of chemical fertilizers and pesticides removal using microbes.

REFERENCES:

1. Callow, J.A., Ford Lloyd, B.V. and Newbury, H.J. (1997). Biotechnology and Plant Genetic Resources; Conservation and Use. CAB International, Oxon, UK.
2. Dubey, R.C. (1999). A Text Book of Biotechnology. S. Chand & Company.
3. Glazer, A.N. and Nikaido, H. (1995). Microbial Biotechnology. W.H. Freeman & Company, New York, USA.
4. Gupta, P.K. (1998). Elements of Biotechnology. Rastogi Publication.
5. Ignachimuthu, S.(1995). Basic biotechnology. TaTa Mc Graw-Hill Publishing Company Ltd., Madras.
6. Kartha, K.K. (1985). Cryopreservation of Plant cells and organs. CRC Press, Boca Ration, Florida, USA.
7. Santharam, S. and Montgomery, J.F. (1999). Biotechnology, Biosafety and Biodiversity. Oxford and IBH Publishing Co., New Delhi.

CODE: 10BOTCO9

PLANT PHYSIOLOGY AND BIOCHEMISTRY

UNIT-I:

Water, its biological significance, water relationship of the plants, osmosis, permeability, diffusion, chemical potential, water potential, metric potential, pressure potential. A general account of absorption and translocation of water, solutes and assimilates. Transpiration and stomatal mechanism.

UNIT-II:

Photosynthesis, organization of thylakoids. Photosynthetic pigments and functions. An outline of chlorophyll biosynthesis. Mechanism of photosynthesis-light reaction, the two transport chains. Emerson's effect, photophosphorylation, carbon fixation and glycolate metabolism and its significance.

UNIT-III:

Respiration-glycolysis, energy conversion stages of glycolysis, metabolism of fats and storage proteins to carbohydrates, regulation of glycolysis, and outline of pentose phosphate pathway. Pyruvate metabolism, TCA cycle, electron transport system coupled with oxidative phosphorylation, inhibitors of electron transport system.

UNIT-IV:

Thermodynamics – Laws, enzyme as catalysts – enzyme kinetics, classification, nomenclature, properties and mechanisms of enzyme action. Biomolecules : A concise account of biomolecules-carbohydrates-classification, structure and properties of functional groups. Isomerism (only outline.)

UNIT-V:

Amino acid-structure, classification, properties, isoelectric points and zwitter ions-isomerism. The concept of heterocarbon (only outline) Proteins-classification, properties primary and secondary, tertiary and quaternary, structures (only outline) Lipids-Classification, properties, saturated and unsaturated fatty acids, plant waxes and steroids (only outline).

PRACTICALS:

1. Determination of osmotic pressure (OP) of cell sap of given specimen (Rheo leaf)
2. Determination of diffusion pressure deficit (DPD) with potato tubers.
3. Effect of light intensity on transpiration.
4. Measurement of respiratory rate in germinating seeds and flower buds using simple respirometer.
5. Rate of photosynthesis under varying CO₂ conc. in a water plant.
6. Effect of intensity of light O₂ evolution during photosynthesis using Willmot's bubble counter.
7. Determination of water absorption/transpiration ratio.
8. Measurement of respiration by a simple respirometer or winklers method.
9. Determination of transpiration rate using simple photometer.
10. Calculation of stomatal index of upper and lower epidermal peelings of Moringa.

11. Effect of pH and temperature on the enzyme activity of the following
a) Peroxydase, b) Amylase, c) Catalase.

Demonstration experiments:

a) Physiology

1. Nitrification in soil.
2. Effect of GA and amylase activity in cereals
3. Effect of IAA and IBA on excised shoot/hypocotyls cuttings of legumes.
4. Hydrolysis of starch by amylase.
5. Demonstration of Hill reaction by isolated chloroplast.
6. Sand/water culture experiments to determine essentiality of minerals
7. Manometric determination of R.Q
8. Effect of ABA on stomatal opening and closing mechanism

b) Bio-Chemistry - Practicals

1. pH: operation of pH meter to measure the pH of expressed cell sap and soil solutions.
2. Buffers: preparation of phosphate buffer and citrate buffer
3. Chromatography:
 - I. Paper chromatographic technique to separate sugars, aminoacids, chloroplast pigments
 - II. Thin layer chromatographic technique to separate chloroplast sugars and lipids
4. Determination of absorption spectra of chlorophyll a and b with spectrophotometer.

Demonstrations

1. Calorimetric/spectrophotometric estimation of the following biomolecules:
 - ii) total free aminoacids (ninhydrin reagent method)
 - iii) proteins (Biuret and Lowry et al 1951v method)
 - iv) Total soluble carbohydrates (Anthrone reagent method)
 - v) Starch (Clegg's 1956, method)
3. Demonstration of electrophoresis.

