

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – I SUBJECT - BIOLOGY & DIVERSITY OF VIRUS, BACTERIA & FUNGI

SUBJECT CODE – MSB 101

UNIT-I Viruses: Characteristics Classification and Ultra structure of virions, Isolation and Purification of viruses, Chemical nature, replication, transmission of viruses Economic importance of viruses.

UNIT–II General characteristics classification, Ultra structure, Nutrition, and Reproduction Biology and economic importance of Archaeobacteria, Eubacteria, Cynobacteria, Actinomycetes, Mycoplasma, Rickettsiae, Chlamydiae.

UNIT-III General characteristics, Classification of fungi, Substrate relationship in fungi, Ultra structure, unicellular and multicellular organization, cell wall, composition, Nutrition, (Saprobic,biotrophic, Symbiotic),Reproduction (Vegetative, Asexual, Sexual).Heterothallic, Para sexuality, Heterokaryosis, Economic Importance of fungi,(Fungi in industries, medicine, as food, fungal diseases in plants and Humans, Fungus as biocontrol agent) Mycorrhiza.

UNIT–IV General Characteristics of mastigomycotina- Synchronium,Saprolegnia, Pythium, Phytophthora, Peronospora, Sclerospora..General characteristics of Zygomycotina-Rhizopus, Pilobolus.General characteristic of Ascomycotina-Yeast, Taphrina,Aspergillus, Penicillium, Erysiphae, Phyllactinia, Uncinulla,Chaetomium, Peziza & Morchella.

UNIT–V General Characteristics of Basidiomycotina-Puccinia, Melampsora, Ustilago, Agaricus, Geastrum. General characteristic of Deuteromycotina—Alternaria, Curvularia, Cercospora,Colletotrichum

Suggested Readings :-

Alexopoulos, C.J. Mims, C.W. and Blackwell, M. 1996 Introductory Mycology. John Wiley and sons. inc

Mehrotra, R.S. and Aneja, R.S. 1998; An Introduction to Mycology. New Age Intermediate Press.

Rangaswamy, G. and Mahadevan, A, 1999 Diseases of crop plants in India Prentice Hall of India Ltd New Delhi.

Maheshwari, D.K. ;2005 A text book of microbiology, S. Chand publisher, New Delhi.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – I SUBJECT - BIOLOGY & DIVERSITY OF ALGAE

SUBJECT CODE – MSB 102

UNIT-I General characteristics of Algae: Diversified Habitats, Thallus organization, Cell Ultra structure, reproduction, Criteria for Classification of Algae, Pigmentation reserve food, Flagella Classification, Economic importance of Algae.

UNIT–II General characteristics of Chlorophyta and Charophyta-Chlamydomonas, Sphaerella, Pandorina, Eudorina, Chlorella, Hydrodictyon, Pediasrtrum, Ulothrix, Iadophora, Draparnadiopsis, Spirogyra, Zygnema, Bryopsis and Nitella.

UNIT-III General characteristics of Xanthophyta: Botrydium, Vaucheria, General characteristics of Bacillariophyta: Diatoms (Pinnularia,) General Characteristics of Euglenophyta :Euglena.

UNIT–IV General Characteristic of Phaeophyta: Ectocarpus, Dictyota,Laminaria, Fucus, Sargassum.

UNIT-V General Characteristic of Rhodophyta: Porphyra, Batrachospermum,Gelidium, Cryptonemia, Gigartina,, Rhodymenia, Polysiphonia.

Suggested Readings

Kumar .H.D. 1988 Introduction to Phycology, Affiliated East- West Press ltd , New Delhi

Smith g,M Cryptogamic Botany Vol -I Tata Mc Graw Hill Publishing co. Ltd Bombay , New Delhi

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

**SEMESTER – I SUBJECT - BIOLOGY & DIVERSITY OF BRYOPHYTA &
PTERRIDOPHYTA**

SUBJECT CODE – MSB 103

UNIT-I General Characteristics, Classification, Morphology, Reproduction, Life history, Distribution, Origin, Evolution & Affinities, Ecology and Economic Importance of Bryophytes. Contribution to Bryophytes in India.

UNIT-II General Characteristics of Hepaticopsida- Riccia, Marchantia, Targionia, Dumortiera, Cyathodium, Plagiochasma, Sphaerocarpus, Pellia, Porella. General Characteristics of Anthocerotopsida: Anthoceros, Notothylas. General Characteristics of Bryopsida : Sphagnum, Polytrichum.

