

Chhindwara University, Chhindwara (M.P.)

SYLLABUS OF M.A./M.Com/M.Sc./M.H.Sc./PREVIOUS/FINAL OR SEMESTER II - BOTANY

Name of Paper	Title of paper	Max. Marks		Minimum Marks			Total Marks
		Theory	CCE	Practical	Theory	CCE	
Paper I	Taxonomy of Angiosperms	40	10	50	15	04	20
Paper II	Morphology, Anatomy and Embryology of Angiosperms	40	10	Pract I	15	04	
Paper III	Plant Ecology	40	10	50	15	04	20
Paper IV	Cell Biology, Genetics and Plant Breeding	40	10	Pract-II	15	04	

Board of Studies :

- I. Chairman - Dr. S. K. Chitale
- II. Subject Expert -
 1. Dr. Nemant Verma
 2. Nikhil Kanungo
 - 3.
 - 4.
 - 5.
 - 6.
 - 7.

SYLLABUS PRESCRIBED FOR THE DEGREE OF MASTER OF SCIENCE IN BOTANY

(Academic Session 2019 – 2020 & Onwards)

SECOND SEMESTER

Paper 1 – Taxonomy of Angiosperms

Unit – 1

Species concept, Taxonomic hierarchy, International Code of Botanical Nomenclature, Taxonomic evidences – Morphology, Anatomy, Embryology, Palynology, Cytology, Phytochemistry and Numerical taxonomy. Taxonomic tools – Histological, biochemical, cytological, phytochemical, serological and molecular techniques. Herbarium, Botanical gardens, taxonomic literature, taxonomic keys, floras.

Unit – 2

Systems of Angiosperm classification – phenetic versus phylogenetic. Angiosperms phylogeny group (APG). Relative merits and demerits of major systems of classification. Origin of Angiosperms – various theories. Origin of interpopulation variation; population and environment; ecads and ecotypes; Evolution of different species – various models.

Unit – 3

Plant exploration, invasions, introduction and secondary centers. World centers of primary diversity of domesticated plants. World's megadiversity centers and hotspots of Indian biodiversity, Various levels of biodiversity. Endemism. IUCN red list of threatened species. Local plant diversity and its socio-economic importance.

Unit – 4

Exhaustive and comparative study of Families of Magnoliopsida – Ranunculaceae, Magnoliaceae, Annonaceae, Papaveraceae, Brassicaceae, Capparidaceae, Portulacaceae, Oxalidaceae, Rutaceae, Meliaceae, Rosaceae, Cucurbitaceae, Cactaceae, Apiaceae, Rubiaceae, Asteraceae, Gentianaceae, Apocynaceae, Bignoniaceae, Acanthaceae, Lamiaceae, Verbenaceae, Chenopodiaceae, Nyctaginaceae, Euphorbiaceae, Urticaceae and Moraceae.

Unit – 5

Exhaustive and comparative study of Families of Liliopsida – Orchidaceae, Eridaceae, Amaryllidaceae, Musaceae, Zingiberaceae, Commelinaceae, Arecaceae, Typhaceae, Cyperaceae and Poaceae.

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SECOND SEMESTER

Paper 2 – Morphology, Anatomy and Embryology of Angiosperms

Unit – 1

Morphological nature of different plant parts, Morphology of stamen and carpel; Carpel evolution; Morphology of inferior ovary. Placentation: their origin and types. Genetics of floral development: *Arabidopsis thaliana* and *Antirrhinum major*. ABC model of floral development.

Unit – 2

Shoot development; organization of shoot apical meristem (SAM). Cytological and molecular analysis of SAM. Cell to cell communication. Control of tissue differentiation especially xylem and phloem, secretory ducts and laticifers. Wood development in relation to environmental factors.

Root development; organization of root apical meristem (RAM). Vascular tissue differentiation. Root microbe interaction. Root-Stem transition.

Leaf growth and differentiation; Determination of phyllotaxy. Determination of epidermis and mesophyll. Control of leaf fall.