REFERENCES:

1. Frank. B. Salisbury and Leon Wross.. Plant Physiology CBS publishers and distributors, New delhi.
2. Malcolm S. Wilkins. Advanced Plant Physiology.
3. Pushit., S.S., Hormonal regulation of plant growth and development.
4. Sltiar, R.G Plant water relationships.
5. Roy, G.Nogge and George J. Fritlz., Introductory Plant physiology.
6. Mayer and Anderson. Plant physiology.
7. Robert M. Devlin and Francis V. Witham Plant physiology.
8. Devlin, R.M. plant Physiology.

CODE: 10BOT P3

PRACTICAL – 3

Environmental Botany and Conservation Biology; Angiosperm Systematics

CODE: 10BOT P4

PRACTICAL – 4

Biotechnology and Genetic Engineering; Plant Physiology and Biochemistry

CODE: 10BOT SP1

FOOD SCIENCE AND NUTRITION

UNIT I:

Different food groups and planning diets to meet the requirements at different socio economic levels. Recommended allowances for Indians – basis for requirement, computation of the allowances, comparison of Indian recommended allowances with that of FAD/WHO standards.

UNIT II:

Pulses, grams, dhal and nuts, processing, composition, methods of cooking. Effect of processing such as soaking, roasting, germination and fermentation.

UNIT III:

Nutritional importance of carbohydrates, proteins, lipids, minerals and vitamins. Role of dietary fiber – digestion and utilization, protein, energy malnutrition, iron malnutrition. Strategies for combating malnutrition (role of novel protein and vegetable protein mixtures).

UNIT IV:

Proteins and lipids, amino acid requirements, and amino acid pattern, essential amino acids and fatty acids. Indices of protein quality evaluation, role of essential fatty acids in the body effects of deficiency and excess of fat, role of fats in the etiology of atherosclerosis.

UNIT V:

Naturally occurring food toxicants, protease inhibitors, haemoagglutinins, cyanogens, saponins, lathyragens, allergens and toxic amino acids and naturally occurring carcinogen – their physiological role and prevention of toxicity.

PRACTICALS:

1. Extraction and estimation of starch from starchy food grains;
2. Extraction and estimation of soluble proteins from pulses;
3. Extraction and estimation of crude lipids from oil-rich food grains;
4. Extraction and estimation of crude fiber;
5. Extraction and estimation of niacin;
6. Extraction and estimation of ascorbic acid.

REFERENCE:

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2. Jalliffe D.B. 1966 Assessment of the nutritional status of the community, WHO, Geneva.
3. MO. Laren, 1979. Nutrition in the community.
4. Dietrich Knorr, 1987. Food biotechnology. Marcel Dekker Inc. New York.
5. Jose M.Conon, 1988. Food toxicology- part A. Principles and concepts. Marcel Dekker Inc, New York.
6. Biochemical toxicology of Environment agents. A De Brain 1976. Elsevier, North Holland, Biomedical press, pp 1-302.

7. Potter N.M.1979. Food Science. The AVI Pub., Co., Inc., West post, Connecticut, U.S.A.
8. Fox B.A. and Camerson S.G.1978. Food science – A chemical approach Second edition. University of London press Ltd.
9. Davidson, S., Pass mere, P., Brock, J.F. & Truwell 1975. human nutrition and dietetics. The English language Book society and Churchill, Livingston.
10. Swaminathan M.S 1974. Essential of Food and Nutrition Vol.I & II. Ganesh & Co. Madras.
11. Howa P. S. 1971. Basic nutrition in health and disease. W.B. Sandres Company, Philodolphia, London. Toronoto.
12. Williams S.R. 1973. Nutrition and diet theory. The C.V. Mosby Co., Saint Louis U.S.A
13. Antia F.P. 1973. Clinical dietetics and nutrition, Oxford University Press, New Delhi.
14. Gopalan, C. Balasubramanian S. C. Harnsasastri B.V. and Viswaswars Rao, 1971. Diet atlas of India ICMR. New Delhi.
15. Grey and Hills S. 1972. the complete Hand book of nutrition. Report speller and sons pub., New York.
16. Browin H. 1974. Protein nutrition. Charls V. Thomas Publishers, Spring field Illinois U.S.A.
17. Lawrie R. A. 1970. Protein and human food AVI technical books Inc., West fort. Connecticut, USA.
18. Chemistry and biochemistry of food legumes 1982. Arora S.K: eds. Oxford and IBH Pub. House, New Delhi.
19. Plant protein. Norton G.Ed. 1978. Butterworths, London.
20. Leung H.K. and Saulinkhe D.K. 1985. Advances in food sciences. Academic press, New York.
21. Liener I.F. 1980. Toxic constitute in plant food stuffs Academic press, New York.
22. Toxicants occurring naturally in food. National academy of sciences, Washington, Cyberleas D.M. eds. 1973.
23. Jeans A. and Hodge J. 1975. Physiological effects of food carbohydrates, American Chemical Society, Washington D.C., USA.

