

61. BOTANY

Part-A (40 Marks):

Microbial Diversity :

Bacteria: Structure, nutrition, reproduction and economic importance. An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice. Brief account of Archaeobacteria, Actinomycetes. General account of Mycoplasma with reference to Little leaf of brinjal and Papaya leaf curl.

Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro.

Algae

Algae: General characters, structure, reproduction and classification of algae (Fritsch).

Cyanobacteria: General characters, cell structure, thallus organisation and their significance as biofertilizers with special reference to Oscillatoria, Nostoc and Anabaena.

Structure and reproduction of the following:

Chlorophyceae-*Volvox*, *Oedogonium*, *Chara*.

Phaeophyceae-*Ectocarpus*.

Rhodophyceae-*Polysiphonia*.

Fungi

Fungi: General characters and classification of fungi (Ainsworth). Structure and reproduction of the following:

Mastigomycotina-*Albugo*

Zygomycotina-*Mucor*

Ascomycotina-*Saccharomyces*, *Penicillium*

Basidiomycotina- *Puccinia*

Deuteromycotina-*Cercospora*.

Lichens: Structure and reproduction; ecological and economic importance.

Bryophytes, Pteridophytes, Gymnosperms and Paleobotany:

Bryophytes: Structure, reproduction, life cycle and systematic position of *Marchantia*, *Anthoceros* and *Polytrichum*. Evolution of Sporophyte in Bryophytes. **Pteridophytes:** Structure, reproduction, life cycle and systematic position of *Rhynia*, *Lycopodium*, *Equisetum* and *Marsilea*. Stellar evolution, heterospory and seed habit in Pteridophytes. **Gymnosperms:** General characters, structure, reproduction and classification (Sporne's). Distribution and economic importance of Gymnosperms. Morphology of vegetative and reproductive parts, systematic position and life cycle of *Pinus* and *Gnetum*. **Palaeobotany:** Introduction, Fossils, types of fossils and fossilization, Importance of fossils. Geological time scale.

Taxonomy of Angiosperms:

Principles of plant systematics, Types of classification: Artificial, Natural and Phylogenetic; Systems of classification: Salient features and comparative account of Bentham & Hooker and Engler & Prantle. An introduction to Angiosperm Phylogeny Group (APG). **Current concepts in Angiosperm Taxonomy:** Embryology in relation to taxonomy, Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy. Nomenclature and Taxonomic resources: An introduction to ICN, Shenzhen code - a brief account. Herbarium: Concept, techniques and applications. Systematic study and economic importance of plants belonging to the families; Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae, Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Monocotyledons: Orchidaceae and Poaceae, Zinziberaceae.

Ecology

Component of eco system, energy flow, food chain and food webs. Plants and environment, ecological adaptations of plants, Hydrophytes, Xerophytes and Mesophytes. Plant Succession serial stages, modification of environment, climax formation with reference to Hydrosere and Xerosere. General account of adaptations in xerophytes and hydrophytes.

Part-B (60 Marks)**Plant Anatomy**

Meristems: Types, histological organization of shoot and root apices and theories. Tissues and Tissue Systems: Simple, complex and special tissues. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths. Stem and root anatomy: Vascular cambium - Formation and function. Anomalous secondary growth of Stem - *Achyranthes*, *Boerhaavia*, *Bignonia*, *Dracaena*; Root- *Beta vulgaris*. Wood structure: General account. Study of local timbers – Teak, Rosewood, Red sanders, Nallamaddi and Neem.

Embryology

History and importance of Embryology. Anther structure, Microsporogenesis and development of male gametophyte. Ovule structure and types; Megasporogenesis; types and development of female gametophyte. Pollen morphology, pollination and fertilization, Pollination – Types, Pollen - pistil interaction, double fertilization. Seed structure appendages and dispersal mechanisms. Endosperm - Development and types. Embryo - development and type, Polyembryony and Apomixis - an outline.

Cell Biology

Plant cell envelopes: Ultra structure of cell wall, Models of membrane structure, structure and functions of Semi permeable Plasma membrane. **Cell Organelles:** Structure and semiautonomous nature of Mitochondria and Chloroplast. **Nucleus:** Ultra structure, types and functions of DNA & RNA. Mitochondrial DNA & Plastid DNA and Plasmids. Chromosomes: Morphology, organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype. Special types of chromosomes: Lampbrush and Polytene chromosomes. **Cell division:** Cell and its regulation; mitosis, meiosis and their significance

Genetics

Mendelism: History, Principles of inheritance, Chromosome theory of inheritance, Autosomes and sex chromosomes, Incomplete dominance and Co-dominance. Multiple alleles, Lethal alleles, Epistasis, Recessive and Dominant traits, Polygenic inheritance. Linkage and crossing over, Recombination frequency, two factor and three factor crosses; Interference and coincidence. Numericals based on gene mapping; Sex Linkage. Variation in chromosome number and structure: Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy. Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens-physical and chemical (Base analogs, deaminating, alkylating and intercalating agents).

Plant Physiology

Plant -water Relations: Water potential, osmosis, osmotic and pressure potential, absorption and transport of water. **Mineral Nutrition:** Essential micro & macro nutrients and symptoms of mineral deficiency. **Transpiration:** Stomatal structure and movement. Mechanism of phloem transport. Enzymes: Nomenclature, properties, Classification and factors regulating enzyme activity. **Photosynthesis:** Photosynthetic pigments, Cyclic and Non-cyclic Photophosphorylation. Carbon assimilation pathways: C3, C4 and CAM. **Respiration:** Aerobic and Anaerobic; Glycolysis, Krebs cycle and oxidative phosphorylation. **Nitrogen Metabolism:** Biological nitrogen fixation. Physiological role of Phytohormones: Auxins, gibberellins, cytokinins, ABA, ethylene and Brassinosteroids.