UNIT-III General Characteristics, Classification, Origin, Telome Theory, Stellar Organization, Homospory, Heterospory and Seed Habit, Reproduction, Indian Contribution to Pteridophyta, Palaeobotany & Geological Time- Scale. Fossilization Types of Fossils.

UNIT-IV General Characteristics of Psilophyta : Rhynia, Horniophyton, Zosterophyllum, Psilophyton, Asteroxylon, Psilotum, Tmesipteris. General Characteristics of Lycopsidea: Lycopodium, Protolopodendron, Lepidodendron, Isoetes, Selaginella,

UNIT-V General Characteristics of Sphenophyta : Hyenia, Sphenophyllum, Calamites, Equisetum, General Characteristics of Filicophyta: Ophioglossum, Osmunda, Gleichenia, Filicophyta Dryopteris, Lygodium, Marsilia, Salvinia, Azolla,

Suggested Reading

Chopra & Kumar 1988 Biology of Bryophyta Wiley Eastern Ltd.

Kashyap-1972 Liver Works of western Himalayas and Panjab. Research co. Publication.

Parihar-N.S. 1991 Bryophyta, Central Book Depot. Allahabad.

Puri .P. 1980 Bryophyta Morphology, Growth and Differentiation , Atama Ram and sons, Delhi.

Ram Udair 1970 An introduction to Bryophyta , Sghashidhar Malviya Prakashan.

Smith, G. M. Cryptogamic Botany. Vol II Tata Mc Grew- Hill Publishing Company Bombay, New Delhi.

Watson 1968 Structure and life of Bryophyta. Hutchinson & company Ltd.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – I SUBJECT - BIOLOGY & DIVERSITY OF GYMNOSPERMS

SUBJECT CODE – MSB 104

UNIT-I General Characteristics, Classification, Distribution of Gymnosperms in India,, Economic Importance, Evolutionary Tendencies in Gymnosperms Indian Contribution to Gymnosperms.

UNIT-II General Characteristics of fossil Gymnosperms, (Pteridospermales): Lygenopteris, Medullosa, Glossopteris, Caytonia, Pentoxylon,

UNIT-III General characteristics of (Cycadeoidales & Cycadales) Bennettitales, Williamsonia, Cycadeoidea, Cycas, Zamia Nillsonia.

UNIT-IV General Characteristics of Ginkgoales, Corditales and Coniferales:Ginkgo, Cordites, Cedrus, Pinus, Araucaria, Cryptomeria, Thuza,Cupressus, Podocarpus, Taxux.

UNIT-V General Characteristics of Ephedrales, Welwitschiales And Gnetales : Ephedra, Welwitschia, Gnetum.

Suggested Reading :-

Bhatnager, S.P. and Moitra, A. 1996; Gymnosperm. New Age International, Pvt. Ltd New Delhi.

Chamberlin, Gymnosperms- Structure & Evolution ; CBS Publisher & Distributors Delhi.

Singh, H. 1978 Embryology of Gymnosperms, Gebruder Bortrager, Berlin
Shukla A.C. &Mishra S.P. Essentials of Paleobotany; Vikash Publishing House Pvt. Ltd. Delhi, Bombay.

Practical 1 - Practical Base on the Course Code 101 & Course Code 102

Practical 2- Practical Base on the Course Code 103 & Course Code 104

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – II SUBJECT - CELL BIOLOGY & GENETICS

SUBJECT CODE – MSB 201

UNIT-I Structure and Organization of Plant Cell, Structure and Function of Cell wall, Plasma Membrane, Ion carriers, Channels and pumps, Receptors, Plasmodesmata, and Sites for ATPases.

UNIT-II Structure and Function of Cell organelles: Chloroplast, Mitochondria, Vacuole, E.R. Lysosomes, Ribosome, Golgi body.

UNIT-III Structure and Function of Nucleus, Nucleosome, Chromosome Structure and Packaging of DNA, Euchromatin, Heterochromatin, Karyotype, Binding patterns a special types of chromosomes.

UNIT-IV Cell division, Cell cycle, Programmed cell death, Structural changes in chromosomes (Duplication, Deletion, Inversion, and Translocation), Numerical changes in Chromosomes (Aneuploids and Euploids, Haploids)

UNIT-V Mendel's laws, Genetics of Mitochondria and Chloroplast Polygenic inheritance, Crossing over and linkage, Transposable elements.