CODE: 10BOT SP2

HORTICULTURE

UNIT I:

History and importance of horticulture. Soil types and preparation and treatment. Chemical fertilizers – Nitrogen, phosphorous, potassium, mixed fertilizers, organic fertilizers and bio fertilizers. Methods of plant propagation – layering, cutting, grafting, budding and their advantages.

UNIT II:

Lawn making, gardening, bonsai. Out door garden types and arrangements – annuals, biennials. Perennials with common examples and culture: influence of environment, training, pruning and transplanting.

UNIT III:

Outdoor floriculture, cut flower, flower arrangement, Pomology – cultivation fruit crops – Mango, Grapes, spacing, irrigation, field disease control. Olericulture – cultivation of vegetables – Tomato, Ginger, Potato planting; Erosion control.

UNIT IV:

Pest and weed management – historical, theoretical, philosophical and biological insect pest suppression. Weed problem and ecological perspective, biological control of weeds in Indian region.

UNIT V:

A preliminary knowledge about glass houses – growth regulators in horticulture, growth retarders, sex modification, flower induction, parthenocarpy, harvesting seed storage, preservation of fruits and vegetables.

PRACTICALS:

1. Fertilizers – biological and industrial.
2. Establishment of nursery, different containers, soil transplantation techniques.
3. Methods of raising a lawn.
4. Plant propagation – layering, cutting, grafting.
5. Visit to nursery and knowledge about the instruments used in horticulture.
6. Layout of garden, plan of a rock garden, glass house, kitchen garden, artificial pond.

REFERNECES:

1. Al David – A complete guide to gardens.
2. Manibushan Rao – Horticulture.
3. Nanda and Kochar – Vegetative propagation of plants.
4. Randhava G. S. – Floriculture in India.
5. Subba Rao – Bio fertilizers in India.
6. Vishnu Swarup – Garden flowers
7. Readers digest – Complete library of gardens (3 volumes) Kissan world.
8. Borthkur S. and Ghen – Studies on weeds and their control.
9. Reinert and Bajaj 1977 – Plant cell, tissue and organ culture, Narosa publication. New Delhi.

CODE: 10BOT SP3

FOREST BOTANY

UNIT I:

Scope; merits of combining traditional botany and forestry practices. General introduction to – forest, natural and man made; different examples: tropical, temperate, evergreen, semi evergreen, deciduous, monoculture, multipurpose, social, industrial. Forest and climate; forest and biodiversity, forest and gene conservation, forest and ecosystem, forest and civilization. Geographical history of the forest vegetation: natural Vs artificial. Characteristics of each. And categories under each. Special emphasizes on social forestry. Industrial forestry. Multipurpose forestry. And preservation of natural forestry, pollution control.

UNIT II:

Forest genetics, Forest physiology, forest ecology – strong interrelationships. Macro dynamic ecosystem reserves, hydrological cycles, balance. Identification of timber plants based on vegetative features. Seedlings, leaves, bark branching pattern architectural models of trees. Major and minor forest products, use and misuse of forests by man, direct and indirect forest wealth, forest policies, forest protection through peoples committee.

UNIT III:

Silviculture: concept and scope of study, forest in general form, composition, classification of world forests and Indian forests. Classification based on sites quality density, tolerance, crown; water cycles of forest. Photosynthetic processes in forest: nitrogen and mineral nutrition in forests.

UNIT IV:

Seed dynamics in forest: seed production, dissemination, germination, establishment and mortality, growth of trees in general terms – height, diameter, volume, growth of stands – gross increment, net increment, stand reaction to various types of cuttings. Menturation: definition, direct measurements, direct and indirect estimate, and prediction. Measurement of diameter – rules and methods, measurement of height – different rules, methods, instruments, total height and merchantable length.

UNIT V:

Measurement of volume – common units, different methods and procedures of volume measurements. Measurement of age: direct estimate, averages, standard error, and sampling, General concept of indirect estimate based on one or more independent variables. Forestry for social and national development. Progress to be achieved in social forestry, industrial forestry and multiple forestry.

PRACTICALS:

1. Ecological studies on forest soil analysis, soil mycorrhiza, succession and natural balance in selected areas.
2. Biomass studies – based on number, energy, fresh and dry weight.
3. Selected forest ecosystem analysis through project work.

