

**Department of Biotechnology
GITAM Institute of Science
GITAM UNIVERSITY**

Syllabus for M.Phil. & Ph.D. entrance examination

PART-A

1. Techniques of chromatography, electrophoresis, centrifugation, spectroscopy and microscopy. Computational methods employed in Biology. Nucleic acid and protein sequence databases. Radio labeling techniques. Blotting techniques. Bacterial staining techniques. Antigen-antibody interactions, Immunodiffusion, Immuno electrophoresis ELISA, RIA and Western blotting.
2. DNA sequencing by chemical and enzymatic methods. Automated DNA Sequencing. Cloning vectors. Artificial chromosomes. Gene transfer Techniques. Reporter gene assay, selection and expression of r-DNA clones. PCR. Construction of genomic libraries and C-DNA libraries. Colony and Fluorescent *in situ* hybridization, Nucleic acid probes and probe construction. DNA micro array technology.
3. Molecular markers and their applications. RFLP, AFLP, simple sequence repeats. RAPD for molecular mapping and crop improvement. Animal Cell transformation and maintenance. Kinetics of cell growth. Basic techniques of animal cell, tissue and organelle cultures. Production of Transgenic Animals and plants.
4. Scientific data description, tabulation and graphical representation. Measures of central tendency and dispersion - mean, median, mode, range, standard deviation, variance. Types of errors and level of significance. Tests of significance - F and T -tests, chi-square tests, ANOVA. Simple linear regression and correlation. Introduction to genomics and proteomics and their applications. Molecular phylogeny Functional genomics.

PART-B

1. Structure of Prokaryotic and Eukaryotic cells. Ultra structure and functions of Cell organelles. Cell division and regulation of cell cycle. Cell-cell interaction. Cell signaling-Hormones and their receptors. Classification of bacteria and virus. Bacterial staining techniques. Bacterial growth curve. Microbiology of Soil and water. Clinically important bacteria and viruses. Bacterial recombination. Principles of Mendelian inheritance, Linkage and crossing over. Cytoplasmic inheritance. Pedigree analysis. Hardy-Weinburg law.
2. Classification, structure, properties, functions of Biomolecules-carbohydrates, lipids, amino acids, proteins, nucleic acids and vitamins. Metabolic pathways and disorders of carbohydrates, lipids, amino acids, proteins and nucleic acids. Enzymes-factors affecting enzyme activity, Enzyme inhibition, Coenzymes, metalloenzymes, allosteric enzymes, isoenzymes and ribozyme.
3. Nature of Genetic material, organization of Genetic material in prokaryotes and eukaryotes, DNA replication, transcription and translation in prokaryotes and eukaryotes. Inhibitors of Protein synthesis. DNA damage and repair. Regulation of gene expression in prokaryotes and eukaryotes. DNA methylation and Chromatin remodeling in gene expression Environmental regulation of gene expression. RNAi and Gene silencing.
4. Plant Tissue culture. Phytohormones. Edible vaccines and plantibodies. Plant secondary metabolites. Maintenance of Primary and established animal cell lines. Stem cells – Embryonic and Adult stem cells. Application of stem cells. Concepts of immune response. Cells and organs of the immune system Antigens. Antibodies-generation of antibody diversity.