Syllabus for M.Sc. Entrance in Botany 2025

Note: The syllabus prescribed for the entrance test has been divided into fifteen units. Each unit carries a weightage of four marks. Paper setters are required to set four multiple choice type questions with only one correct or most appropriate answer separately for each unit, giving uniform representation to the whole syllabus contained therein.

1. Viruses: Discovery, general structure, replication, DNA virus (T-phage); lytic and lysogenic cycle, RNA virus (TMV);Bacteria: General characteristics and cell structure; reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); economic importance
2. Fungi: General characteristics, classification (Alexopolous , Mims & Blackwell), cell wall composition, nutrition and reproduction; life cycle of Slime moulds, *Rhizopus*, *Venturia, Morchella, Agaricus, Puccinia, Alternaria, Phytophthora.* ; Introduction to plant pathology, General symptoms of plant diseases.; Symptoms, causal organisms and management of apple scab, powdery mildew in cucurbits, Paddy blast, *Alternaria* leaf blight of apple. Plant diseases control. Symbiotic associations: Lichens and Mycorrhiza - general account and significance
3. Algae: General characteristics, classification, criteria for algal classification; range of thallus organization; morphology, reproduction and life cycle of *Nostoc*, *Chlamydomonas, Oedogonium, Vaucheria, Ectocarpus, Batrachospermum*; economic importance of algae.
4. Archegoniate – General characteristics, adaptations to land habit. Bryophytes - General characteristics, Proskauer's classification (upto family); morphology, anatomy and reproduction (excluding developmental details) of *Marchantia* and *Funaria*; Evolution of sporophyte; apogamy and apospory; alternation of generation; economic importance of bryophytes.
5. Pteridophytes - Early land plants (*Rhynia*); morphology, anatomy and reproduction (excluding developmental details) of *Equisetum* and *Dryopteris*; heterospory and origin of seed habit; evolution of stellar systems in pteridophytes. Gymnosperms -morphology, anatomy and reproduction (excluding developmental details) of *Cycas* and *Pinus*; economic importance of gymnosperms.
6. Plant taxonomy: components and aims; types of classification - artificial, natural and evolutionary; phenetics: principles and methods; cladistics: concept and methods; classification systems - Bentham and Hooker (upto series), Angiosperm Phylogeny Group (AGP-IV) (upto order level).
7. Taxonomic sources and institutions: role of anatomical, embryological, cytological, palynological, phytochemical and molecular characters in plant taxonomy; herbaria: preparation and functions; botanical garden: criteria and uses; taxonomic literature: flora, monograph, manual, field guides; taxonomic keys; principles of nomenclature; typification.
8. Meristematic and permanent tissues**:** Simple and Complex tissue (Types and Functions); Organization of root and shoot apical meristem- Histogen theory; Tunica and corpus theory. Plant organs: Structure of a typical dicot and monocot root, stem and leaf. Secondary growth: Cambium- types, structure and function, Secondary growth in typical dicot stem; General account of wood structure (Heart wood and Sap wood); Adaptations: General structure and function of cuticle, epidermis and stomata.

9. Structural organization of flower: Development and structure of anther and pollen; Structure and types of ovules; Types of embryo sacs; Structure of a typical embryo sac. Pollination and fertilization**:** Types of pollination. Double fertilization. Embryo and Endosperm**:** Endosperm development, structure and functions; Structure and development of dicot and monocot embryo. Apomixis and Embryogeny: Definition, types and practical applications of apomixis and polyembryony.
10. Plant Water Relations**:** Water potential and its components; Transpiration and its significance; Factors affecting transpiration; Ascent of Sap, Pressure flow model; Phloem loading and unloading. Mineral nutrition: Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport.
11. Photosynthesis: Photosynthetic Pigments (Chl-a, Chl-b, xanthophylls, carotene); Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration. Respiration: Glycolysis, anaerobic respiration, TCA cycle; Electron Transport system and Oxidative phosphorylation.
    Enzymes: Structure and Classification; Mechanism of enzyme action and enzyme inhibition.
12. Nitrogen metabolism: concept of symbiotic and asymbiotic associations, Biological nitrogen fixation; Nitrate and ammonia assimilation. Plant growth regulators: Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA and ethylene. Photoperiodism (SDPs, LDPs, Day neutral plants); Vernalization.
13. Mendelian principles of inheritance; modified Mendelian ratios: incomplete dominance; 9:7; Duplicate genes 15:1. Multiple allelism and pleiotropy. Linkage: concept; complete & incomplete linkage, Bridges experiment. Crossing over: concept and significance. Numerical and Structural changes in chromosomes.
14. Cell Biology; structure of prokaryotic and eukaryotic cells; structure and function of biomembranes; fluid mosaic concept, Cell wall-structure and functions. Structure and functions of endoplasmic reticulum, Golgi bodies, lysosomes, and glyoxisomes, mitochondria, chloroplast and nucleus. Euchromatin and heterochromatin; mitosis and meiosis.
15. DNA-structure, types and replication-Watson and Crick's model, Griffith's and Avery's transformation experiments. Types of RNA (mRNA, tRNA, rRNA), Transcription and translation in prokaryotes, genetic code. Gene regulation in Prokaryotes: Lac operon.

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