Suggested Reading -

Albert's, B. Bray, D., Lewis, J., Raft, M., Roberts, K., & Watson, J.D Molecular Biology of the Cell. Garland Publishing: Inc., New York.

Buchanan, B.B Groissem, W. & Jones, RL.2000. Biochemistry, CRC Press, Boca Raton, FLORIDA., U.S.A.

De, D.N. 2000: Plant Cell Vacuoles: An Introduction. CSIRO Publication, Collingwood~ Australia.

Karp, G 1999 Cells & Molecular Biology: concepts & experiments. John Wiley & sons, Inc. U.S.A.

Snustad, D.P and Simmons, M.J. 2000 Principles of Genetics. John Wiley & Sons. Inc, U.S.A.

Wolfe, S.L 1993. Molecular and Cellular Biology, Wadsworth Publishing Co., California, U.S.A.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – II SUBJECT - PLANT DEVELOPMENT & REPRODUCTION

SUBJECT CODE – MSB 202

UNIT–I Organization of the higher plant body : Shoot and Reproductive meristem, Tissue system, Shoot apical meristem, Root apical meristem, Lateral meristem, Control of Tissue differentiation especially Xylem and phloem, Lateral root and Root hair.

UNIT–II Development of Shoot, Secondary growth in stem, Primary and secondary anomalous structure of stem, Origin, development, differentiation, arrangement, diversity, venation, modification and anatomy of leaves.

UNIT-III Flower development: floral organ differentiation, Homeotic Mutants in Arabidopsis and Antirrhinum, Androecium, Microsporangium, Microsporogenesis, Role of Tapetum, Male gametophytes and their development, Pollen Storage, Pollen allergy and pollen Embryos, Male Sterility.

UNIT–IV Gynoecium: Structure of Megasporangium, Ovule structure, types and development, Megasporogenesis, organization of embryo sacs, Pollination Mechanisms and vectors, Self Incompatibility,

UNIT–V Double fertilization, Endosperm development, Embryogenesis, Storage proteins of endosperms and embryo. Fruit growth: Biochemistry & molecular biology of fruit maturation, Seed growth & their dispersal, Polyembryony, apogamy and apomixis.

Suggested Reading -

Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms. Vikas Publishing House New Delhi.

Burgess, J. 1985. An Introduction to Plant Cell Development. Cambridge University Press, Cambridge.

Fahn, A 1982. Plant Anatomy. Pergamon Press, Oxford.

Fosket, D.E. 1994. Plant Growth and Development. A Molecular Approach. Academic Press, San Diego.

Lenis, P., Tucker, S.C. and Endress, P.K. 1988. Aspects of Floral Development. J. Cramer, Germany.

Maheswari, P. the Embryology of Angiosperms.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – II SUBJECT - PLANT PHYSIOLOGY - I

SUBJECT CODE – MSB 203

UNIT–I Principle of thermodynamics, Free energy and redox potential, Plant water relation, Mechanism of water absorption, water transport through xylem, Transpiration, Root microbe interaction in facilitating nutrient uptake, Mineral nutrition, Membrane transport protein.

UNIT–II Phloem transport, Signal transduction, Receptors and G- protein, Phospholipids Signaling, Role of cyclic nucleotide, calcium calmodulin cascade.

UNIT-III Plant growth regulators and elicitors, Physiological effects and mechanism of action of auxins, gibberellins, cytokinins, ethylene, abscissic acid, bracinosteroids, jasmonic acid, salicylic acid and polyamines, Hormone receptors.

UNIT–IV Flowering process, Floral induction and development Photoperiodism and its significance, Endogenous clock and its regulation, Movement, Phytochrome and cryptochrome, their photochemical and biochemical properties, Molecular mechanism of action of photomorphogenic receptors, Vernalization.

UNIT–V Stress physiology: Plant response to biotic and abiotic stress, water deficit and drought resistance, Salinity stress and resistance, concepts of freezing, Heat stress and oxidative stress.

Suggested Reading–

Hopkins, W.G. 1995. Introduction to Plant Physiology. John Wiley & Sons, Inc., New York, USA.

