

Vardhman Mahaveer Open University, Kota
School of Science & Technology

PG Botany Entrance Test Syllabus

Viruses:

Characteristics, Ultra-structure, Classification and nomenclature, isolation, purification, replication, transmission, economic importance

Mycoplasma:

General characters and role in causing plant diseases

Bacteria:

Archaeobacteria and Eubacteria, General account, ultra-structure, nutrition, reproduction and economic importance

Cyanobacteria:

Silent features, structure, biological and economic importance

Fungi:

General characteristics of different classes/groups of fungi, cell ultra-structure, cell wall composition, nutrition, reproduction, heterothallism, parasexuality, recent trends in classification, economic importance

General account of diseases caused by plant pathogens:

Etiology of white rust of Albugo, green ear disease of bajra, rust and smut diseases, ergot of bajra, red rot of sugarcane, root knot and rot diseases of vegetables, citrus canker, little leaf of brinjal, disease control and disease management.

Algae:

Algae in diversified habitat (terrestrial, freshwater, marine), Thallus organization, cell structure, General Characters and reproduction in different classes/groups; Criteria of classification of algae; Economic importance

Bryophyta:

General characters, classification, structure, reproduction and life-cycle, economic importance

Lichens:

General account, structure, economic and ecological importance

Pteridophyta:

General characters, classification, structure, reproduction, evolution of stele, Heterospory & Origin of Seed habit, economic importance

Gymnosperms:

General characters, classification, structure, reproduction, economic importance, Evolution and inter-relationships of Pteridophytes and Gymnosperms

Paleobotany:

History, aims & objectives of paleobotany, Fossilization, Types of fossils, Techniques of fossil study, Geological times scale, General characters of Fossil Plants

Cell Biology:

Structure and function of cell and cytoplasmic constituents, Cell theory
Structure of cell organelles: Nucleus, Mitochondria, Golgi bodies, Endoplasmic reticulum, Vacuoles, Lysosomes and Ribosomes, Cell cycle and Cell division,
Membrane: structure and functions, transport and mechanism,
Chromosome organization: Morphology and structure, chromosome alterations, deletion, duplication, translocation, inversion, variations in chromosome number, specialized types of chromosomes

Genetics:

Nucleic Acid as the genetic material, concept and structure of gene,
Genetic Inheritance: Mendelian laws of segregation and independent assortment, Linkage analysis, allelic and non allelic interaction, Cytoplasmic Inheritance
Genetic Variations: Mutations, spontaneous and induced mutations.
Extranuclear genome: presence and function of mitochondrial and plastid DNA, Plasmids

Molecular Biology:

Structure, Chemistry and types of Nucleic Acid, Replication of DNA, DNA repair, Nucleosome model, Genetic code, satellite and repetitive DNA
Gene expression: Structure of gene, transfer of genetic information, transcription, translation, protein synthesis and processing, ribosome, Regulation of gene Expression

Plant Breeding:

Introduction and objectives of plant breeding, Selection methods (Mass, pureline and clonal), Introduction and acclimatization, Hybridisation, Hybrid vigour and Heterosis

Plant Morphology and Anatomy:

General concepts, Introduction, types of tissues and tissue system,
Shoot System: Organization of shoot apical meristems, Shoot development

Root System: Organization of root apical meristems; Root development
Internal structure of monocot and dicot stem and root,
Primary and Secondary growth (normal and anomalous),
Leaf growth and differentiation, Phyllotaxy, Internal structure of leaf, senescence and abscission
Flower: A modified shoot, structure, development of floral whorls, symmetry of flowers, floral diversity, functions

Plant Biochemistry:

Bioenergetics: Principles of bioenergetics. Energy Rich compounds. Biological oxidation-reduction reactions

Enzymology: Nomenclature, characteristics of enzymes, concept of enzyme, regulation of enzyme activity, mechanism of action.

Carbohydrates: Structure and function of carbohydrate, types, classification, chemistry and metabolism

Lipids: structure and function of Lipid, Beta-oxidative pathway of fatty acids, brief account of biosynthesis of triglycerides, cholesterol & its metabolism.

Amino Acid: Structure and Properties, Peptide Bond Formation and Primary Protein,

Protein: Various Protein Structures, Deamination, transamination, decarboxylation, Ornithine cycle, fate of carbon skeleton.

