

Department of Biotechnology

PROGRAMME OUTCOMES-COURSE OUTCOMES OF M.Sc Biotechnology

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| Department of Biotechnology | After successful completion of 2 year post graduate program a student should be able to |
| Programme Outcomes | PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of biotechnology |
| | PO-2. Apply knowledge of creativity & innovative thinking, Strategic and entrepreneurship |
| | PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of biological reactions. |
| | PO-4. Inculcate the scientific temperament in the students and outside the scientific community. |
| | PO-5. Use modern techniques, latest equipments, Bioinformatic's softwares to analyse and solve problems in various courses of biotechnology. |
| | PO-6. Solve the problem and also think methodically, independently and draw a logical conclusion |
| | PO-7. Create an awareness of the impact of biotechnology on the environment, society, and development outside the scientific community. |
| | PO-8. Understand, analyse and communicate global, economic and ethical aspects of biotechnology |
| Programme Specific Outcomes | PSO-1. Gain the knowledge of biotechnology through theory and practical's. |
| | PSO-2. Explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the biochemical reactions. |
| | PSO-3. Understand good laboratory practices and safety. |
| | PSO-4. Introduce advanced techniques and ideas required in developing area of biotechnology |
| | PSO-5. Carry out experiments in the area of organic biochemical analysis, estimation, separation and fermentation process |
| | PSO-6. Work in research and development sector to analyze sequences, detect samples for toxicity |
| COURSE OUTCOMES M.Sc Biotechnology | |
| Semester-I | |
| Course | Outcomes After completion of these courses students will be able to |

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| BTT-101 Cell and Molecular Biology | <p>CO-1. Understand the structures , basic components of prokaryotic and eukaryotic cells</p> <p>CO-2. Write the physiology of cell cycle, Functions of cell surface receptors, and mechanism of extra & intracellular signaling pathways</p> <p>CO-3. Explain the organization and complexity of DNA, mechanism of DNA replication and post transcriptional modifications in prokaryotes and eukaryotes.</p> <p>CO-4. Discuss about the transcription in prokaryotes and eukaryotes, protein sorting.</p> <p>CO-5. Demonstrate DNA protein interactions, types of genes and gene expression.</p> |
| BTT-102 Microbiology and Microbial Genetics | <p>CO-1. Write the classification of bacteria according to Bergey's manual</p> <p>CO-2. Demonstrate different methods of identification of bacteria</p> <p>CO-3. Understand the mode of action of antibiotics</p> <p>CO-4. Know transposable elements in prokaryotes and eukaryotes</p> <p>CO-5. Explain Genetic recombination, conjugation and transduction in bacteria</p> |
| BTT-103 Biomolecules | <p>CO-1. Explain about composition of biomolecules and principles of bioenergetics.</p> <p>CO-2. Understand the types, structure of carbohydrates and their biological functions.</p> <p>CO-3. Study about the essential and nonessential aminoacids, structure of proteins and Ramachandran plot.</p> <p>CO-4. Discuss about lipids types, classification and their functions.</p> <p>CO-5. Demonstrate the structure, types and functions of nucleic acids and nucleotides.</p> |
| BTT-104 Biophysical and Biochemical Techniques | <p>CO-1. Demonstrate the Chemical foundations of Biology, Principles of cell disruption, Concentration & separation of biomolecules.</p> <p>CO-2. Understand the principles, types and applications of Centrifugation.</p> <p>CO-3. Explain the working principle and applications of UV- Visible, NMR spectrophotometry, Circular dichroism (CD), X-ray diffraction and Mass spectrometry</p> <p>CO-4. Study about the principles, types and applications of Chromatography.</p> <p>CO-5. Discuss about the Electrophoresis, Blotting techniques and DNA protein interactions assay.</p> |
| Semester-II | |
| BTT-201 Enzymology And Metabolism | <p>CO-1. Understand the nomenclature, classification and general properties of Enzymes, Michaelis-Menten equation and Lineweaver-burk plot.</p> <p>CO-2. Describe different types of Enzyme inhibitions, methods and applications of Immobilized enzymes and Biosensors.</p> <p>CO-3. Explain the Introduction, Aerobic and anaerobic pathways of Carbohydrate Metabolism.</p> <p>CO-4. Demonstrate Lipid Metabolism, Biosynthesis of fatty acids, triacylglycerol, phospholipids and Cholesterol.</p> <p>CO-5. Write the general reactions of Aminoacids metabolism, Biosynthesis, degradation of Purines and</p> |