Moore, T.C. 1989. Biochemistry and Physiology of Plant Hormones. Springer-Verlag, New York, USA

Nobel, P.S. 1999. Physiochemical and Environmental Plant Physiology. Academic Press, San Diego, USA.

Salisbury FB and Ross CW 1991 Plant Physiology IV edition Wdsworth Publishing co. California USA.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – II SUBJECT - PLANT ECOLOGY

SUBJECT CODE – MSB 204

UNIT –I Introduction, division of plant ecology, Ecosystem components (abiotic and biotic) Factors (light temperature, water), Population ecology, Inter and intra specific competition and self regulation

UNIT-II Community organization Concept of community and continuum, analysis of community, (analytical and synthetic characters,) community coefficient, association, concept of ecological niche, concept of bio diversity evolution and differentiation of species, allopatric and sympatric speciation, ecads and ecotypes.

UNIT–III Ecosystem development and stability Temporal changes (cyclic and non cyclic), succession process & types, mechanism of succession, facilitation, tolerance and inhibition models concept of climax, persistence, Ecological stability concept (resilience and resistance.) Ecological perturbation natural and anthropogenic and their Impact on plants and ecosystem.3 Ecosystem restoration.

UNIT-IV Fate of energy and matter in ecosystem : Tropic organization and structure, food chain and food web energy flow path way, Ecological efficiencies consumption ,assimilation and production tropic Primary production method of measurement, limiting factors ,litter fall and decomposition Recycling path way relation between energy flow and recycling pathway nutrient cycling Global biogeochemical cycle of C,N,P,S,

UNIT-V Major biomes, major vegetation and soil types of world, Phytogeography tropical rain forest and seasonal forest, boreal forest Grassland, desert, aquatic ecosystem, wetland Lakes, ponds, Streams Rivers, marine and estuarine habitats.

Suggested Reading -

Barbour, M.G.,Burk, J.H. and Pitts, W.o.1987. Terrestrial Plant Ecology. Cummings Publication Company, California.

Chapman,J.L. and Reiss, M.J. 1988. Ecology: Principles and Applications. Cambridge University Press, Cambridge , U.K.

Kormondy, E.J.1996. Concepts of Ecology. Prentice-Hall of India Pvt. Ltd., New Delhi.

Odum. E.P.1971. Fundamentals of Ecology. Saunders, Philadelphia.

Odum,E.P.1983. Basic Ecology. Saunders, Philadelphia.

Smith. R.L. 1996. Ecology and Field Biology. Harper Collins. New York.

Practical – 3 Practical Base on the Course Code 201 & Course Code 202

Practical – 4 Practical Base on the Course Code 203 & Course Code 204

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – III SUBJECT – SYSTMETIC OG ANGIOSPERMS

SUBJECT CODE – MSB 301

UNIT-I Morphology of flower, floral induction and development, Homeoticmutant in Arabidiopsis and antirrhinum, morphology of stamens and carpals, carpel evolution, morphology of inferior ovary, placentation: their origin and types,

UNIT-II The species concept Taxonomic hierarchy, international code of Botanical nomenclature, Taxonomic evidences(:Morphology,anatomy, palynology, embryology, cytology, phytochemistary).Taxonomic tools(Herbarium, Botanical garden, Taxonomic keys, Taxonomic Literature, Floras, Histological, biochemical, cytological phytochemical, serological, and molecular technique)

UNIT-III Systems of Angiosperm classification:Phenetic versus phylogenetic system, Cladistics in taxonomy relative merits and demerits of major system of classification, Plant exploration , invasions and introduction and secondary centers, World centres of primary diversity of domesticated plant. Origin of angiosperms.

UNIT-IV Families of Dicotyledons: Ranunculaceae, Magnoliaceae,Annonaceae, Papaveraceae Capparidaceae, Portulaceae,Oxalidaceae, Rutaceae, Meliaceae, Rosaceae, Cucurbitaceae,Cactaceae, Rubiaceae Asteraceae, Gentianaceae, Bignoniaceae,Acanthaceae, Lamiaceae, Verbenaceae, Chenopodiaceae,Nyctaginaceae, Euphorbiaceae, Urticaceae, Moraceae

UNIT-V Families of Monocotyledons: Orchidaceae, Iridaceae, Amaryllidaceae Musaceae, Zingiberaceae, Commelinaceae, Arecaceae, Typhaceae,Cyperaceae, Poaceae, General characteristics and phylogeny of Ranales,Amentiferae, Tubiflorales Santaales, Centrospermales, and Hellobiales.

