

BSc. Botany

SEMESTER V

**Paper– VII
Plant Biochemistry**

M.M.100

Unit – I

Carbohydrates: classification, structure and properties of- monosaccharides (aldose and ketose sugars); oligosaccharides (reducing and non-reducing sugars); polysaccharides (storage- starch, inulin; structural- cellulose, pectin, chitin, aminoglycans, peptidoglycans, glycoprotein, glycolipids).

Unit - II

Lipids: classification, structure and properties of - fatty acids (saturated and unsaturated); simple lipids, compound lipids and derived lipids.

Vitamins: structure and properties of vitamins.

UNIT III

Amino acids: classification, structure and properties of amino acids, essential and non-essential amino acids.

Proteins: classification, structural organization of proteins, biological roles of proteins.

Unit IV

Enzymes: general structure; active sites; action specificity; mode of action; aspects of enzyme kinetics (Michaelis-Menten constant); enzyme inhibition, factors affecting catalytic efficiency of enzyme.

Bioenergetics: Laws of thermodynamics; concept of Gibb's free energy in plants; redox reactions; high energy rich compounds.

BSc. Botany

SEMESTER V

Paper VIII

Plant Resource Utilization, Palynology and Biostatistics

M.M. 100

Unit- I

Centres of diversity of plants, origin of crop plants, domestication and introduction of crop plants. Cultivation, production and uses of - wheat, rice, legumes, sugarcane

Unit-II

A general account of plants yielding oils, spices, beverages. An account of major fiber, medicinal and petro plants of Uttar Pradesh.

Unit-III

Conservation of plant resources for agriculture and forestry.

In situ conservation sanctuaries, national parks, biosphere reserves, wetlands, mangroves.

Ex situ conservation; field gene banks, seed banks, cryobanks.

Unit-IV

An introductory knowledge to palynology, morphology, viability and germination of pollen.

Classification of data, mean, median and mode, standard deviation, standard error, variance, co-relation, X^2 test.

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SEMESTER VI

**Paper – IX
Ecology, Soil Science and Evolution**

M.M 100

Unit- I

Ecology: definition and scope.

Ecological adaptations and ecological groups: hydrophytes, xerophytes , halophytes

Mineral resources of planet earth, conservation of mineral resources.

Unit-II

Ecosystem: Concepts and components.

Kinds of ecosystems; Food chains, webs and ecological pyramids.

Plant community and Plant succession - hydrosere, xerosere etc.

Unit-III

Soil science: soil formation, profile development; soil composition.

Properties of soil (Texture, density, temperature, organic matter, soil pH, ion exchange)

Soil types of India.

Soil erosion,soil conservation.

Problem soils and their reclamation.

Unit-IV

Evolution and Origin of life

Evidences of organic evolution-from anatomy, taxonomy, distribution, embryology, palaeontology, physiology and biochemistry, genetics and molecular biology

Theories of organic evolution- Darwinism, Lamarckism, Mutation theory, Synthetic theory

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SEMESTER VI

Paper - X
Environmental Botany and Plant Pathology

M.M 100

Unit – I

Mineral resources of planet earth, conservation of mineral resources.
The source of water, physico-chemical and biological properties of water.
Sustainable management of water.
Energy resources in India
Forests: global forest wealth, importance of forests, deforestation.

Unit – II

Environmental pollution: air, water, soil, radioactive, thermal and noise pollutions, their sources, effects and control.
Greenhouse effect, ozone depletion and acid rain.
CO₂ enrichment and climate change.

Unit – III

Biodiversity and Phytogeography.
Biotic communities and populations, their characteristics and population dynamics.
Natural vegetation of India, static and dynamic plant geography.
Basic principles governing geographical distribution of plants, endemism.

Unit – IV

Etiology of viral, bacterial, fungal and insect-pest diseases.
Mosaic diseases on tobacco and cucumber, yellow vein mosaic of bhindi, citrus canker, potato scab, little leaf of brinjal, damping off of seedlings, late blight of potato, red rot of sugarcane.
Integrated pest disease management.

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SEMESTER VI

**Paper – XI
Plant Molecular Biology and Biotechnology**

M.M. 100

Unit – I

Nucleic acid as genetic material.
Structure and properties of nucleic acids and their functions.
Replication of DNA in Prokaryotes and Eukaryotes.
Cell cycle.

Unit – II

Central Dogma and Genetic code.
Transcription in Prokaryotes and Eukaryotes.
Processing and modification of RNA, Structure of t RNA.
Translation- Ribosome structure and assembly in prokaryotes and eukaryotes; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides.

Unit - III

Regulation of Gene expression in Prokaryotes and Eukaryotes- Regulation of lactose metabolism and tryptophan synthesis in E.coli.; Britten Davidson approach, Transcription factors, Hormonal control and second messengers Ca⁺, Cyclic AMP, IP₃ etc.

Unit IV

Introduction to biotechnology.
Recombinant DNA technology.
Plant tissue culture –methods and applications.
Methods of gene transfer, relevance of transgenic plants.
Biotechnology and healthcare.
Microbial and environmental biotechnology.

B.Sc. Semester V - Botany Practical Syllabus

Plant Biochemistry; Plant Resource Utilization, Palynology and Biostatistics;
Ecology, Soil Science and Evolution; Environment Botany and Plant Pathology;
Plant Molecular Biology and Biotechnology

- Q. 1.** Experiments on enzyme (catalase) activity and various factors affecting it; isolation of proteins and carbohydrates and their qualitative tests; isoelectric point determination, solubility of proteins and lipids.
- Q. 2.** (a) Demonstrations of plants and plant parts yielding commercially important products viz. cereals, pulses, oil species, fibers, medicines etc.
- (b) Biochemical tests for starch, cellulose, lignin etc.; Study of morphology and viability of pollen.
- Q. 3.** (a) Ecological adaptations (anatomical & morphological) of Hydrophytes (*Hydrilla*, *Eichhornia*, *Nymphaea*, *Typha*) and Xerophytes (*Casuarina*, *Nerium*, *Saccharum*, *Begonia*).
- (b) Demonstration of soil types and soil forming minerals (for spotting).
Demonstration of soil texture by touch/sieve method.
Determination of water capability rise rate, water infiltration rate, water percolation rate, soil pH by pH paper method, calcareousness by effervescence method, base deficiency test, soil fertility evaluation for N and P .
- Q. 4.** (a) Demonstration of instruments for measuring environmental parameters (for spotting).
Determination of acidity, alkalinity, hardness, dissolved oxygen in water sample.
- (b) Representative material/ specimens for study of symptoms (external and internal) of fungal, bacterial and viral diseases, based on morphological/anatomical study as applicable eg. Leaf spot of crucifers, red rot of sugarcane, late blight of potato, fruit rot, damping off, TMV, vein clearing, citrus canker etc.,
- Q. 5.** Demonstrations of diagrams/ electron micrographs/ photographs/ flow schemes of all the topics related to molecular biology and biotechnology.