Ph.D. Entrance Examination Syllabus (Biotechnology) (2024-25)

Biomolecules – Bioenergetics, metabolism and Techniques

Biomolecules- structure and function, intra- and intermolecular forces, bioenergetics, biochemical equilibria, Enzyme kinetics, metabolism of carbohydrates, lipids, proteins and nucleic acids and biochemical techniques

Cell and Molecular Biology

Cell Biology Basics with cell membrane, Cell organelles and cell transportation, DNA Replication in prokaryotes and eukaryotes, DNA damage and repair, Transcription and Translation in prokaryotes and eukaryotes, RNA processing, post-translational modifications, Transfer of genetic material in microorganisms

Genetic engineering and Immunology

DNA modifying enzymes, Gene cloning and expression vectors, Genomic & cDNA libraries, Molecular cloning Techniques and Applications, Transgenic plant and animals & their applications, Gene silencing, Gene editing, Innate and adaptive Immunity, Antigen & antibody and their interactions. Immune Deficiencies, Immunological techniques

Industrial Microbiology and Biotechnology

Microbial growth and nutrition, microbial physiology, preservation and control of microorganisms, Industrial applications of Microbes/Enzymes, Bioprocessing fundamentals, Downstream Processing.

Plant and Animal Biotechnology

Micro-propagation and its applications, Somatic embryogenesis, Haploid and triploid production and applications, Protoplast isolation and fusion and application. Studying biological systems using cell culture techniques: Cytotoxicity assays, Study of Cell Death: senescence, apoptosis and necrosis, Cell proliferation, Cell viability measurements, Application of Cell culture Technology Hybridoma technology for monoclonal antibody production.

Plant, Animal and Microbial Diversity

Principles & methods of taxonomy, Levels of structural organization, Outline classification of plants, animals & microorganisms, Organisms of health & agricultural importance,Organisms of conservation concern.

Environmental Biotechnology

Ecosystem Structure and Functions, Biodiversity and its Conservation, Concept of Industrial Ecology, Bioremediation, Biofuels and Bioenergy.