

Name of the Department : DEPARTMENT OF STUDIES AND RESEARCH IN BIOTECHNOLOGY

Academic Year : 2019-20

A. Program Outcome and Program Specific Outcomes

Name of the programme	M.Sc Biotechnology
Programme Outcomes	
Students will be able to:	<ol style="list-style-type: none">1. Demonstrate and an understanding of all major concepts in inter-disciplinary sciences.2. Apply the Biotechnological concepts for basic and applied research.3. Explore new areas of research in all the branches of Biotechnology in addition to inter-disciplinary fields such as Chemistry and Physics.4. Create an awareness of the impact of Biotechnology on the environment, society, and development outside the scientific community5. Use modern techniques, advanced equipments and Bio-software's6. Perform research experiments and solve the research problems7. Meet the needs of the thrust areas of future bioscience.
Program Specific Outcomes	
Students will be able to:	<ol style="list-style-type: none">1. Understand the fundamental concepts in core (stem cell, plant, animal, molecular biology, genetic engineering, genetics, industrial and environmental biotechnology, nanoscience and technology) and allied (health science, medical microbiology, chemistry, developmental biology and evolutionary biology) subjects.2. Understand good laboratory practices and safety rules.3. Perform bio-protocols expertly by employing their practical training.4. Get exposure to various research fields and thrust area of the core and interdisciplinary subjects.5. Develop research and industry oriented skills and acquiring competence to work in industry and research labs.

B. Course Outcomes

Name of the Programme: **M.Sc. Biotechnology**

Sl. No.	Name of the Course	Course Code	Program Specific Outcomes (After completing this course, the students will be able to)
1	Biomolecules and Metabolism	BT-HCT 1.1	<ol style="list-style-type: none">1. Identify the characteristics of living organisms.2. Understand the fundamental biochemical principles and the regulation of biological/biochemical processes.3. Review the structure of biomolecules and cite the importance of these biomolecules in biological systems.4. Predict potential outcomes of biochemical defects.
2	Molecular biology	BT-HCT 1.2	<ol style="list-style-type: none">1. Know about fundamentals of molecular concepts2. Acquire the in-depth knowledge of biological and/or medicinal processes through the investigation of the underlying molecular mechanisms.
3	General Microbiology	BT-HCT 1.3	<ol style="list-style-type: none">1. Understand the systematic position and salient features of the various microbes.2. Classify the microbes based on the structure and biochemical characterization.3. Role of microorganisms in the diversity4. Sterilization and disinfecting the working environment for microbial cultivation5. Use different types of staining techniques to observe the microbes
4	Biochemical analysis and Techniques	BT-SCT 1.1	<ol style="list-style-type: none">1. Apprehend the functioning, maintenance and safety aspects of the basic apparatus used in a Biotechnology lab.2. Assimilate the principles and applications of centrifuge, electrophoresis and chromatography in research and related experiments.3. Employ the knowledge for the separation of proteins/peptides by selecting appropriate separation techniques.

