



DRAVIDIAN UNIVERSITY
Centre for Off-Campus Education & Research
Syllabus for M.Phil/Ph.D Botany
Paper II: Broad Field

UNIT – I

General principles of plant pathology: Infection, disease development, symptomatology and Epidemiology of plant diseases incited by Fungi, Bacteria, Viruses, Viroids and Phytoplasmas. Principles of plant disease control. Gene Mutations - Types, Physical and Chemical Mutagens, Molecular basis of Gene Mutations. Transposable Elements in Prokaryotes and Eukaryotes, Mechanism of Transposition. Site-directed Mutagenesis. Structural and numerical alterations in chromosomes: Origin, Meiotic behavior of Duplication, Deficiency, Inversion and Translocation; Structural Heterozygotes. Origin, Production and Meiotic behavior of Haploids, Autopolyploids, and Allopolyploids. Genome analysis of Allopolyploids. Production, Meiosis and significance of Trisomics and Monosomics.

UNIT - II

Historical development of phenetic versus phylogenetic systems of classification. Merits and demerits of Bentham and Hooker, Engler and Prantle, Bessey, Hutchinson, Cronquist, Thorne, Dahlgren, and APG classification systems. Herbarium Methodology. Plant identification and Taxonomic Keys. Agriculture and Food crops: Cereals-Major and Minor Millets; Pulse crops, Oil seed crops, Fruits and Vegetables; Non Wood Forest Products: Rubber, Latex, Gums, Resins, Dyes, Tannins, Fibers, Apiculture, Bio-vitamins and Aromatic plants; Commercial crops: Spices and Condiments, Flavoring Products, Beverages, Fumigatories and Mastigatories, Narcotics, Orchids, Ornamentals and Cut flowers; Silviculture: Timber yielding plants; Conventional and Non Conventional Energy Resource Development. Bamboos, Ratoons, Generation of Paper Industry Raw material.

UNIT – III

Structure of anther; Microsporogenesis, Role of Tapetum; Pollen Development, Pollen Germination, Pollen tube growth and Guidance; Pollen storage; Pollen allergy; Elements of Palynology. Ovule – Structure and development; Megasporogenesis; Development and Organization of the mature Embryo Sac; Structure of the Embryo Sac cells; Embryo Sac Haustoria. Green House Gases and Global Warming; Ozone hole, Impact on Plant and Ecosystem, Restoration. Remote sensing – Concept, Principles, Application and Role in Study

and Identification of Phyto Diversity and Natural Resources. GIS, Application of Microwaves and Radiation.

UNIT – IV

Plant cell water relations, Mechanism of water uptake and transport in plants; SPAC concept; Stomatal movements, Phloem transport of organic substances – Phloem loading and unloading; Passive and active solute transport; Membrane transport proteins.

Fundamentals of Enzymology: General concepts, Allosteric mechanism, Mode of Enzyme action, Regulator and Active sites, Isozymes. Over view of plant Respiration, Glycolysis, TCA cycle, Electron transport and ATP synthesis, Pentose Phosphate Pathway. Structure and functions of Lipids, Glyoxylate cycle, Fatty acid biosynthesis; Synthesis of Membrane, Structural and storage lipids; Catabolism of lipids.

UNIT - V

Principles of Gene Cloning and Analysis: DNA isolation, Chemical synthesis, use of Restriction Endonucleases, DNA end Modifying enzymes, Homo Polymers, Linkers and Adaptors used in Genetic Engineering. Cloning vectors – Plasmids, Phages, Cosmids, Phagemids, YAC's and BAC's. Host systems, Bacterial transformation and Transfection. Selectable markers and Reporter genes. Genomic DNA and cDNA libraries. Nucleic acid probes. Colony and Plaque hybridization. Dot Blotting, Southern, Northern, Western blotting; Analysis of cloned gene product -PCR, variation and significance. DNA marker systems – RFLP, RAPD, AFLP, SSR & SNP' s, Molecular Genetic maps and Physical maps. DNA sequencing; DNA databases. Genome and Gene Annotation. Bioinformatic Tools for Gene Identification and Function. Rice and *Arabidopsis* Genome Projects.
