

## **Ph.D. Entrance Examination Syllabus (Biotechnology) (2026-27)**

### **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.