4. Defoliation studies related to climate.
5. Physiological studies on photosynthetic rates of different strata of vegetation.
6. Germination studies – percentage, competition.
7. Water demand, collection and evaporation in selected forest areas.
8. Physical features of wood – height, diameter, density, moisture, specific gravity, tension, strength, modulus of rupture.
9. Anatomical features of wood – porous, non-porous, ring-porous, diffused-porous, different kinds of wood parenchyma rays.
10. Menturation – measurement of tree height, diameter, volume, estimation, prediction, standard error, growth pattern and factors affecting growth.

REFERENCES:

1. Principles of silviculture, Frederick S. Backer, Mc Graw Hill Book Co. NY, 1950.
2. Forest menturation, Donald Bruce and Grancis X. Schumacher, Mc Graw Hill Book Co. NY, 1950.
3. Multipurpose tree germplasm, Ed. Burley S. and Von Carlowitz P. international council for research in agroforestry, Nairobi, 1984.
4. Tropical forests, Ed. Holm – Neilsen L.B. Nielsen. DC and balslev II Academic press, London, 1989.
5. Plant anatomy – A Fahn.
6. Plant anatomy – K. Esau.
7. Indian woods – six volumes Ed. Chowdhuri, Pub. Forest research institute, Dehra Dun.

CODE: 10BOT SP4

ETHNOBOTANY

UNIT I:

Ethnobotany – definition, its significance within the limits of the state, the nation and the conservation of rare heritage from global point of view. The loss to mankind, if the heritage is not preserved and researched by present generation. Landmarks in history of ethnobiology – relation between geology, phyto geography and ethnobotany.

UNIT II:

indigenous societies and interaction with plants - a global view. Relationship between man and plants – for benefit of both and developmental strategies of both. Relationship between man and plants – mutually destructive approaches.

UNIT III:

Linkage of Ethnobotany with other sciences and disciplines in biology – food and nutrition, medicine, sociological and cultural practices, religions and social costumes and economic relations, archaeology, history and politics.

UNIT IV:

Major tribes of South India and their ethnobotanical and ethno-biological heritage – Parayar, Kurichiar, Paniyar, Mulla, Karuman, Kanikkars, Naikas, Shola Naikas, Thodas, Kothas, Kurumbas, Irullas, Kattu Naikas.

UNIT V:

Ethnobotany and conservation of plants with special reference to India – mythology and conservation of ecosystems, conservation of selected plant species: sacred groves, forestry and unique ecosystems and their ethnobiological values, plants and animals in art, tradition and ethnography: methodologies in ethno-botanical research.

PRACTICALS:

1. Collection and identification of 100 plant specimens of ethno-botanical importance in South India.
2. Knowledge of making use of 20 plants – parts of the above 100 for various medicinal purposes. The mode of application, the efficiency and superstitions, if any, associated with them. The student may prepare a case study report, preferably, by direct contact with the Tribe or the community concerned who are known to possess with the knowledge of the same.
3. Visit to sacred grove or sacred forest or a particular ecosystem to prepare a field report on the ecosystem.
4. Collection and identification of ethnobotanical specimen – preparations of the following categories (4 each) – oils, medicines for asthma, skin diseases, diarrhea, family planning, and snake bite.

REFERENCES:

1. "Ethnobiology in human welfare: - abstracts published symposium volume under print – IV international Congress of Ethnobiology – 1994. organized by society of Ethnobotanists, national botanical research institute, Lucknow – 226001.
2. Ariyar, Yegna Narayana A.K. 1980. "Field crops of India", Bangalore – Printing and Publishing company – Bangalore.
3. CSIR 1948 – 76. The wealth of India. XI volumes.
4. Murthy A.V.S & N.S. Subramanian, 1989. "The Book of economic botany" Wiley Easterns, New Delhi.
5. Krishna Iyer L.A. 1987. "The travancore Tribes and Casts, Government Press, Travancore.
6. Manilal K.S. 1990. "Linkages of ethnobotany with other sciences and disciplines", ethnobotany 1(1):14-23.
7. Sivarajan V.V. and Indira Balachandran. 1994. "Ayurvedic drugs and their plant sources", Oxford – IBH, Bangalore.
8. Manilal K.S. 1981. "Hortus malabaricum, Indian ethnobotany and Carmelite Missionaries", in The Christian heritage of Kerala, Ed. K.John, Fr.G.
9. Burkill I.H. 1965. "Chapters on the history and botany in India". Botanical Survey of India, Calcutta.
10. Jain. S.K. (Ed).....Glimces of Ethnobotany.