

<b>Name of the Department : -</b>	<b>Department of Biotechnology</b>
<b>Name of the Subject - 1 : -</b>	<b>Biotechnology</b>
<b>Number of full time teachers in the subject teaching only UG courses :</b>	<b>2</b>
<b>Number of teachers teaching both UG and PG courses: -</b>	<b>5</b>
<b>Number of full time teachers in the subject teaching only PG courses: -</b>	<b>-</b>
<b>Program outcomes of all Programs (UG and/or PG and/or Diploma) offered by the Department:</b>	
<b>Program Specific Outcomes of all Programs (UG and/or PG and/or Diploma) offered by the Department: -</b>	
<b>Course Outcomes of all Courses (in UG and/or PG and/or Diploma) offered by the Department: -</b>	

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*Name and Signature of the Head of the Department*

<b>B. Sc. Third Year: Learning outcome</b>
<b>r DNA technology</b> Students will be 1. Able to improve the knowledge of genomic structure of microbes, techniques useful in recombinant DNA technology and application of genetic engineering. 2. This course will help to understand the concept of blotting and sequencing of biomolecules. This course will help to become skilled in DNA extraction, purification and quantification.
<b>B. Sc. Third Year: Animal and Plant Development</b> Students will be 1. understand basics of gametogenesis, fertilization, stem cells, cloning & embryogenesis and developmental biology aspects in plants & animals
<b>B. Sc. Third Year: Bioprocess Engineering</b> Students will be able to 1. Improve the knowledge concerning the biological and engineering sciences 2. to get knowledge of upstream development. basics of fermentation microbial processes knowledge and the basics of microbial growth
<b>Agricultural Biotechnology</b> Students will be able to 1. To understand the problems of farmers and them to tackle them with recent Biotechnological advances. 2. Understand recent technologies in agriculture
<b>Mushroom Cultivation Technology</b> Students will be able to 1. Carry out commercial mushroom cultivation techniques.
<b>Techniques in Plant Tissue Culture</b> Students will be able to 1. Understand Micro propagation of various commercially used plants. 2. Get basic knowledge of plant cells, role of hormones, sterilization techniques and the basics of microbial growth.
<b>Pharmaceutical Biotechnology</b> Students will be able to 1. understand the role of different herbal and chemical pharma products in cure of diseases. 2. It will also help students to learn the application of computational approaches in drug discovery. 3. To understand the role of various pharmaceutical product in cure and presentation of human diseases and to provide knowledge of drug discovery and designing.
<b>Industrial Biotechnology</b> Students will be able to 1. Get knowledge of many procedures in industries, role of microorganisms in industries and techniques used to improve product formation in industries.
<b>Environmental Biotechnology</b> Students will be able to 1. understand the problems of environments and they can tackle environmental problems using recent Biotechnological advances. 2. Understand aspects of environmental science and techniques implemented to solve environmental problems.
<b>Herbal Drug Development</b> Students will be able to 1. Understand the role of various pharmaceutical product in cure and quality control of processed products
<b>Food Biotechnology</b> Students will be able to

1.The application of fermented foods and its speciality. 2.To understand the basic concepts of food, fermented foods and methods of food preservations.
<b>Advanced Bioinformatics</b> Students will be able to 1.Learn basic concept of molecular biology, genetic engineering, biochemistry, basic fundamental knowledge about computer.
<b>Fundamentals of Nanobiotechnology</b> Students will be able to 1. To get knowledge of sequence alignment, to study the genomic & structural bioinformatics prerequisites. 2. To get knowledge of physics, physical chemistry, organic chemistry, molecular biology, genetic engineering, biochemistry, basic fundamental knowledge about computer.
<b>Medical Biotechnology</b> Students will be able to 1. understand the role of antigen antibody reactions and role of carcinogenic agents 2.Get technical understanding of Microbiology, immunology and basics of cancer is required to learn this subject.
<b>Biofertilizers and Biopesticides</b> Students will be able to 1.Understand the role of Biofertilizers in the field of agriculture and allied industry. 2.Get technical understanding of microbial culturing, fermentation techniques is prerequisite to student to learn this syllabus.
<b>Fermentation technology</b> Students will be able to 1.Get familiar with various designs of fermenter and related principles.
<p style="text-align: center;"><b>B.Sc Biotechnology I Year</b> <b>Learning outcome</b></p>
<b>Functional English</b> 1.Understand and demonstrate Basic English usages for their different purposes. 2. Clear entrance examination and aptitude tests. 3. Write various letters, reports required for professional life.
<b>Introduction to Biotechnology-</b> 1.Students become able to understand the applications of Biotechnology in different fields.
<b>Basic Bioscience</b> 1.Students will understand biodiversity of living organism and plant body organization
<b>Microbiology-I</b> 1.Students will understand the history of microbiology. 2.They will learn the fine structure of bacteria and applied areas of Microbiology
<b>Business Communication</b> 1.Students will understand and demonstrate Basic English usages for their different purposes. 2. Clear entrance examination and aptitude tests. 3. Write various letters, reports required for professional life.
<b>Principles of Genetics</b> 1.Students will learn the Mendel's laws of Inheritance and will acquire the laboratory skills of microbial recombination.
<b>Biomolecules</b> 1.Students will analyze the structure and functions of biomolecules in life forms. 2.They will acquire the lab skills for the estimation of biomolecules.