5	IPR and Biosafety	BT-SCT 1.2	<ol style="list-style-type: none"> 1. File national and international patent for the biotechnological inventions. 2. Gain knowledge about the biotechnological inventions between different countries 3. Predict the risk arise due to the use of Genetically Modified Organisms
6	Biomolecules and Metabolism practical	BT-HCP 1.1	<ol style="list-style-type: none"> 1. Analyze and identify the protein and carbohydrate concentrations by using qualitative and quantitative methods 2. Separate the DNA using agarose gel electrophoresis 3. Separate the protein using PAGE
7	Molecular biology practical	BT-HCP 1.2	<ol style="list-style-type: none"> 1. Isolate the Genomic and Plasmid DNA from different biological samples 2. Analyze the properties of nucleic acids. 3. Quantify the nucleic acid using spectrometer 4. Execute the laboratory molecular techniques & to interpret laboratory experiments in molecular biology, with the appropriate analysis and interpretation of results obtained
8	General Microbiology practical	BT-HCP 1.3	<ol style="list-style-type: none"> 1. Implement microbial techniques for isolation of pure cultures of bacteria, fungi and actinomycetes 2. Demonstrate various staining techniques in identifications of microbes 3. Design culture media for microbe cultivation and isolation from various samples 4. Apply the sterilization and disinfection technical skills in Quality Control Department of pharma industries
9	Immunology	BT-HCT 2.1	<ol style="list-style-type: none"> 1. Differentiate between different types of immune cells and acquire knowledge on cells involved in cell- mediated and humoral immunity 2. Understand the working principles of immuno diagnostic methods 3. Apply an imminent knowledge on immune system and immune power 4. Implement advance techniques in treating various infections and physiological problems
10	Genetic engineering	BT-HCT 2.2	<ol style="list-style-type: none"> 1. Acquire the knowledge of the principles and methods of DNA manipulation and transfer into target cells. 2. Implement advanced technologies and protocols for DNA manipulation, genome editing and sequencing. 3. Provide knowledge about the RFLP & RAPD technique 4. Amplify the Various DNA samples through PCR

11	Cell biology	BT-HCT 2.3	<ol style="list-style-type: none"> 1. Understand the evolutionary development of the cell 2. Compare the organization of prokaryotic and eukaryotic cellular organelles. 3. Understand the basic concepts about different cell organelles and its function. 4. Acquire knowledge on identifying cancer cells from normal cells.
12	Bioinformatics and Biostatistics	BT-SCT 2.1	<ol style="list-style-type: none"> 1. Comprehend the basics of bioinformatics scope and applications. 2. Acquire the major steps in pairwise and multiple sequence alignment and executing alignment by dynamic programming. 3. Interpret data and the outcomes of research findings. 4. Identify the methods and means of data collection and research methodology 5. Acquire knowledge of correlation and regression analysis and to interpret the outcomes of a research study.
13	Food Biotechnology	BT-SCT 2.2	<ol style="list-style-type: none"> 1. Analyze the nutrient content of food 2. Use microbial enzymes for food industry 3. Understand the enzymes action and main classes of enzymes used in food processing and organic properties of food 4. Describe selected classical fermentation processes and how fermentation can deliver nutrition 5. Acquires the unit operations in food processing and production of number of fermented products
14	Immunology practical	BT-HCP 2.1	<ol style="list-style-type: none"> 1. Understand the basics about the composition of human blood 2. Differentiate the structure of blood cells 3. Identify the concentration of antibodies 4. Interpret the laboratory tests in the diagnosis of infectious diseases.
15	Genetic engineering practical	BT-HCP 2.2	<ol style="list-style-type: none"> 1. Analyze various medical related real problems by applying the practical knowledge & gains hands on experience of handling various instruments. 2. Gain knowledge about the RFLP & RAPD technique. Amplify the Various DNA samples through PCR 3. Master various DNA isolation techniques. 4. Implement various techniques to handle different instrument.