Suggested Reading

Heywood & Moore, D.M; 1984: CWTent concept in Plant Taxonomy Academic Press.

Banson, L.B.;1957; Plant Classification, Health & Co. Boston.

Davis, P.R & Heywood, V.H 1973; Principles of Angiosperms and Taxonomy, Robert E. Kreiger Pub. Co. New York USA.

Eames, AL.; 1961; Morphology of Angiosperms, McGraw Hill, New York.

Lawerence, G.H.M,;1951: Taxonomy of Vascular Plants Macmillan, New York

Naik V.N,;1984: Taxonomy of Angiosperms. Tata McGraw Pub Co. Ltd New Delhi.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – III SUBJECT – MOLECULAR BIOLOGY & PLANT BREEDING

SUBJECT CODE – MSB 302

UNIT –I Nuclear DNA content DNA structure and Forms, DNA replication, mutation, DNA, C value paradox, cot curve, and its significance, damage and repair, Restriction Mapping, Multigene families and their evolution,

UNIT –II Gene structure and expression, Gene fine structure, cis and transtest, introns and exons their significance, Recombination of genetic mapping, Genetics of Bacteria and Virus (genetic transformation, conjugation, transduction, Recombination in Phage) Regulation of gene expression in eukaryotes.

UNIT-III RNA synthesis and processing,-adding, splicing, polyadenilation structure and function of different types of RNA, RNA transport.

UNIT–IV Protein synthesis–Ribosome structure and site of protein synthesis, initiation complex, factors, elongation, and termination, Genetic code, amino assimilation of RNA, Translation, post translation modification of protein, protein sorting. Targeting of protein to organelles.

UNIT-V Plant breeding,: In situ Hybridization. Concept and techniques genetic basis of inbreeding and heterosis, exploitation of hybrid vigor, Cancer onkogone, Apoptosis, Immune innate and adaptive immune system.

Suggested Reading

Alberts, B.Bray, D.,Lewis,J., Raff, M., Roberts, K. and Watsons,JD.1999

Molicular Biology of the Cell :Inc, Garland Publising House New York.

Krisnamurthy, K.V. 2000 Methods in Cell Wall Cytochemistry, CRC Press, BocaRaton, Florida USA.

De, D.N.2000 Plant Cell Vacuole; An Introduction. CSIRO Publication, Collingwood, Australia.

Kleinsmith,L.J.andKish,V.M.1995.Priciples of cell and Molecular Biology Harper Collins College Publisher, New York USA.

Twyman, R.M.2003 Advanced Molecular Biology, viva Book Private Ltd, new Delhi.

Wolfe, S.L.1993, Molecular and Cellular Biology, Wadsworth Publising co., callifornia, USA.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – III SUBJECT - Plant Physiology, Biochemistry and Metabolism

SUBJECT CODE – MSB 303

UNIT –I Fundamentals of enzymology: General aspects, allosteric mechanism, regulatory and sites, isoenzyme, kinetics of enzymatic catalysis, Michaelis-Menten equation, and its significance, Mechanism of enzyme action.

UNIT –II Photochemistry and Photosynthesis: General concept and Historical back ground, evolution of photosynthetic apparatus, photosynthetic pigment and light harvesting complexes, Photooxidation of water, mechanism of electron and proton transport, Carbon assimilation, Calvin cycle, Photorespiration and its significans, C-4 cycle, CAM path way physiological and ecological consideration.

UNIT–III Respiration : Overview of plant respiration, Glycolysis, TCA cycle, Electron ransport, Structure, function & synthesis of ATP, oxidative pentose phosphate pathway.

UNIT –IV Structure classification and function of carbohydrate Biosynthesis of sucrose and starch, Structure and function of Lipids, Fatty acid biosynthesis, Synthesis of membrane lipids, structural lipids and storage lipids, , and their catabolism, Glyoxilate cycle and alternative oxidases system.

UNIT–V Nitrogen fixation, (chemical and biological) Nodule formation, Mechanism of Nitrate uptake and reduction, ammonium assimilation, Sulphate uptake, transport and assimilation. Sulphur metabolism, Vitamins (structure and role).

Suggested Reading

Hopkins, W.G. 1995. Introduction to Plant Physiology. John Wiley & Sons, Inc, New York. USA.

