

Botany

PAPER-I

- Unit-I - Algae** - General characteristics, Organization of thallus, Cell Structure, Reproduction, Alternation of generation, Economic importance; Structure, Reproduction and life cycle of *Chlamydomonas* and *Spirogyra*.
- Cyanobacteria** - General characteristics, Cell structure, Heterocysts, Reproduction and Economic importance.
- Fungi** - General characteristics, organization of thallus, Reproduction, Alternation of generations, Economic importance; Structure, Reproduction and life cycle of Yeast, *Mucor* and *Rhizopus*.
- Lichens** - Thallus structure and Reproduction of Lichen.
- Plant Diseases** - Late blight of potato, Smut and rust of wheat, Citrus Canker, Mosaic Disease of tobacco.
- Unit-II - Bryophytes** - General characteristics, Alternation of generation, Economic significance; Structure & Reproduction of *Riccia*, *Anthoceros* and *Sphagnum*.
- Pteridophytes** - General characteristics, Alternation of generation, Stelar structure, Heterospory and seed habit; General Morphology, Anatomy and Reproduction of *Psilotum*, *Sellaginella* and *Marsilea*.
- Gymnosperms** - General characteristics, Resemblances with and differences between Pteridophytes and Angiosperms; General Morphology, Anatomy and Reproduction of *Cycas*.
- Unit-III - Morphology of Angiosperms** - Root, Stem and their modifications; Leaves and their types, Venation and modifications; Phyllotaxy; Inflorescence; Structure of flower, Floral diagram and Floral Formula; Important features of the families; Cruciferae, Fabaceae, Malvaceae and Poaceae.
- Unit-IV - Anatomy** - Anatomy of typical dicot stems, root and leaf; Secondary growth and anomalous secondary growth of stems.
- Embryology of Angiosperms**- Microsporangium, Male gametophyte, Megasporangium, Female gametophyte, Pollination, Fertilization, Sexual incompatibility, Endosperm, Embryo, Seed development, Structure and types of seeds, Seed dispersal, Seed dormancy and germination.
- Unit-V - Ecology** - Ecological factors; Ecological adaptations - Hydrophytes, Xerophytes, Mesophytes; Plant succession; Bio-geochemical cycles, Ecosystem and their components, Major ecosystems, Environmental pollution- air, soil and water pollution and their control measures.

PAPER-II

- Unit-I- Viruses**- General characteristics, size and shape, structure, viral multiplication.
- Bacteriophages**- Types, Multiplication, Lytic cycle, Lysogeny.
- Archaea** - General features, cell structure and types.

Eubacteria - Morphology, Internal structure, Transformation, Conjugation, Transduction.

Unit- II - Cell Biology - Cell structure, Cell wall, Cell membrane, Plastids, Mitochondria, Golgi bodies, Glyoxisomes, Peroxisomes, Ribosomes, Nucleus and Nucleolus; Structure of Chromosomes; Cell cycle - Mitosis and Meiosis.

Unit - III - Genetics - Mendel's laws of Inheritance, Interaction of genes; Linkage, Recombination and Gene mapping; Extra-Nuclear inheritance; Mutation-Types and induction, DNA damage and repair; Types of polyploidy, Role of mutation and polyploidy in crop improvement.

Unit - IV - Molecular Biology - DNA is the genetic material, Structure and Replication of DNA, DNA polymerase; Structure and types of RNA; RNA polymerase and transcription, RNA processing; Translation; Regulation of gene action in prokaryotes with reference to lac-operon.

Plant Biotechnology- General idea about plant tissue culture, sterilization techniques, clonal propagation, somaclonal variation; Protoplast isolation and somatic hybridization.

Transgenic plants- *Agrobacterium*-mediated gene transfer, Direct gene transfer, Insect (Bt.) and herbicide(glyphosate) resistant transgenic plants.

Unit - V - Plant Physiology - Water relations of plant cells, absorption of water, ascent of sap, transpiration, mineral nutrition; Phloem transport.

Plant Biochemistry - enzymes; Photosynthesis and photorespiration, respiration, nitrogen metabolism.

Plant growth regulators - (auxins, gibberellin, cytokinin, abscisic acid, ethylene), Photoperiodism and vernalization.

Chemistry

PAPER-I

SECTION-A : PHYSICAL CHEMISTRY

Unit-I:

Classical thermodynamics

Brief resume of concepts of law of thermodynamics – free energy, chemical potential and entropies – Partial molar properties – partial molar free energy – partial molar volume and partial molar heat content and their significances – concept of fugacity and determination of fugacity – activity – activity coefficient – Third law of thermodynamics, excess functions for non ideal solutions