

**UNIVERSITY OF MYSORE**  
**SYLLABUS FOR PG ENTRANCE EXAMINATION 2013-14**  
**BOTANY**

**UNIT I: MICROBIAL DIVERSITY, VIRUSES, MYCOPLASMA, BACTERIA, CYANOBACTERIA AND ALGAE**

Introduction and a brief account of microbiology, Microbes from soil, air & Water.

**Virology** -History and discovery, Status of viruses in microbiology (Living & non-living characteristics) Structure and multiplication of TMV and bacteriophage[T4], Virioids, Prions, Transmission; Tobacco mosaic disease, Yellow mosaic of Bean.

**Mycoplasma**- A general account of Mycoplasma -History, discovery characteristics, Sandal spike disease -symptoms and management

**Bacteria:** History and discovery, Occurrence, classification based on morphology and flagellation, Ultra structure, nutrition and reproduction- Vegetative, Fission Budding- Endospore formation. Genetic recombination, conjugation, transformation and transduction. Role of bacteria in human welfare-As Nature's scavengers, Biofertilizers, Industrial curing of Tea, Tobacco, Leather, Retting of fibres, Alcohols and acids. A mention of bacterial diseases -Plants, Animals and Humans.

**Cyanobacteria:** A general account of occurrence, structure reproduction and economic importance. Type study: *Spirulina and Nostoc*, food value, biofertilizers, pioneers in plant succession, biological indicators, water blooms.

**Algae:** A general account, habitat, thallus, reproduction, economic importance. A brief account of classification. Type study: *Chlorella, Oedogonium, Caulerpa, Sargassum and Polysiphonia*

**UNIT II: MYCOLOGY, PLANT PATHOLOGY, LICHENS AND BRYOPHYTES**

**MYCOLOGY:** General Characters, occurrence, thallus organization, Nutrition, Reproduction, Ainsworth's classification and Economic importance of fungi. Type study: 1) *Albugo* 7) *Rhizopus* 3) *Penicillium* 4) *Lycoperdon*

Cultivation of Mushrooms, Spawn production, Cultivation methods of *Pleurotus* on Paddy straw- polythene method, Nutritional values of Mushrooms.

**PLANT PATHOLOGY** -symptoms, causal organisms and management of

1. Downy Mildew of sorghum 2. Tikka disease of groundnut 3. Late blight of potato 4. Koleroga of arecanut 5. Coffee rust. 6. Grain smut of sorghum 7. Wheat rust- *Puccinia graminis*. A brief account of Biopesticides: Neem, Trichoderma, *Bacillus thuringiensis* in pest and disease control.

**LICHENS:** Distribution, types, structure, reproduction and economic importance

**BRYOPHYTES:** General characteristics and classification of bryophytes, Structure and Reproduction, Alternation of generations in 1. *Marchantia* 2. *Anthoceros* 3. *Funaria*. Economic Importance of Bryophytes

### **UNIT III: PTERIDOPHYTA, GYMNOSPERMS, ANATOMY & PALEOBOTANY**

**PTERIDOPHYTA:** Introduction, general characters, classification. External and internal structure and reproduction of the following forms: (Developmental details not required) 1. *Psilotum* 2. *Selaginella* 3. *Equisetum* 4. *Ophioglossum* 5. *Marsilea*. A brief account of Heterospory and seed habit. Stellar evolution among Pteridophytes

**GYMNOSPERMS:** Introduction, general characters and classification. External and internal structure and reproduction of the following forms: 1. *Cycas*- Anatomy of Coralloid root, Young stem and leaf-let. Reproductive organs.

2. *Pinus*- Stem anatomy (Young and old), Anatomy of Needle. Reproductive organs.

3. *Gnetum*- Stem anatomy (Young), Eccentric secondary growth in stem, leaf anatomy. Reproductive organs.

4. A brief account of economic importance of Gymnosperms

**ANATOMY (Angiosperms) - Tissues-** Classification. Theories of apical meristem. A brief account of Simple and complex tissues. Study of anatomy of Dicot and Monocot Roots, Stems and Leaves. Secondary growth in Dicot stem. Anomalous secondary growth in Monocot stem (Ex.: *Dracaena*). A brief account of Trichomes, Stomata and Laticifers.

**PALEOBOTANY:** A brief account of the study of Geological time-scale, Fossil types. Type study of *Rhynia*, *Cycadeoidea*

## UNIT IV: MORPHOLOGY OF ANGIOSPERMS AND REPRODUCTIVE BIOLOGY

**MORPHOLOGY OF ANGIOSPERMS** (A) Parts of a plant: Monocot and Dicot plant. (B) Root System: Tap and Fibrous root system. Root modifications: Fusiform, Napiform, Conical, Fasciculated, Tuberos, Prop, Stilt, Climbing, Respiratory, Parasitic and Epiphytic. (C) Shoot system.

