

## **Botany ; PAPER II**

1. Systematics: Aims, objectives and scope of taxonomy, Nomenclature and classification. Taxonomic literature, Evolutionary trends and variations, ICN, phylogenetic classifications, APG system of classification, species concepts, speciation, Biosystematics, biosystematic categories, Paleobotany.

2. Cryptogams and Phanerogams.

3. Plant Physiology & Biochemistry: Water relations and membrane transport, photosynthesis and respiration, nitrogen metabolism, hormones, Stress physiology and tolerance mechanisms, strategies used for development of stress resistant. Carbohydrates, Lipids, Proteins, Nucleic acid, Enzymes, Enzyme kinetics; Metabolism of carbohydrates, Lipids, Proteins.

4. Molecular & Cell Biology: Chromosome organization, DNA replication and repair, Chromatin organization, protein synthesis, transcriptional and translational regulation, Protein targeting. Organization of plant cell and its inclusions, Cell membrane, vacuoles, cytoskeleton, Totipotency, cell cycle, apoptosis, , signal transduction in cells.

5. Genetics & plant breeding: Mendelian genetics, concept of gene, Linkage and recombination, genetic mapping, extra chromosomal inheritance, chromosome banding, FISH and GISH, Microbial genetics, phage genetics, linkage and crossing over, recombination, homologous and non-homologous linkage maps.

Mutation breeding, role of polyploidy in plant breeding, genetically engineered plants.

6. Ecology: Structure, types and functions of Ecosystem, Ecological succession, habitat & Niche concept. Biomes, population & community ecology, plant interactions, phytogeography, endemism, Endangered species, IUCN categories, Ecological modelling . Biodiversity, Natural resources, Forest types & protected area. Wetlands, GIS and Remote sensing.

7. Environmental Biology: Air, water & soil Pollution, Pollution indicator species, Ecorestoration with reference to plants and microbes, Environmental Impact

Assessment, Ecotoxicology, waste & sewage treatment, carbon sequestration. National and International conventions and laws for protection and conservation of biological resources. Climate change .

8. Plant Biotechnology: Plant tissue culture techniques, Micropropagation, cell, tissue and organ culture, Elicitation and secondary metabolites production. Enzymes in genetic engineering, cloning vectors, Agrobacterium mediated gene transfer, characterization of transformants, Gene libraries, DNA sequencing.

9. Bioprospecting & Ethnobotany: types of Bioprospecting, Phytochemicals used in aroma, flavour and medicines. Active biomolecules. Plant resources and natural products, Exploration of lower and higher plant for standardization of herbal medicines as per US-FDA.

10. Tools and Techniques: Microtomy, Chromatography, Electrophoresis, Centrifugation, Microscopy, Chromatographic techniques – column, HPLC, GCMS, Immunological and Electrophoretic techniques, Spectroscopy. Fluorescence and confocal microscopy, SEM and TEM.

11. Biostatistics and Bioinformatics: Mean, Mode Median. Standard Deviation. Experimental Design – Completely Randomized Block and Factorial Experimental Design. Analysis of variance, Populations and samples, Graphical representation of data, frequency distribution, central tendency and dispersion, Introduction to databases and retrieving information from databases, Molecular tools in protein and nucleotide sequence analysis.