INTERDISCIPLINARY BIOTECHNOLOGY UNIT

FACULTY OF LIFE SCIENCES

A.M.U., Aligarh

Syllabus for Ph.D Admission test, 2020-21

SECTION –B

1. **Cellular & Molecular Biology:** Cell diversity: Chemical equilibrium and energetics; Cell theory; Cell organelles; Cell cycle and cancer biology; Prokaryotic and Eukaryotic transcription; RNA polymerases; Gene expression in bacteria and eukaryotes.
2. **Immunology:** Immunology-fundamental concepts and anatomy of the immune system Components of innate and acquired immunity; Organs and cells of the immune system; Major Histocompatibility Complex - MHC genes; Antigen-antibody interactions; Autoimmunity; Types of autoimmune diseases.
3. **Microbiology & Industrial Applications: Microbial** culture and its characteristics; culture media and its types; Batch culture; fed-batch; continuous kinetics; Host–Pathogen interactions; pathogenicity and virulence; exotoxins and endotoxins; Basic principles in bioprocess technology; Primary and secondary metabolites; Biotechnologically important products.
4. **Genetics & Genetic Engineering:** DNA Structure and properties; Cloning Vectors and methodology; Transduction and Transformation; Types of genetic diseases; Role of genetics in medicine; Complex inheritance-genetic and environmental variation.
5. **Proteins & Enzymes:** Peptides & proteins; Forces stabilizing native protein conformation; Primary, Secondary, Super-secondary, Tertiary and quaternary structure. Enzymes: Features of enzyme catalyzed reaction; Kinetics of single and multi-substrate reactions; Enzyme inhibition.
6. **Genomics & Proteomics:** Introduction Structural organization of genome in Prokaryotes and Eukaryotes; Organelle DNA-mitochondrial; chloroplast; DNA sequencing-principles and translation to large scale projects. Proteomics: Protein analysis; 2-D electrophoresis of proteins; Peptide fingerprinting; LC/MS-MS for identification of proteins and modified proteins; MALDI-TOF; SAGE and Differential display proteomics.
7. **Plant Biotechnology:** Transgenic Plants: Mechanisms of DNA transfer;Viral vectors and their applications. Vector Transformation techniques; Terminator gene technology; Metabolic engineering and industrial products: Plant secondary metabolites; Molecular marker-assisted selection.
8. **Bioprocess Engineering & Technology:** Basic principle of Biochemical Engineering; Isolation; screening and maintenance of industrially important microbes; Concepts of basic mode of fermentation processes Bioreactor designs; Process wastes-whey; molasses; starch substrates and other food wastes for bioconversion to useful products.