Stem modifications: Rhizome, Tuber, Corm, Bulb, Runner, Stolon, Offset, Sucker, Phylloclade (*Opuntia*, *Euphorbia tirucalli*), Cladode (*Ruscus*, *Asparagus*)

Leaf-Parts, Phyllotaxy, Simple and Compound leaves (Pinnate and Palmate) Leaf modifications: Tendril, Spine, Phyllode, Pitcher.

Inflorescence: Racemose types, Cymose types and Special types (Cyathium, Thyrsus, Verticillaster, Hypanthodium).

An account of floral morphology, Fruits: Classification- Simple (Dry dehiscent, dry indehiscent, Schizocarpic and Fleshy types), Aggregate and Composite types. Structure of seed: Dicot structure of grain: Monocot

### **REPRODUCTIVE BIOLOGY (Embryology )**

Structure of Anther, T.S. of anther, Microsporogenesis, Development of male gametophyte, Role of tapetum. A brief account of Palynology. Structure of Ovule, types of Ovule, Megasporogenesis, Development of female gametophyte (Polygonum type). Pollination Biology: Types, Contrivances and significance of cross pollination Fertilization- a general account. Endosperm- Types and development- a brief account. Embryo- Dicot type with development- Cruciferad type.

Experimental embryology, Apomixis, Polyembryony Scope of Reproductive biology

## UNIT V: TAXONOMY OF ANGIOSPERMS, ECONOMIC BOTANY AND ETHNOBOTANY

**TAXONOMY:** Principles of Taxonomy, A brief account of Classical and modern Taxonomy.

Systems of classification: Broad outline of Bentham and Hooker's and Engler and Prantl's Classifications with merits and demerits.

Plant Nomenclature- Binomial system, ICBN Principles and aims. Recent trends- Chemotaxonomy, Cyotaxonomy.

Field and Herbarium Techniques, Herbaria, Botanical gardens, Floras and their importance, Botanical Survey of India and its functions.

Study of following Families according to Bentham and Hooker's system of Classification

**DICOTS:** 1.Magnoliaceae 2.Brassicaceae 3.Malvaceae 4.Rutaceae, 5.Fabaceae, 6.Myrtaceae, 7.Cucurbitaceae, 8.Apiaceae, 9.Asteraceae 10.Rubiaceae 11.Apocynaceae 12.Asclepiadaceae, 13.Solanaceae, 14.Verbenaceae 15.Acanthaceae, 16.Lamiaceae, 17.Amaranthaceae, 18.Euphorbiaceae.

**MONOCOTS :** 1 . Orchidaceae 2. Musaceae, 3. Liliaceae, 4.Arecaceae, 5.Poaceae,

**ECONOMIC BOTANY** (Cultivation aspects not required)

Food plants: Rice, Wheat, Maize, Potato. Pulses: Pigeon Pea, Bengal gram, Black gram, Green gram. Fibres and Fibre plants: Cotton, Jute, Coir. Oil and oil yielding plants: Ground nut, Coconut, Safflower, Sunflower. Firewood, Timber and Bamboos: Rose wood, Teak, Honne, Acacia, Bamboo. Spices:'Cardamom, Clove, Cinnamon, Pepper. Beverages: Coffee and Tea. Narcotic Plants: 1.Opium, 2.Cannabis,3 .Tobacco. Medicinal plants: A general account –Plants of medicinal importance studied in Monocot and Dicot families under Taxonomy

**ETHNOBOTANY:** Introduction and significance. Examples under Ethnobotany: 1.*Phyllanthus*. 2. *Hemidesmus indicus* 3.*Terminalia chebula*. 4. *Strychnos nux-vomica* 5. *Aloe vera* 6.*Boerhaavia dffisa*. 7.*Withania somnifera*. Importance of sacred groves and their conservation.

## **UNIT VI: CELL BIOLOGY AND MOLECULAR BIOLOGY**

**CELL BIOLOGY-** Principles and uses of Light, Phase- contrast, Fluorescent and Electron Microscopes. Ultra structure of Prokaryotic and Eukaryotic cells. Cell-organelles-Cell wall, Cell membrane, Endoplasmic reticulum, Golgi apparatus, Nucleus, Chloroplast, Mitochondria, Lysosomes and Ribosomes. Chromosome- Structure and number, Karyotype and Idiogram, nucleosome concept.

Cell cycle- Mitosis, Meiosis and their significance. Numerical variation in chromosomes, Euploidy and Aneuploidy (Detailed account) Structural changes in Chromosomes: Deletion, duplication, Inversion and Translocation.

**MOLECULAR BIOLOGY-** Nucleic acids as genetic material-Avery et.al's experiment,

Fraenkel Conrat's experiment. **DNA**- Chemistry, structure, types and function, RNA Chemistry, structure, types and function. **DNA- replication**- mechanism of replication in Prokaryotes and Eukaryotes. **Gene Concept**- Gene structure, action, One gene-one polypeptide concept.