Lodish, H. Berk, A. Zipursky, S.L. Matsudaira, P. Baltimore, D. & Darnell, J. 2000 Molecular Cell Biology, W.H. Freeman and company, New York. USA.

Moor, T.C. 1989 Biochemistry And Physiology of Plant Hormones Springer-Verlag, New York, USA.

Nobel, P.S. 1999 Physiochemical and Environmental Plant physiology Academic Press, San Diego, USA.

Sallisbury F.B. and Ross, C.W. 1991 and 2012, Plant Physiology Widsworth, Publishing Co. California. USA.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – III SUBJECT – ECOLOGY - II (Conservation & Utilization of Plant Resources)

SUBJECT CODE – MSB 304

UNIT–I Plant biodiversity concept, status in India,& World. .World center of primary diversity of domesticated plants. The Indoburmiese centre, plant introduction, and secondary centre.

UNIT –II Sustainable Development, Utilization, of Resources from forest, Grassland, Aquatic Habitats, Food, Fodder, Forage, Timber and non wood forest products. Threats to quality and quantity of resources due to over exploitation. Speciation and Extinction IUCN categories of threat. Distribution and Global Pattern terrestrial biodiversity, Hot spots, inventory.

UNIT–III Strategies for conservation of resources Social forestry, Principle of conservation, In situ conservation, Sanctuaries, National Parks, Biosphere reserves, for wild life conservation, for forest ranges Soil and Water. Exsitu conservation, Botanical Garden, Field gene bank, Seed Banks, in vitro repositories, Cryo banks,

UNIT–IV Pollution and Climate change,: Air, Water Soil pollution,(Kinds sources quality ,Parameters ,and effects on plants & ecosystem,)Green house gases,CO₂ ,CH₄ N₂O CFCs (source trend and role)Ozone layer and Ozone Hole, Consequence of climate change, (Co₂ as fertilization, Global warming, sea level rise, UV radiation.) Bioremediation (Management of Pollution)

UNIT–V Resource Monitoring Remote sensing Concepts and tools, Satellite remote sensing ,basics, sensors, Visual and digital interpretation)EMR bands and their application , Indian remote sensing Program Thematic mapping of resources Application of Remote sensing.

Suggested Reading

Brady,N.C.1990 The Nature and Properties of Soil MacMillan.

Heywood, V.H. and Watson, R.T. 1995 Global Biodiversity Assessment. Cambridge University Press.

Hill, M.K. 1997 Understanding Environmental Pollution,. Cambridge University, Press.

Kohli, R. Arya, K.S., Singh, P.H. and Dhillon, H.S,. 1994 Tree Directory of Chandigarh, Lovedale Educational, New Delhi.

Kothari A. 1997 Understanding Biodiversity Life Sustainability and Equity.

Practical – 5 Practical Base on the Course Code 301 & Course Code 302

Practical – 6 Practical Base on the Course Code 303 & Course Code 304

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – IV SUBJECT - Methods in Biology, Applied Biology
Instrumentation, Biostatistics, & Computer

SUBJECT CODE – MSB 401

UNIT-I Microscopy, TEM, SEM, ELISA, Western and southern blotting, staining spectrophotometer, Electrophoresis colorimeter, x-ray differentiation, pH meter, centrifugation, chromatography, microtome Laminar air flow.

UNIT-II Biostatistics: mean, median, mode, probability, distribution normal and binomial, histogram, standard deviation, standard errors, correlation and regression, Significance based on small and large sample (t, z, f-test and chi square test,).

UNIT-III microbial fermentation transgenic plants (bioremediation) biosensors, application of different techniques in biology, culture of Algae, and fungi, tissue culture technique.

UNIT-IV Introduction to computer; fundamentals, Permanent storage of number, system,, MS, DOS, MS WORD, MS EXCEL, application of computer biostatistics problems, computer in biology:, sequence data bases, analysis of protein and nucleic acid, structure prediction, simple molecular modeling, sample graph plotting.

UNIT -V Networking of computer, need and application.. Detail study of internet, Use of e-mail and internet, modern strategies of literature search, Record and presentation of data and scope.

Suggested Reading

Cell and Molecular Biology- P. k. Gupta.

