Department of Botany

Punjabi University, Patiala

Proposed Syllabus for Ph.D. Entrance Test-2022

Section-A
(Research Methodology)

BOTANY: RESEARCH TECHNIQUES /METHODOLOGY

1. TECHNIQUES IN MOLECULAR: Techniques of molecular biology and recombinant DNA technology and their applications**.**

2. CELL AND TISSUE CULTURE TECHNIQUES: Requirements and Techniques for micro propagation of plants, embryo anther and pollen application of cell and Tissue culture.

3. ANATOMICAL AND HISTOCHEMICAL TECHNIQUES: Stains and staining techniques; Maceration; Principle of fixation, types of fixatives and their applications, Functioning and application of microtomy. Principle and methods of histochemical localization of biomolecules.

4. CENTRIFUGATION: Principle, functioning and applications of low speed, high speed and ultracentrifugation.

5. SPECTROSCOPY: Principle, functioning and applications of UV-visible spectrophotometry, spectrofluoremetry.

6. ELECTROPHORESIS: Principle, functioning and applications of simple and 2D gel electrophoresis.

7. CHROMATOGRAPHIC TECHNIQUES: Principle and applications of paper chromatography, column chromatography, thin layer chromatography, Ion Exchange, Gel filteration chromatography and Gas HPLC chromatography.

8. MICROSCOPIC TECHNIQUES: Principal and application of light microscope, phase contract microscope, scanning and transmission electron microscope.

9. IMMUNOTECHNIQUES: Detection of biomolecules using ELISA, RIA, western blotting, immuno-precipitation immuno-fluorescence microscopy.

10. CHROMOSOME TECHNIQUES: Fixation of buds for cytological studies, stains for chromosomes staining, chromosome techniques, FISH and GISH.

Section-B
(Subjective)

11. DIVERSITY OF LIFE FORMS: **Principles and methods of taxonomy and outlines of latest criteria for classification of Algae, Fungi, Bacteria and Plants. Reproduction and evolutionary relationships among taxa of different groups of organisms.**

12. CELL BIOLOGY AND CYTOGENETICS: Membrane structure and function; Structural organization and function of intracellular organelles; Organization of genes and chromosomes; Cell division & cell cycle. Genomatic (Chromosomal aberrations, aneupoidy, polyploidy) and point mutations.

13. FUNDAMENTAL PROCESSES: DNA replication, repair and recombination; RNA synthesis and processing; Protein synthesis; Control of gene expression at transcription and translation level; Host parasite interaction against pathogens in plants;

14. DEVELOPMENTAL BIOLOGY: Microsporogenesis, Megasporogenesis and Post fertilization development. Morphogenesis and organogenesis in plants. Programmed cell death, aging and senescence.

15. PLANT PHYSIOLOGY: Photosynthesis; Respiration & photorespiration; Nitrogen metabolism; Plant hormones, their mechanism of action and functions; Sensory photobiology; Solute transport & photoassimilate translocation; Secondary metabolites; Stress physiology; Signal transduction in plants.

16. MOLECULES & THEIR INTERACTION: Bioenergetics, coupled reaction, group transfer, biological energy transducers; Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes; Conformation of proteins (Ramachandran plot, 2^0, 3^0 & 4^0 structures; domains; motif and folds); Conformation of nucleic acids (A-, B-, Z-, DNA), t-RNA, micro-RNA).

17. ECOLOGICAL PRINCIPLES: The Environment; Habitat and niches; Population ecology; Species interactions; Community ecology; Ecological succession; Ecosystem; Environmental pollution; global environmental change; Conservation biology

18. APPLIED BIOLOGY: Transgenic plants, molecular approaches to diagnosis and strain identification; Genomics and its application to health and agriculture; Bioresource and uses of biodiversity; Breeding in plants, including marker – assisted selection; Bioremediation and phytoremediation; Economic importance of Algae, Fungi, Lichens and Bacteria. Economic plants as a source of Food, Timber, Drugs, Essential oils, Rubber, Beverages and Fiber. Metabolomics.