

BOTANY SYLLABUS

UNIT-1

Algae-General characteristics, Classification, Organization of thallus, cell structure, Pigmentation, Reproduction, Economic Importance. Structure, Reproduction and life cycle of *Chlamydomonas*, *Oedogonium*, *Chloeochoatae*, *Fucus*, *Batrachospermum*, *Polysiphonia*.

Fungi-General characteristics, cell structure, Classification, Economic Importance, Structure, Reproduction and life cycle of *Rhizopus*, *Penicillium*, *Aspergillus*, Yeast, *Puccinia*, Heterothallism, Degeneration of sex in fungi.

Plant Pathology-Concept of pathogen, Mode of infection, Disease cycle, Host-parasite interaction, Causal organism, Symptoms and Control measures of Late blight of potato, Smut of Sugarcane, Rust of wheat, Citrus canker, Mosaic disease of Tobacco.

Viruses-General characteristics, Size and shape, Structure, Replication in TMV and Bacteriophages (Lytic and Lysogenic cycle).

Bacteria-Archaea- General features, Cell structure, Eubacteria-Structure, Nutrition and Reproduction (Vegetative, Asexual and Sexual), Economic importance. Cyanobacteria-General characteristics, Cell structure, Life history of *Nostoc*, *Oscillatoria*, *Spirulina*.

UNIT-II

Bryophyta- General characteristics, Classification, Reproduction and Alterations of generations, Economic importance. Morphology, anatomy and Reproduction of *Riccia*, *Marchantia*, *Anthoceros* and *Spagnum*.

Pteridophyta-General characteristics, Classification, Reproduction and Alterations of generations. Morphology, anatomy and reproduction of *Psilotum*, *Lycopodium*, *Selaginella*, *Equisetum*, *Isoetes* and *Marsilea*, Stellar evolution, Heterospory and seed habit

Gymnosperm-General characteristics, morphology, anatomy and reproduction of *Cycas*, *Pinus*, *Gnetum*. Fossil and fossilization Process. Fossils :- *Cycadeoidea* and *Lyginopteris*.

UNIT-III

Morphology and Taxonomy of Angiosperms: Root, stem and their modifications. Types of leaves; Venation, Phyllotaxy and modification. Inflorescence, structure of flower, Placentation, Types of fruits, Floral diagram, Floral formula. Important features of the families, Cruciferae, Fabaceae, Malvaceae, Asteraceae, Lamiceae and Poaceae. Classifications: Bentham and Hooker, Hutchinson, Modern trends in botany (ICBN, Typification, Author Citation, Valid Publication).

Anatomy: Tissue and tissue systems, Organisation of apical meristem in root and shoot, Anatomy of typical Dicot and Monocot roots, stems and leaves. Origin of lateral root, Secondary growth, heartwood, sapwood and annual ring. Anomalous secondary growth of stem and root (*Bignonia*, *Boerhavia*, *Mirabilis*, *Nyctanthes* and *Dracena*).

Embryology of Angiosperms:

Microsporogenesis, Male gametophyte, Megasporogenesis, Female gametophyte, Pollination, Pollen- Pistil interaction, Fertilization (Double fertilization and Triple fusion) Sexual incompatibility, Development of Embryo (Monocot and Dicot), Apomixis, Polyembryony, Parthenogenesis. Development of Endosperm. Seed development, Types of seeds, Mechanism of seed dispersal.

UNIT- IV

Plant Physiology: Water relations (Adsorption, Imbibition, Osmosis, Water Potential and its components), Absorption of water, ascent of sap, transpiration (mechanism of stomatal movement, factors affecting transpiration, significance), Importance and deficiency of macro and micro nutrients, Translocation of organic solutes, Phloem loading and unloading.

Biochemistry: Photosynthesis, Pigments, Reaction center (PSI & PSII, LHC I & LHC II) Light reaction, Cyclic and Non – Cyclic Photophosphorylation, Dark reaction, Factors affecting photosynthesis.

Respiration: Types, (Aerobic, Anaerobic, Fermentation). Biochemistry of Glycolysis, Krebs cycle, ETC and Oxidative phosphorylation, Photorespiration, Synthesis of ATP.

Enzymes: Classification, Structure and Properties. Concept of Active site (Domain & Motif), Mechanism of enzyme action, Michaelis-Menten constant, Enzyme inhibition.

Nitrogen metabolism: Essentiality of Nitrogen to Plants, Mechanism of Biological Nitrogen fixation, (Symbiotic & Asymbiotic), Nif gene, Assimilation of Nitrate & ammonia.

Plant growth & growth hormones: Concept of growth and development, Measurement of growth, growth curve. Photoperiodism, Vernalisation, Senescence, Physiological effects of Auxin, Gibberlin, Cytokinin, Absciscic acid, Ethylene. Plant movement, cause and breaking of Seed dormancy.

Ecology: Ecological factors, Morphological, physiological & anatomical adaptations, Hydrophytes, Halophytes, Xerophytes, Epiphytes

Plant succession: Concept and principle of succession, Hydrosere, Xerosere, Ecosystem-Structure and function, Food chain and food web, Ecological pyramid, Energy flow in ecosystem, Biogeochemical cycles (Carbon, Nitrogen, Phosphorous). Plant community & its characters.

Environmental pollution: Causes, effects & control measures of Soil, Water, Air & Noise pollution.

UNIT-V

Cell biology: Cell theory, Structure and Function of Cell wall, Plasma membrane, Protoplasm, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgibodies, Glyoxisome, Peroxysome, Ribosome, Lysosome, Dictyosome, Sphaerosome, Vacuole, Cytoskeleton, Nucleus, Chromosome. Cell cycle & its regulation. Mitosis, Meiosis (Stages & significance).

Molecular Biology: DNA as the genetic material, Structure and types of DNA. Replication of DNA, types of RNA, Transcription, Post-transcriptional modification, Genetic code, Translation, Post-translational modification, Regulation of gene expression in prokaryotes & eukaryotes, Gene silencing, Transposons, DNA, RNA & Protein hybridization (Northern, Southern & Western blotting).

Genetics: Mendel's laws of inheritance, Gene interaction (Non – Mendelian ratio) Linkage & Crossing over, Sex determination in plants, Chromosomal aberration, Extra nuclear inheritance, Mutation Mutagenic agents, Polyploidy. Plant breeding and crop improvement.

Evolution: Evidences, Theory and mechanism.

Plant biotechnology: Plant tissue culture & techniques. Clonal Propagation, Somaclonal variation, Protoplast isolation & somatic hybridization. Pollen & Ovary culture for generation of haploid plants. R-DNA Technology, DNA Transfer (Direct & Vector mediated)

Transgenic plants: Agrobacterium mediated gene transfer, Importance & application of Transgenic plants in Agriculture.

Economic botany: Crop domestication, Importance of germplasm diversity, Origin, morphology, cultivation, processing & economic uses of Rice, Jute, Mung, bean, Potato, Groundnut, Black pepper, Tea, Rubber. Medicinal use of *Cinchona*, *Rawolfia*, *Vinca*, *Aegle* and *Emblica*.