16	Cell biology practical	BT-HCP 2.3	<ol style="list-style-type: none"> 1. Relate cellular functions with the overall activity of a living organism. 2. Acquire knowledge about the structure and various stages of cells through mitosis. 3. Enlightens the cellular processes like cell signalling and metabolism. 4. Identify the chromosome
17	Animal Biotechnology	BT-HCT 3.1	<ol style="list-style-type: none"> 1. Integrate various areas like medicine and agriculture, where this technology can be applied to gain opportunities 2. Gain knowledge on basics of cell culture techniques 3. Appreciate the difference between conventional products from recombinant products 4. Translate their theoretical knowledge to therapeutic output
18	Plant Biotechnology	BT-HCT 3.2	<ol style="list-style-type: none"> 1. Culture different plant parts 2. Understand the basic techniques in plant tissue culture and its applications 3. Relate various gene transfer techniques in plants. 4. Acquire knowledge on secondary metabolite production 5. Acquire knowledge in the area of genetic transformation in plants
19	Enzyme technology	BT-HCT 3.3	<ol style="list-style-type: none"> 1. Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and mechanisms 2. Compare methods for production, purification, characterization and immobilization of enzymes 3. Acquire knowledge on various application of enzymes that can benefit human life 4. Discover the current and future trends of applying enzyme technology for the commercialization purpose of biotechnological products.
20	Environmental Biotechnology	BT-SCT 3.1	<ol style="list-style-type: none"> 1. Inter-relate the concept of environment and biotechnological applications. 2. Predict challenging issues and offers solutions as introduction of biofertilizers and biopesticides. 3. Identify the role of biosensors in bioremediation. 4. Understand the concepts of toxicology.
21	Techniques in Microbial Biotechnology	BT-SCT 3.2	<ol style="list-style-type: none"> 1. Acquire technical knowledge and entrepreneurial skills in areas of microbial biotechnology
22	Animal Biotechnology practical	BT-HCP 3.1	<ol style="list-style-type: none"> 1. Utilize the animals for high value products production 2. Acquire knowledge in basic techniques of animal

			cell culture
23	Plant Biotechnology practical	BT-HCP 3.2	<ol style="list-style-type: none"> 1. Demonstrate the fundamental techniques in plant cell culture. 2. Acquire knowledge on techniques such as micropropagation, callus culture, somatic embryogenesis and synthetic seed technology
24	Enzyme technology practical	BT-HCP 3.3	<ol style="list-style-type: none"> 1. Able to quantitatively and qualitatively estimate protein and sugars can differentiate samples by doing different test. 2. Apply biochemical calculation for enzyme kinetics 3. Plot graphs based on kinetics data
25	Bioprocess engineering	BT-HCT 4.1	<ol style="list-style-type: none"> 1. Implement the genetic engineering course - to exploit microorganisms, to manipulate their metabolic pathways, and also to improve the strain of industrially useful organisms 2. Analyze the pathways of secondary metabolite in microbes 3. Gain knowledge in the production of industrially important enzymes 4. Exploit microbial cellular processes for yield enhancement
26	Medical Biotechnology and Nanobiotechnology	BT-HCT 4.2	<ol style="list-style-type: none"> 1. Acquire knowledge of genetic counseling and pre – natal diagnosis is again an added advantage to the young generation 2. Diagnose various disease 3. Enhance the skill and knowledge in health care sector to improve employability 4. Acquire training skills in clinical research related to drug discovery 5. Acquire the knowledge in basics of nanobiotechnology and its application in medicine and biology 6. Deliver the drugs effectively using nano biotechnology 7. Apply the Nanobiotechnology in treatment of disease
27	Research Methodology	BT-SCT 4.1	<ol style="list-style-type: none"> 1. Design research plan 2. Use statistical method to find the significant of the results 3. Perform research experiments with proper controls
28	Genomics and Proteomics	BT-SCT 4.2	<ol style="list-style-type: none"> 1. Describe recent advances in genomics, transcriptomics, proteomics and metabolomics 2. Analyze information and data relating to specific genes using general and plant-specific databases, proteomics and metabolomics online portals, next

			generation sequencing tools and next generation mapping portals.
29	Project dissertation	BT-HCMP 4.3	1. To address and assess the diverse problems associated with various fields relevant to biotechnology through the techniques learnt to design managerial measures for a healthy environment.
30	Bioprocess engineering practical	BT-HCP 4.1	1. Identify new strains that can be used for commercial purposes and for industrial processes. 2. Exemplify the methods of identification of various strain for the production various pharma products
31	Medical Biotechnology and Nanobiotechnology practical	BT-HCP 4.2	1. Acquire knowledge in identification of pathogenic microorganisms, their characterization, pathogenesis and control. 2. Safeguard rules for self & society and can work diagnostics and hospitals. 3. Synthesize and characterize various nanomaterials

Dr. Ashajyothi C
Assistant Professor
Dept. of Biotechnology
VSK University
Ballri-583 105