Nitrogen Metabolism and Nitrogen Fixation: Biology of nitrogen fixation, importance of nitrate reductase and its regulation, ammonium assimilation

Plant Physiology:

Plant-water relation, membrane transport and translocation of water and factors affecting

Photosynthesis : Pigments, photophosphorylation, Mechanism of photosynthesis, photorespiration, photosynthesis in C4 plants, CAM

Respiration: ATP the biological energy currency, aerobic and anaerobic respiration, Krebs's cycle, electron transport mechanism, oxidative phosphorylation, pentose phosphate pathway.

Growth and Development: Kinetics of growth, seed dormancy, Seed germination and factors of their regulation,

Plant movements, photoperiodism, physiology of flowering, florigen concept, biological clocks, vernalization, Physiology of senescence, fruit ripening,

Plants hormones auxins, gibberellins, cytokinins, abscissic acid, ethylene, biosynthesis

Physiological role and mechanism of actions, phytochromes and cytochromes.

Taxonomy:

Taxonomic literature, Taxonomic hierarchy, Botanical nomenclature; Principles and rules, Taxonomic ranks, Taxonomic tools

History of classification and Important systems of classification (Bentham and Hooker; Engler and Prantl; Hutchinson and Takhtajan)

Taxonomy of some selected families: (Ranunculaceae, Brassicaceae, Malvaceae, Fabaceae, Asteraceae, Solanaceae, Apocynaceae, Asclepiadaceae, Acanthaceae, Lamiaceae, Euphorbiaceae, Liliaceae and Poaceae). Phylogeny of angiosperms

Plant Embryology:

Structure of anther and pistil, Development of male and female gametophytes, pollination, pollen pistil interaction, fertilization, endosperm development and embryogenesis;

Polyembryony, Apomixis, Parthenocarpy, Adventive embryony

Dynamics of Fruit growth and seed development, Seed dispersal strategies, Structure of mature seed (Dicot and Monocot embryo), Significance of seed

Experimental embryology: Introduction, Nutrient medium, Aseptic condition, Production of haploids: androgenesis, gynogenesis, importance of haploids, embryo culture, endosperm culture, parthenocarpy, and polyembryony, *in vitro* Fertilization

Genetic Engineering:

Introduction and Basic Concept, Recombinant DNA technology: Restriction Enzyme, Vector, Plasmid, Cosmid, Transposons, Construction and screening of DNA & Genomic library, Achievements & Extended area of Recombinant DNA technique, Transgenic Plants and Crop improvements.

Biotechnology:

Biotechnology and Plant Tissue culture, Organogenesis, Micropropagation and Somatic Embryogenesis, Protoplast Culture, Somatic Hybridization, Anther, Culture, Applications of Plant Tissue Culture, Agriculture, Medicine, Environmental & Industrial applications of Biotechnology, Achievements and perspectives.

Plant Ecology and Biodiversity:

Basic concepts of ecology, ecological factors affecting the plants, interactions among organisms Principle of limiting factors; population characteristics, population interaction, genecology and range extensions,

Community characteristics, community classification, concept, ecological niche,

Plant succession in various habitats, concept of climax

Ecosystem: Structure and functions of ecosystem, components of ecosystem, energy flow and biogeochemical cycles (N,P,C,S), primary production, plant indicators,

Major biomes of the world, Phytogeographical regions of India, Vegetation of Rajasthan

Environmental pollution – Air, Water and Soil, Ozone layer depletion, Acid rain

Biodiversity: Concept of biodiversity with special reference to India, Hot spots, Rare,

Endangered and Endemic plant species, strategies for conservation of the flora.

WWF, Chipko movement,. Introduction to Climate change, green house effect, Carbon sequestration, energy and environment

Bio-monitoring. Environmental Impact Assessment.

Economic Botany:

Plant civilization, centers of origin of crop plants, gene diversity Utilization, cultivation and improvement of food plants (Rice, Wheat, Maize, Bajra, Potato, Sugarcane, Pulses and vegetables), Oil seeds (Mustard, Coconut, Soybean And Ground Nut), medicinal (*Withania*,

Rauvolfia, Cinchona, Neem, Aloe, Ephedra, Papaver and Atropa), fibre (Cotton, Jute and Coir) and plants of industrial value (Rubber, Sugarcane, Tea and Coffee).
