

# SYLLABUS

## BOTANY (C.G.) : B. Sc. III

### FIRST PAPER

#### PLANT PHYSIOLOGY, BIOCHEMISTRY AND BIOTECHNOLOGY

**Unit 1. Plant-Water Relations** : Importance of water to plant life; physical properties of water; diffusion and osmosis; absorption, transport of water and transpiration; physiology of stomata.

**Mineral nutrition** : Essential macro and micro-elements and their role; mineral uptake; deficiency and toxicity symptoms.

**Unit 2. Transport of Organic Substances** : Mechanism of phloem transport; source-sink relationship; factors affecting translocation.

**Basic of Enzymology** : Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and cofactors; regulation of enzyme activity, mechanism of action.

**Photosynthesis** : Significance, historical aspects; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems; Z-scheme; photo-phosphorylation; Calvin cycle;  $C_4$  pathway; CAM plants; photorespiration.

**Unit 3. Respiration** : ATP the biological energy currency; aerobic and anaerobic respiration; Krebs's cycle electron transport mechanism (chemi-osmotic theory); redox potential; oxidative phosphorylation; pentose phosphate pathway.

**Nitrogen and Lipid Metabolism** : Biology of nitrogen fixation; importance of nitrate reductase and its regulations; ammonium assimilation; structure and function of lipids; fatty acid biosynthesis; Beta-oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids.

**Unit 4. Growth and Development** : Definitions; phases of growth and development; kinetics of growth seed dormancy, seed germination and factors of their regulation; plant movements; the concept of photoperiodism; physiology of flowering; florigen concept; biological clocks; physiology of senescence, fruit ripening; plant hormones

auxins, gibberellins, cytokinins, abscisic acid and ethylene, history of their discovery, biosynthesis and mechanism of action; photomorphogenesis; phytochromes and cryptochromes, their discovery, physiological role and mechanism of action.

**Unit 5. Genetic Engineering :** Tools and techniques of recombinant DNA technology; cloning vectors; genomic and c-DNA library; transposable elements; techniques of gene mapping and chromosome walking.

**Biotechnology :** Functional definition; basic aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of *Agrobacterium*; vectors for gene delivery and marker genes; salient achievements in crop biotechnology.

## SECOND PAPER

### ECOLOGY AND UTILIZATION OF PLANTS

**Unit 1. Plants and Environment :** Atmosphere (gaseous composition), water (properties of water cycle), light (global radiation, photosynthetically active radiation), temperature, soil (development, soil profiles, physico-chemical properties) and biota.

Morphological, anatomical and physiological responses of plants to water (hydrophytes and xerophytes), temperature (thermoperiodicity), light (photoperiodism, heliophytes and sciophytes) and salinity.

**Unit 2. Community Ecology :** Community characteristics, frequency, density, cover, life forms biological spectrum; ecological succession.

**Ecosystems :** Structure, abiotic and biotic components; food chain, food web, ecological pyramids, energy flow; biogeochemical cycles of carbon, nitrogen and phosphorus.

**Unit 3. Population Ecology :** Growth curves; ecotypes; ecads. Biogeographical regions of India.

**Vegetation Types of India :** Forests and grasslands.

**Unit 4. Utilization of Plants**

**Food Plants :** Rice, wheat, maize, potato, sugercane.

**Fibres :** Cotton and jute.

**Vegetable Oils :** Groundnut, mustard and coconut.

General account of sources of firewood, timber and bamboos.

**Unit 5. Spices :** General account.

**Medicinal Plants :** General account.

**Beverages :** Tea and coffee.

**Rubber.**