

Syllabus of Ph.D. Entrance Examination

16. BOTANY

- 1 Biology and Diversity-I:** Microbes, Lichens, Algae And Fungi, Characteristics and ultra structure of Viruses, General characteristic of lichen and its economic importance, General concept of Algae including economic importance , General characteristics of fungi, parasexuality; Mycorrhizae; Mycotoxins; fungi as biocontrol agents, economic importance of fungi. Fungal diseases in plants; types of pathogens; symptoms of different diseases; methods of disease control; biotechnological approaches for production of disease resistant plants.
- 2 Biology and Diversity:** Bryophyta, Pteridophyta And Palaeobotany: General idea about the morphological, cytological and ecological characteristics of bryophytes. Morden system of classification up to order level and salient features of the various groups, Economic importance of bryophytes, , general idea about pteridophytes, Stelar evolution, telome theory, evolution of sorus, homosporry, heterosporry and seed habit, Kinds of fossils.
- 3 Angiosperm and Gymnosperm:** The species concepts, Salient features of international code of botanical nomenclature (ICBN), Taxonomic tools, Bentham & Hooker and Hutchinson Systems of classification : taxonomical study of Some important families viz. Rannunculaceae, Rosaceae, Asteraceae, Lamiaceae, Orchidaceae, , Poaceae, Concepts of phytogeography: Endemism, plant migration., Botanical survey of India, General Introduction and distribution of Gymnosperms, structure and reproduction of Cycadales, Ginkgoales, Coniferales,

- 4 **Cell and Molecular Biology:** Structural organization of the plant cell, Structure and function of cell wall, and other cell organelles, nucleus, DNA structure, ribosomes, cytoskeleton, Structure and Genomic organization of chloroplast and mitochondria, Cell cycle check points and role of cyclin and cyclin dependent kinases, Antigen and antibody, Types of Immunity, immunodiffusion and Radial immunodiffusion, confocal microscopy.
- 5 **Biotechnology:** General concept of Biotechnology, Concepts of cellular differentiation, Totipotency, Organogenesis, Micro propagation, Somatic embryogenesis, tissue culture techniques, artificial seeds, secondary metabolites, somaclonal variation, application of plant tissue culture, Industrial biotechnology, Biofertilizers, Recombinant DNA Technology, Genomics
- 6 **Plant Ecology:** Major biomes of the world, Vegetation organization, Ecological succession and concept of climax, structure and function of Ecosystem, energy flow pathways, biogeochemical cycles of C, N, and P, Biological diversity, Environmental pollution, Climate changes: Green house gases (CO_2 , CH_4 , N_2O , CFCs, sources, trends and role), Ozone layer and Ozone hole, consequences of climate change.
- 7 **Cytology, Genetics and Plant Breeding:** Chromosome structure, Structure and numerical alteration in chromosomes, Genetics of prokaryotes and eukaryotic organelles, Gene structure and expression, Genetic recombination and gene mapping, Mutation, Molecular Cytogenetics, Alien gene transfer of whole genome.
- 8 **Plant Physiology & Metabolism:** Fundamental of enzymology, Membrane transport and translocation of water

and solutes, Signal transduction, Photosynthesis , Respiration and lipid metabolism , Phytochromes, Plant growth regulators, Photoperiodism , vernalization., Stress physiology

9 Plant Development and Reproduction: Development of plant, Shoot development, Leaf growth and development, Root development, Reproduction, Male and female gametophytes, Pollination and fertilization, Seed development and fruit growth, Senescence and programmed cell death (PCD)

10 Plant Resource Utilization and Conservation: Concept of plant biodiversity and sustainable development, World centers of primary diversity of domesticated plants, Green revolution, Strategies for conservation – In- situ and Ex- situ conservation, botanical gardens, ,seed banks, in-vitro repositories; cryobanks; general account and activities of Botanical Survey of India (BSI) and other important Institutions.