

# GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Declared as Deemed to be University u/s 3 of UGC Act, 1956)

Visakhapatnam | Hyderabad | Bengaluru

Accredited by **NAAC** with **A++** Grade

Website: [www.gitam.edu](http://www.gitam.edu)

## GITAM SCHOOL OF TECHNOLOGY

Department of Biotechnology

PhD in Engineering: Biotechnology

PhD Entrance Test Syllabus - 2023-2024

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### PhD in Engineering: Biotechnology

#### Section 1: General Biotechnology

**Biomolecules:** Structure and function of glucose, fructose, peptides and nucleotides. Enzymes: kinetics and mechanism of action. Basic concepts of metabolism. Glycolysis, Krebs cycle, electron transport chain.

**Microbiology:** Overview of applications of microbes in industry. Aerobic and anaerobic respiration. Nitrogen fixation.

**Cell Biology:** Prokaryotic and eukaryotic cell structure. Cell cycle.

**Molecular Biology and Genetics:** Molecular structure of genes and chromosomes. Mutations and mutagenesis. Nucleic acid replication, transcription and translation. Mendelian inheritance. Gene interaction. Complementation. Linkage, recombination and chromosome mapping. RNA interference. Molecular basis of genetic diseases.

**Recombinant DNA Technology:** Gene isolation, cloning and expression. DNA sequencing. Polymerase chain reaction. Microarrays. Gene therapy.

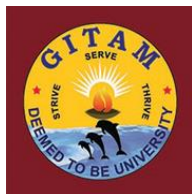
**Analytical Techniques:** Principles of microscopy, spectroscopy and chromatography. Electrophoresis. Flow cytometry.

**Immunology:** Antibody structure and function. Molecular basis of antibody diversity. B and T cells and macrophages. Immune tolerance. Hypersensitivity. Autoimmunity.

**Bioinformatics:** Major bioinformatic resources and search tools. Sequence and structure databases. Sequence analysis (biomolecular sequence file formats, scoring matrices, sequence alignment, phylogeny).

#### Section 2: Applied Biotechnology

**Plant and Animal Biotechnology:** Production of secondary metabolites by plant suspension cultures. Transgenic plants. Animal cell culture - Anchorage and non-anchorage dependent cell culture. Animal cell and tissue preservation. Hybridoma technology. Stem cell technology. Animal cloning. Transgenic animals.



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Bioprocess Engineering and Process Biotechnology: Principles of bioreactor design, Rheology of fermentation fluids, Aeration and agitation. Kinetics of microbial growth. Unit operations in solid-liquid separation and liquid-liquid extraction. Process scale-up. Production of Biofuels, Bioplastics, Industrial enzymes and antibiotics. Production and purification of vaccines and recombinant proteins. Bioremediation-Aerobic and anaerobic processes for stabilization of solid / liquid wastes.

### Reference Books

1. Molecular biology of the Gene: James Watson
2. Kuby Immunology: Barbara A. Osborne and Janis Kuby
3. Bioprocess Engineering Principles: Pauline M.Doran
4. Principles of Gene Manipulation and Genomics: Primrose
5. Microbiology: Michael J. Pelczar
6. Lehninger Principles of Biochemistry: Michael M. Cox
7. Bioinformatics: Sequence and Genome analysis: D. Mount.