Unit - 3

Anatomy of typical monocot and dicot stem and root and their secondary growth. Anatomy of anomalous dicot stem – *Bougainvillea*, *Salvadora*, *Achyranthes*, *Chenopodium*, *Boerhaavia*, *Leptadaenia*, *Mirabilis*, *Amaranthus*, *nyctanthus*, *Bignonia*, *Yucca* and *Dracaena* stem.

Unit – 4

Ecological anatomy of stem, root and leaf of Xerophytes, Halophytes, Hydrophytes, Epiphytes, Mesophytes and Parasites.

Unit – 5

Embryology of Angiosperms: Male gametophyte – Structure of anthers, microsporogenesis, role of tapetum, pollen development, pollen germination, pollen tube growth and guidance, pollen storage, pollen allergy and pollen embryos. Female gametophyte – Ovule development, megasporogenesis, organization of embryo sac, structure of embryo sac cells. Pollination, Pollen – Pistil interaction and fertilization. Seed development and fruit growth, Seed dormancy.

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SECOND SEMESTER

Paper 3 – Plant Ecology

Unit – 1

Introduction, divisions of plant ecology; Ecosystem components – abiotic and biotic. Factors – light, temperature and water. Population ecology; Inter and Intra specific competition and self regulation. Community organization; concept of community and continuum. Analysis of community – analytical and synthetic characters; Community coefficient, association, concept of ecological niche.

Unit – 2

Ecosystem development and stability; Temporal changes – cyclic and non-cyclic. Succession process and types, facilitation, tolerance and inhibition models, concept of climax and persistence. Ecological stability concept – resilience and resistance. Ecological perturbation – natural and anthropogenic and their impact on plants and ecosystem. Ecosystem restoration.

Unit – 3

Fate of energy and matter in ecosystem; trophic organization and structure; food chain and food web, energy flow pathways. Ecological efficiencies, consumption, assimilation and production. Primary production method of measurement, limiting factors. Litter fall and decomposition; Recycling pathway relation between energy flow and recycling pathway nutrient cycling. Global biogeochemical cycle of carbon, nitrogen, phosphorous and sulphur.

Unit – 4

Air, water and soil pollution – kinds, sources, quality parameter, effect on plant and ecosystem. Climate change, green house gases – trends and role, Ozone layer and ozone hole. Consequences of climate change – CO₂, fertilization, global warming, sea level rise and UV radiation. Ecological management concept, sustainable development and sustainability indicator.

Unit – 5

Major biomes, major vegetation and soil types of world. Botanical regions of India – tropical rain forest and seasonal forest, boreal forest, grasslands, desert, aquatic ecosystem, wetland lakes, ponds, streams, rivers, marine and estuarine habitats.

Paper 4 – Cell Biology, Genetics and Plant Breeding

Unit – 1

Structure and organization of Plant cell, Structure and function of Cell wall, Plasma membrane – ion carriers, channels and pumps, Receptors, plasmodesmata and sites for ATPases. Structure and function of cell organelles: ER, Lysosomes, Ribosomes, Golgi complex and vacuoles. Cytoskeleton: Microfilaments and Microtubules.

Unit – 2

Structure and functions of Chloroplast and Mitochondria. Structure and function of Nucleus, Nucleosome, Chromosome structure and packaging of DNA, Euchromatin and Heterochromatin, Karyotype, Binding patterns, Special types of chromosomes. Structure of prokaryotic chromosomes - E.coli and λ Phage. Extra chromosomal genome (Cytoplasmic inheritance) of Chloroplast, Mitochondria and Plasmids.

Unit – 3

Mendel's laws of Inheritance, Neomendelism, Interaction of genes. Sex determination in plants. Crossing over. Molecular mechanism of recombination. Role of Rec A B C & D, Site specific recombination. Linkage and linkage maps.

Unit – 4

Cell division, Cell cycle, programmed cell death, role of cyclins and cyclin-dependent kinases, Structural changes in chromosomes (Duplication, Deletion, Inversion and Translocation), Numerical changes in chromosomes (Aneuploids, Euploids and Haploids). Oncogenes and Tumor Suppressor Genes.

Unit – 5

Plant breeding: in-situ Hybridization, Origin centers, Concept and techniques, Genetic basis of inbreeding and heterosis, exploitation of hybrid vigor, Cytoplasmic hybridization and tissue culture in plant breeding.

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