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| | Pyrimidines and Genetic errors of metabolism with Representative examples. |
| BTT-202 Genetic engineering | CO-1. Isolate genes/ DNA fragment and Enzymes used in molecular cloning. CO-2. Explain the different types of Cloning vectors and Expression vectors along with Cloning Strategies. CO-3. Describe different methods used in introduction of Cloned Genes in to Host cell, Identification and characterization of cloned genes. CO-4. Write about the PCR amplification, RFLP, RAPD, DNA finger printing and DNA sequencing methods. CO-5. Demonstrate different types of mutagenesis and Gene silencing techniques. |
| BTT-203 Immunology and immunotechnology | CO-1. Study about the history, Introduction to Immunology, Cells and Organs of the Immune system, Types of immunity and Antigens. CO-2. Demonstrate different types, structures and biological activities of antibodies, Antigen and antibody interactions and Immune effector mechanisms. CO-3. Explain the Major histocompatibility complex (MHC), Humoral immune response and Cell mediated immune response. CO-4. Know hypersensitivity reactions, Immunodeficiency disorders and transplantation antigens. CO-5. Understand the Transfusion Immunology, Tumor Immunology, Infection and immunity, Merits and demerits of conventional and modern vaccines. |
| BTT-204 Environmental biotechnology | CO-1. Demonstrate different Types, methods for the measurement of pollution and Environmental Monitoring by using biosensors. CO-2. Write about the Water pollution & its control, Treatment schemes for waste waters of dairy distillery, tannery, Skin & Hide processing, sugar, antibiotic Industries. CO-3. Explain concepts & principles of Bioremediation and Microbiology for degradation of xenobiotics in environment. CO-4. Know Microbes in extreme environment, microbial biofilms, Biofouling & corrosion, antifouling paints, Biofertilizers, Biopesticides, Vermiculture. CO-5. Understand the microbial groups involved in biogas production & interactions, Biodiversity-levels and environmental safety guidelines. |
| | Semester-III |
| BTT-301 Plant and Agricultural Biotechnology | CO-1. Know about sterilization techniques and media preparation, Initiation and maintenance of callus and suspension culture, somatic embryogenesis and Somatic hybridization CO-2. Study about plant transformation techniques and Molecular marker techniques CO-3. Explain about transgenic plants, Biotic and abiotic stress tolerant plants CO-4. Discuss about Plant secondary metabolites and their pathways CO-5. understand the concept of therapeutic proteins and Plantibodies |

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| BTT-302 Animal Biotechnology | CO-1. Understand the Animal cell culture media and reagents, Primary cell culture, secondary cell culture, Application of animal cell culture for virus propagation and <i>in vitro</i> testing of drugs. CO-2. Discuss on Animal reproductive Biotechnology, Structure of sperms and ova, Artificial insemination and Embryo transfer technology. CO-3. Explain Transgenic animal technology, Animal cloning, Development of transgenic mice, fishes, knockout mice and Applications of biotechnology in animal health. CO-4. Demonstrate different Biotechnological applications of Aquaculture, Genetic status and manipulations in gynogenesis, androgenesis, sex reversal and induced breeding in fishes. CO-5. Write about the Baculoviruses in biocontrol and foreign gene expression, Pest management using ju hormone analogues. |
| BTT-303 Bioprocess engineering and nanotechnology | CO-1. Demonstrate the Isolation, screening, Preservation and maintenance of industrially important microorganisms. CO-2. Explain the basic principles, construction of Fermentation and Bioprocess control measurements. CO-3. Illustrate various Methods for Downstream Processing and product recovery. CO-4. Know Microbial Production of Alcohols & Beverages: Wine, beer, ethanol & acetone-butanol and other industrially important microorganisms CO-5. Understand the introduction to Nanobiotechnology, Classification of Nanomaterials, Strategies and Applications of Nanomaterials and Environmental health hazards of Nanoparticles. |
| BTT-304 Research Methodology | CO-1. Discuss the types, quality of research and steps in scientific research CO-2. Understand and formulate the research problem CO-3. Write characteristics of a good sample design CO-4. Distinguish between measures of central tendency and measures of dispersion CO-5. Write research reports according to journal format publications |
| Semester-IV | |
| BTT-401 Genomics and proteomics | CO-1. Study Introduction to Genomics, Proteomics and Transcriptomics, DNA sequencing, Tools for genome analysis, and Human Genomic Project. CO-2. Understand the Accessing and retrieving genome project information from web, Comparative genomics and different genome Mapping methods. CO-3. Explain Proteomics and Transcriptomics, Properties of proteins, 2D electrophoresis of proteins, Mass Spectrometry, MALDI-TOF ESI. CO-4. Demonstrate different mechanisms of protein folding, tertiary folds and methods for protein-protein interaction analysis. CO-5. Write the Protein sequencing, Protein modifications, Protein engineering and Clinical application of |

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| | proteomics. |
| BTT-402 Biostatistics & Bioinformatics and Pharmainformatics | CO-1. Understand the measures of central tendency and methods of sampling CO-2. Study the importance of databases and identify their domains CO-3. Distinguish between Homology, Phylogeny and evolutionary tree CO-4. Explain Predictive methods using DNA and protein sequences CO-5. Know the pharmacodynamic and pharmacokinetic properties of drugs with target validation by docking studies |
| BTT-403 Innovation, Bioentrepreneurship and IPR | CO-1. Discuss about biosafety, socio – economic, legal and ethical impacts of biotechnology CO-2. Develop business Plan, qualities of a successful entrepreneur and built Entrepreneurial ecosystem CO-3. Know Franchising Entrepreneurship opportunities for Enthusiastic young Women Biotechnologists CO-4. Explain the Importance of Finance for Bio business –Sectorial support by Government of India - policies, and frameworks CO-5. Learn Environmental Biotechnology, Applications form and Procedures-Patent cost and Values |
| BTT-404 Internal Elective Cancer Biology | CO-1. Study the causes of cancer, different forms of cancer, cell proliferation, Death and differentiation CO-2. Compare between Chemical carcinogenesis, Genotoxic carcinogenesis, Nongenotoxic carcinogenesis, and Radiation Carcinogenesis CO-3. Define Oncogenes and further Identification of Oncogene products CO-4. Know different forms of therapy, Chemo therapy-Alkylating agents, Radiotherapy and Hormone therapy CO-5. Understand the approaches to Cancer prevention with Diet . |

M. Sc BIOTECHNOLOGY

PROGRAM OUTCOMES (PO) – COURSE OUTCOMES (CO)

MAPPING

YEAR - I

SEMESTER – I

(H- High; M- Medium; L - Low)

| BTT-101 | CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
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| Cell and Molecular Biology | CO101.1 | H | M | M | H | M | H | M | H |
| | CO101.2 | H | H | L | M | H | M | M | M |
| | CO101.3 | H | M | H | H | M | L | L | M |