Central dogma of Molecular Biology, Genetic code, Protein Synthesis- Transcription, **RNA** splicing and Translation, Gene regulation in prokaryotes (Operon concept) and Eukaryotes. Molecular basis of genetic disorders- Sickle cell Anemia and Thallasemia.

## **UNIT VII: PLANT PHYSIOLOGY**

**Plant and Water Relations**-Diffusion. Imbibition, Osmosis, Cell as an Osmotic system, Concept of water Potential

**Short Distance Transport**-Active and Passive absorption of water. Absorption of minerals, Donnan's Equilibrium, Carrier Concept.

**Long Distance Transport**- Ascent of Sap, Root pressure Theory, TCT Theory, Phloem, Transport- Munch' s Hypothesis

**Transpiration**- Definition, Types, Mechanism of Stomatal movement-Starch- Sugar Inter conversion Hypothesis, Action of potassium ion transport, Antitranspirants, Guttation. A brief account of mineral nutrition, Role of P, Mg, K, Mn, Bo, Cu.

**Growth** - Definition, Phases of growth, Sigmoid curve, Growth Hormones-chemical nature, biosynthesis and application of auxins, gibberellins, cytokinins, ethylene, and ABA. Growth and Movements- Tropisms: Photo, Thigmo, Geo and Hydrotropisms. Photoperiodism and Vernalisation.

**Enzymes**- classification, properties, and mode of action.

**Photosynthesis**- Introduction, significance, photosynthetic apparatus, mechanism- light and dark reactions- C<sub>3</sub> , C<sub>4</sub>, and C<sub>2</sub> pathways.

**Respiration**- Introduction, significance, types, **Aerobic**,-mechanism, Glycolysis, Krebs' cycle, Terminal Oxidation, ATP Synthesis Chemiosmotic theory.

**Anaerobic respiration**- alcoholic and lactic acid fermentation.

**Nitrogen metabolism**,- nitrogen fixation, mechanism- biological nitrogen fixation, nitrate reduction. Aminoacids and their synthesis.

## **UNIT VIII: GENETICS, GENETIC ENGINEERING AND PLANT BIOTECHNOLOGY**

**GENETICS- Introduction-** Mendel's law of inheritance, Test cross, Back cross, Incomplete dominance. Interaction of genes, **Complementary gene action-** flower color in sweet pea **Supplementary interaction-** coat color in pearl millet. **Epistasis-** fruit color in summer squashes. **Multiple factor inheritance-** ear size in maize. Linkage and crossing over- linkage in maize mapping by 2 and 3 point test cross, interference coincidence.

Cytoplasmic inheritance- plastid inheritance in *Mirabilis*- / Cytoplasmic male sterility in Maize.

Mutation- spontaneous and induced, Transposable genetic elements.

### **GENETIC ENGINEERING**

A concise account of methods used in DNA Technology, Restriction enzymes, Ligases, Cloning vectors, Construction of Recombinant DNA and C-DNA libraries. A brief account of Genomics and its applications. A brief account of hazards and safe guards in Recombinant Technology.

**LANT BIOTBCHNOLOGY:** Introduction - Scope of Biotechnology. Tissue culture- Techniques, differentiation, totipotency, Organogenesis, Somatic hybridization, Somatic embryos and synthetic seeds. Anther culture - haploid production and its significance. Gene transfer methods- *Agrobacterium* mediated gene transfer, Electrophoration and shot gun method. Applications of Biotechnology- Transgenic plants in crop improvement, use of microbes in Industry and Agriculture. Production of Penicillin, Alcohol, Single Cell Proteins, Enzymes.

## **UNIT IX: PLANT PROPAGATION AND PLANT BREEDING**

**Plant propagation-** methods of vegetative propagation- stem cutting, grafting, trenching, layering, suckers, stolons, tubers, corms. Basic nursery methods and green house techniques, Advantages of plant propagation.

### **Plant Breeding**

A brief history - Aims and objectives of plant breeding. Techniques in plant breeding - hybridization( intergeneric and interspecific) Hybrid vigour and Hybrid seed production. Germplasm maintenance, pollen banks, and quarantine measures. Plant breeding work done in India-: paddy and cotton.

## **UNIT X: ECOLOGY AND EVOLUTION**

**Ecology:** Ecosystem-Classification, Concepts and components of ecosystem. Ecological factors- a brief account. Study of Forest (dry deciduous), Fresh (Pond) and Marine water ecosystems. Energy flow and Ecological pyramids. Biogeochemical cycles- Nitrogen Cycle and Hydrological cycle. Ecological adaptations---Hydrophytes, Xerophl'tes, Halophytes, Parasites, Epiphytes. Plant succession: Definition, Steps of succession. Phytogeography- Definition, Vegetational types of Karnataka.

**Evolution:** A brief account of the origin of Life and concept of evolution. Theories of Organic Evolution- Lamarckism, Darwinism, Weismanism, DeVries theory, Neo Darwinism- Isolation, Mutation, Genetic Drift and Speciation.