Syllabus for PG Entrance Test, 2026 in Botany (2 Year Programme)

Note: *The syllabus prescribed for the entrance test 2026 has been strictly designed from course curriculum of UG Botany syllabus operational presently in colleges of the Kashmir region. For 2 year PG course in Botany the syllabus has been divided into* ***12 units****. Each unit carries a weightage of* ***five (05)*** *marks. The paper setters are required to set* ***60 MCQs*** *with five multiple choice type questions with one correct or most appropriate answer separately for each unit, giving uniform representation to the whole syllabus contained therein.*

1. **Microbes and Algae**: General characteristics of viruses; structure and life cycle of DNA and RNA viruses (T-phage, TMV); isolation and purification of viruses. General characteristics and cell structure of Bacteria; growth and reproduction in Bacteria; economic importance.
   Algae: General characteristics and classification of algae (Round 1965), criteria for classification of algae; range of thallus organization in Algae; life cycle of *Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Ectocarpus, Batrachospermum*; ecological and economic Importance of Algae.
2. **Mycology and Plant Pathology:** General characteristics; cell wall composition; nutrition and reproduction in Fungi; classification (Alexopolous *et al*., 1996). General account of Oomycota, Chytridiomycota, Zygomycota, Ascomycota, Basidiomycota, and Deuteromycota. Life cycle of *Phytophthora, Rhizopus, Aspergillus, Agaricus,* and *Alternaria.*
   Plant pathology: History and terms in plant pathology; plant disease and management (Late Blight of Potato, Powdery Mildew of Cucurbits, Apple Scab, Root knot of tomato). Methods of plant disease control. General characteristics of Slime Moulds; Lichens and Mycorhizae; ecological and economic importance of Lichens and Mycorhiza.

3. **Archegoniates:** General characteristics and classification of bryophytes (Proskauer, 1957); Morphology, anatomy and reproduction of *Marchantia, Anthoceros* and *Funaria*; evolution of sporophyte; apogamy and apospory; alternation of generation; economic importance of bryophytes. General characteristics of pteridophytes; criteria for classification of pteridophytes (Parihar 1996); morphology, anatomy and reproduction of *Equisetum* and *Dryopteris*; heterospory and origin of seed habit; evolution of stellar systems in pteridophytes.
   General characteristics of gymnosperms; morphology, anatomy and reproduction of *Cycas* and *Pinus*; economic importance of gymnosperms. General account of fossil bryophytes (*Naiadita*) fossil pteridophytes (*Rhynia*), and fossil gymnosperms (*Lyginopteris*).
4. **Plant Taxonomy:** Types of classification - artificial, natural and evolutionary; principles and methods of phenetics and cladistics; classification systems - Bentham and Hooker (1862-83): upto series; Angiosperm Phylogeny Group (AGP-IV) (2016):upto order; role of morphological, palynological, and molecular characters in plant taxonomy (elementary idea); preparation and functions of herbaria, major herbaria of world and India, virtual herbarium; uses of botanical gardens; Flora, monograph and manual; taxonomic keys; DNA barcoding (an elementary idea); principles and rules of nomenclature, typification.
5. **Plant Biochemistry:** Carbohydrates: structure and biological significance of monosaccharides; Fats: structure and functions of triacylglycerols and phospholipids; Proteins: Classification of proteins according to structure; Amino acids: Structure and biological significance. Enzymes: Nature, classification & nomenclature. Mode (Lock & key model, Induced-fit hypothesis) of enzyme action. Lipid Synthesis: Biosynthesis of fatty acids and glycerol. Carbohydrate biosynthesis: Synthesis of sucrose
6. **Plant Physiology:**Plant Water Relations: Water absorption by roots; Root pressure and guttation; Ascent of sap, Transpiration and its significance; Pressure flow model; Mineral nutrition: Essential elements, macro and micronutrients; Role of essential elements. Photosynthesis: Photosynthetic Pigments (Chl-a, Chl-b, xanthophylls, carotenes); 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. Plant growth regulators: Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA and ethylene. Photoperiodism; Vernalization.

7. **Plant Morphology and Anatomy:**Plant habit and life forms; types and modifications of root, stem, and leaves; types of inflorescence; aestivation; androecium & gynoecium (types, position, number and fusion); placentation and its types; fruit types.
   Classification and structure of Meristematic tissue; Organization of shoot apex (Tunica Corpus theory), and root apex (Apical cell theory); Structure and classification of permanent tissues. Structural differences in monocot and dicot stem, root, and leaf; Heart wood and sap wood; Secondary growth in stem; Structure and function of cuticle, trichomes and stomata; types and arrangement of vascular bundles.
8. **Cell Biology:** Cell structure and function; Characteristics of prokaryotic and eukaryotic cells; Structure and functions of cell wall and Plasma membrane. Structure and functions of chloroplast, mitochondria, peroxisomes mitochondria, endoplasmic reticulum, golgi apparatus, and lysosomes.
   Organization and functions of microfilaments, microtubules, Nuclearpore complex, nucleolus; Chromatin organization (Nucleosome model); Euchromatin and heterochromatin. Cell cycle and Cell Division (mitosis and meiosis)
9. **Molecular Biology**:DNA as genetic material; DNA structure (Watson and Crick model); Mechanism of DNA replication (Semiconservative); DNA damage and repair mechanisms.
   RNA structure and Types; Transcription in Prokaryotes and Eukaryotes (RNA polymerases, sigma factor, promoters, initiation, elongation and termination factors); Splicing and processing of pre-mRNA. General aspects of gene regulation; Operon concept (inducible and repressible system); Genetic code and its characteristics, Ribosome structure and assembly, Mechanism of translation (initiation, elongation and termination of polypeptides).
10. **Developmental Biology:** Floral induction and floral organ formation; Microsporogenesis and Megasporogenesis; Embryo sac types (monosporic, bisporic and tetrasporic). Pollination and pollinator types; Pollen pistil interaction; Self incompatibility (Sporophytic and gametophytic); Methods to overcome incompatibility barriers. Double fertilization and its significance; Development and structure of dicot and monocot embryos; Seed and fruit formation; Polyembryony and Apomixis.
11. **Genetics and Cytogenetics:** Chromosome morphology: Polytene & Lampbrush chromosomes; Mendel's Laws of inheritance, back cross and test cross; Multiple Alleles (ABO blood groups); Incomplete dominance and Co-dominance; Epistasis; Sex determination in Drosophila; Concept and types of linkage, factors affecting linkage; Structural changes in chromosomes (deletions, duplications, inversions, translocations).Origin of euploidy and aneuploidy; evolution of major crop plants (wheat, cotton, tobacco); Chromosomal aberrations in humans (Down's syndrome, Turner syndrome, Klinefelter syndrome);
12. **Plant Breeding:** Aims and objectives of plant breeding; modes of reproduction in crop plants; Male sterility mechanisms (GMS, CGMS, TMS); Breeding methods in self-pollinated crops (Mass selection, Pure line selection); Hybridization techniques; Back cross method of breeding. Population genetics (Hardy-Weinberg Law); Heterosis and inbreeding depression (genetic basis/theories); Barriers in wide hybridization; Techniques for overcoming incompatibility barriers. Clonal selection in asexually propagated crops, its merits and demerits; Role of Polyploidy in plant breeding; Concept of molecular breeding and marker assisted selection (brief account).

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