

Department of Biotechnology & Food Technology

Punjabi University, Patiala 147002
(Established under Punjab Act No. 35 of 1961)

Syllabus for Ph. D. Entrance Test for Session 2024-25

Section-A

(Research Methodology)

1. **Analytical Techniques:** Applications of spectroscopy (UV-VIS, NMR, IR, Spectrofluorimetry), chromatography, PCR, electrophoresis, atomic absorption spectroscopy, mass spectroscopy.
2. **Bioinformatics:** Applications of bioinformatics; Biological databases; BLAST, FASTA, local and global alignment algorithms.
3. **Biosafety:** IBSC guidelines; Cartagena protocol; biohazards, bio-containment, risk assessment, risk analysis; biosafety levels, FSSAI.
4. **Commercialization of Technology:** Concepts of TQM; ISO standards, good laboratory practices, good manufacturing practices.
5. **IPRs:** Intellectual property rights, Patents and patenting system in India; Ethical issues related to publishing, Plagiarism.
6. **Research Methods in biotechnology:** Molecular tools and techniques in genetic engineering; Site-directed mutagenesis; upstream and downstream processing in a fermentation process; unit operations.

Section-B

(Subject)

1. **Biochemistry:** Introduction to biomolecules; structure and function of carbohydrates, nucleic acids, lipids, vitamins; nomenclature and characteristics of enzymes; Kinetic characterization of enzymes.
2. **Microbiology:** Principles and applications of microscopes; principles of microbial nutrition; pure culture; microbial growth; food poisoning and food-borne infections.
3. **Microbial Genetics and Recombinant DNA Technology:** Genetic materials and microbial genomes, DNA replication; transcription; translation; cloning and expression vectors; transformation techniques; applications of rDNA technology.
4. **Biochemical Engineering and Fermentation Technology:** Bioreactor design; aeration and agitation systems in bioreactors; types of bioreactors; Concept of k_La ; fermentation types; media for industrial fermentation; inoculum development; alcoholic beverages; Microbial production of organic acids, biopesticides and biofertilizers.
5. **Food Technology:** Principles & methods of food preservation; production of condensed and dried milk, butter, cheese; fermented Indian foods; evaporation, dehydration, distillation.
6. **Environmental biotechnology:** Environmental applications of biotechnology; principles of waste treatment; Primary, secondary and tertiary treatment of waste water, biomining.