Fundamentals of Statistics -D.M. Ethance *et al.*

Biostatistics and Computer Application - Dr. R. Goswami

Bitehnology - R.C. Dubey. Technics of Microbiology, genetics-P.K. Gupta.

hytochemical Methods - Hauberne.

Methods in Microbiology -maheshwari & Dubey.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

**SEMESTER – IV SUBJECT - Taxonomy of Angiosperms
SUBJECT CODE – MSB 402**

UNIT - I

Omenclature I.C.B.N. Principles, Rules, Recommendation, Articles, Typification, Principle of priority, Effective and Valid publication, citation of authority synonyms and homonyms. The species concept Taxonomic hierarchy, topological & biological delimitation of Taxa and attribution of rank, salient features of the International code of botanical nomenclature.

Plant speciation- Allopathic, sympatric, hybrid Apodictic Abrupt and phylletic, speciation, Mechanism of Reproductive isolation Taxonomic tools-herbarium Floras, Botanical garden, Botanical survey of India. Modern trends in Taxonomy-Morphology, Anatomy Palynology, Embryology, Cytology, Ecology, Phytochemistry, Genomic analysis & Nucleic acid hybridization.

UNIT-II

ossils Angiosperms , origin and evolution of angiosperms Endangered plants of m,p System of angiosperms classification phenetic versus phylogenetic system, cladistic in taxonomy. Principle, outline, merits and demerits of Bentham and hooker, Englar & Prantle, Hutchinson, Conquest, APG system. Morphology and evolutionary trends in angiosperms .Morphology of carpel, & stamen Monographic nature of flower. Calculation of similarity coefficients & Preparation of dendrogram.

UNIT-III

Systematic account of following families [Salient feature , Morphological diversity, Phylogenetic relationship and Economic importance] Ranunculaceae, Magnoliaceae, Annonaceae, Nymphaeaceae, Papaveraceae, fumaraceae, Cruciferae (brassicaceae), Podostmaceae, Rosaceae, Linaceae, Capparidaceae, Violaceae, Caryophyllaceae, Dipterocarpaceae, Malvaceae, Tiliaceae, Sterculaceae, Rutaceae, Meliaceae, Rhamnaceae, Sapindaceae, nacardiaceae, Salvadoraceae, Leguminoceae, Lythraceae, Myrtaceae, Onagraceae, Cucurbitaceae, Apiaceae, Tamericaceae, Caricaceae Cactaceae,

UNIT IV

Systematic account of Following Families [Salient feature, Morphological diversity, Phylogenetic relationship and Economic importance] Rubiaceae, Asteraceae, Primulaceae, Sapotaceae, Iteaceae Apocynaceae, Asclepiadaceae, Boraginaceae, Convolvulaceae, Solanaceae, Pedaliaceae, Lentibulariaceae, Scrophulariaceae, Bignoniaceae, Acanthaceae, Verbinaceae, Labiatae, Amaranthaceae, Chenopodiaceae, Polygonaceae, Moraceae, Casuarinaceae, Combricaceae, Nyctaginaceae Bombacaceae, Urticaceae, Oxalidaceae, Moringaceae, Oliaceae, Malpighiaceae, Gentianaceae, Vitaceae

UNIT-V

Monocotyledons families and Phylogeny - Iismaceae, Hydrochariaceae, Poaceae, Cyperaceae, Comelinaceae, Arecaceae, Liliaceae, Amaryllidaceae, Araceae, Iridaceae, Musaceae, Zingiberaceae, Cannaceae, Orchidaceae, Typhaceae, General characteristic phylogeny of following order Ranales, Amentiferae, Tubiflorae, Santalales, Centrospermales, Halobiales, Floristic Works with reference to m.p.

BOOKS:-

- 1) Verma B.K. (2011) – Introduction to Taxonomy of Angiosperms.
- 2) Eames, A.J. (1961) Morphology of Angiosperms Mc-Graw Hill, New York.
- 3) Rendle, A.B. (1997) The Classification of flowering plants, Vol-1 & II
- 4) Takhtajan, A.L. (1969) Flowering Plants - Origin and dispersal.
- 5) Lawrence, G.H.M. (1951) Taxonomy of Vascular plants Macmillan, New York.
- 6) Naik, V.N. (1984) Taxonomy of Angiosperms Tata McGraw Hill Pub. Co. Ltd New Delhi.
- 7) Cronquist, A. (1988) The Evolution and Classification of Flowering Plants, Bronx New York Botanical Garden.
- 8) Harrison, H.J. (1971) New Concept in Flowering Plants Taxonomy. Hiemann Edu. Book Ltd. London.
- 9) Sporne, K.K. (1974) The morphology of angiosperms. New Delhi
- 10) Tiagi, Y.D. & Kshetrapal, S. (1974) Taxonomy of Angiosperms Ramesh Book Depot, Jaipur.
- 11) Stace, C.A. (1989) Plants Taxonomy & Biosystematics.
- 12) Woodland, D.W. (1991) Contemporary Plants systematics, Prentic Hall.

SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

COURSE –M.Sc BRANCH – BOTANY

SEMESTER – IV SUBJECT - Forest Biology, Forest Vegetation

SUBJECT CODE – MSB 403

Unit-1

Introduction:- Forest and National Development. Forest composition, Forests in our national policy, Forest influences. Forest produce, important non-wood forest products (NWFP). Forest & erosion, Forest & Man, Ethno botany in relation to Forest.

Unit-2

Locality factors of the forests: Climate: temperature, forest clouds, monsoon in India. light and wind. Edaphic and Biotic factors, Forest fire and control, Distribution of Epiphytes and the factors controlling them.

Unit-3

Phytogeographical regions of India Classifications of forests, floral types of Indian forest, grasslands of India. Classification of forests of M.P., grassland of M.P., Biosphere reserve of M.P. Forest vegetation of Pachmarhi and Baster area.

Unit-4

Role of FRI (Forest research institute). Functional processes within forest: - 1. Energy and organic matter dynamics. 2. Minerals and nutrient turn over. 3. Diversity and their conservation Natural and artificial regeneration of Forest. Afforestation and impact of afforestation on global climate.

Unit-5

Social forestry, Farm Forestry, Wasteland reclamation theory, Forest growth and forest Resource management, Forest in National economy, Environmental Laws, UNEP, IUCN, ICRAF. Ecology of Sal and Teak. Wild life Management: Silviculture approach and the management of Forest, Principles of forest protection – protection against fire, Grazing and Human interferences.

PRACTICALS: Laboratory exercises corresponding to theory courses covering all Units.

Suggested Practical exercises -

1. Meteorological recording

Determination of air temperature by Min.-Max. thermometer.

Determination of light intensity.

Determination of clouds by Okta scale.

Determination of wind velocity.

Determination of precipitation by Rain Gauge.

2. Non-conventional Bio-management of waste-

1. Planning of Root Zone treatment.

2. Vermicomposting.

3. Sampling for physico-chemical properties of water-

1. To measure temperature by Thermister.

2. To measure pH by pH meter.

3. To determine turbidity by Secchi disc & turbidometer.

4. To determine light intensity by photometer.

5. To determine DO(dissolved oxygen) in eutrophic & oligotrophic water.

6. To determine BOD(biological oxygen demand) of pond water.

7. To determine the amount of chloride/fluoride.

4. Sampling for soil analysis-

1. To determine Nitrate, Phosphate, Carbonate.
2. To determine water holding capacity of soil.
3. To determine organic matter content of soil.
4. To determine bulk density and porosity of soil.

Exercises based on pollution

1. To study the foliar injuries of plants which are exposed to SO₂.
2. To determine dust deposition on leaves of polluted and non polluted areas.
3. To determine pH of plants growing in under polluted and nonpolluted areas.
4. To study environmental impact of a given developmental activity using checklist as AIE method.

The purpose of above practical exercises is to make the students aware of the issues related to environmental science specially global warming, climate change and impact on nature and for ecological services.

SUGGESTED READINGS :

- **Begon. M., Harper, J.L. and Townsend, C.R. 1996.** Ecology. Blackwell Science. Cambridge.
- **Ludwig. J. and Reynolds. J.F. 1988.** Statistical Ecology. John Wiley & Sons.
- **Odum. E.P. 1971.** Fundamentals of Ecology. Saunders, Philadelphia.
- **Odum, E.P. 1983.** Basic Ecology. Saunders, Philadelphia.
- Barbour, M.G., Burk, J.H. and Pitts, W.O. 1987. Terrestrial Plant Ecology. Cummings Publication Company, California.
- **Kormondy, E.J. 1996.** Concepts of Ecology. Prentice-Hall of India Pvt. Ltd., New Delhi.