<b>Microbiology-II</b> 1.Students will learn the microbial nutrition &cultivation. 2.They will understand bacterial growth and various methods of sterilization.
<p align="center"><b>B.Sc Biotechnology II Year</b> <b>Learning outcome</b></p>
<b>Metabolism-I</b> Students will be able to 1. know about enzymes. 2. know metabolism, anabolism and catabolism.
<b>Molecular Biology</b> Students will be able to 1.Explain the properties of genetic materials and storage and processing of genetic information. 2.Apply mechanisms of DNA replication, damage and repair in applied molecular genetics.
<b>Mathematics, Biostatistics and Computers</b> Students will be able to 1.Understand significance of maths and computers in biotechnology.
<b>English and science communication skills</b> Students will be able to: 1. understand and demonstrate Basic English usages for their different purposes.
<b>Cytology</b> Students will be able to 1.Understand types and functions of cells
<b>Metabolism II</b> Students will be able to 1.Understand synthesis of carbohydrates, Fatty acids, amino acids
<b>Applied &amp; Medical microbiology</b> Students will be able to 1.define the science of microbiology, its development and importance in human welfare. 2. describe some of the general methods used in the study of microorganisms. 3. demonstrate aseptic microbiological techniques in the laboratory and check sources of microbial contamination and their control.
<b>Immunology and Virology</b> Students will be able to 1.explain the role of immune cells and their mechanism in body defense mechanism. 2. demonstrate immunological techniques. 3. Structure, Multiplication and role of genetic material in viruses.
<b>Plant and Animal Cell Culture</b> Students will be able to: 1. Acquire the knowledge about the techniques of Plant Tissue Culture, Lab. organization & measures adopted for aseptic manipulation and nutritional requirements of cultured tissues. 2.Learn the techniques of culturing tissues, single cells, protoplasts & anther culture, germplasm conservation and cryobiology.
<b>English and science communication skills</b> Students will be able to: 1. understand and demonstrate Basic English usages for their scientific purposes
<p align="center"><b>B.Sc Biotechnology Vocational I Yr</b> <b>Learning outcome</b></p>
<b>Cell Biology</b> Students will be able to 1.Understand types and functions of cells 2.Understand cell division
<b>Introductory Microbiology</b>

<p>Students will be able to</p> <ol style="list-style-type: none"> <li>1. Describe some of the general methods used in the study of microorganisms.</li> <li>3. Demonstrate aseptic microbiological techniques in the laboratory and check sources of microbial contamination and their control</li> </ol>
<p><b>Math, Statistics &amp; Computers</b></p> <p>Students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand significance of maths and computers in biotechnology.</li> </ol>
<p><b>Biochemistry</b></p> <p>Students will be able to</p> <ol style="list-style-type: none"> <li>1. Know basic structure of biomolecules</li> <li>2. Understand functions and importance of biomolecules in a cell</li> </ol>
<p align="center"><b>B.Sc Biotechnology Vocational II Yr</b></p> <p align="center"><b>Learning outcome</b></p>
<p><b>Genetics and Molecular Biology</b></p> <p>Students will be able to</p> <ol style="list-style-type: none"> <li>1. Know basic structure of DNA</li> <li>2. Know central dogma of molecular biology</li> </ol>
<p><b>Bioinstrumentation</b></p> <p>Students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand applications of different instruments used in laboratory</li> <li>2. Demonstrate working of instruments used in laboratory</li> </ol>
<p><b>Basic techniques in molecular biology</b></p> <ol style="list-style-type: none"> <li>1. Students will be able to demonstrate techniques like PCR, ELISA</li> <li>2. Students will know applications of these techniques.</li> </ol>
<p><b>Biopesticides Production Technology</b></p> <ol style="list-style-type: none"> <li>1. Students will be able to understand applications and production methodologies in biopesticide</li> </ol>
<p><b>r-DNA Technology</b></p> <ol style="list-style-type: none"> <li>1. Able to improve the knowledge of genomic structure of microbes, techniques useful in recombinant DNA technology and application of genetic engineering.</li> <li>2. This course will help to understand the concept of blotting and sequencing of biomolecules. This course will help to become skilled in DNA extraction, purification and quantification</li> </ol>
<p><b>Immunology</b></p> <p>Student will be able to</p> <ol style="list-style-type: none"> <li>1. explain the role of immune cells and their mechanism in body defense mechanism.</li> <li>2. demonstrate immunological techniques</li> </ol>
<p><b>Bioagents in Agriculture</b></p> <p>Student will be able to</p> <ol style="list-style-type: none"> <li>1. Understand role of biotechnology in agriculture</li> </ol>
<p><b>Enzyme Technology</b></p> <ol style="list-style-type: none"> <li>1. Students will know enzyme kinetics</li> <li>2. Students will know industrial applications of enzymes</li> </ol>
<p align="center"><b>B.Sc Biotechnology Vocational III Yr</b></p> <p align="center"><b>Learning outcome</b></p>
<p><b>Plant Tissue Culture</b></p> <p>Students will be able to:</p> <ol style="list-style-type: none"> <li>1. Acquire the knowledge about the techniques of Plant Tissue Culture, Lab. organization &amp; measures adopted for aseptic manipulation and nutritional requirements of cultured tissues.</li> <li>2. Learn the techniques of culturing tissues, single cells, protoplasts &amp; anther culture, germplasm conservation and cryobiology</li> </ol>
<p><b>Environmental Biotechnology</b></p> <p>Students will be able to</p> <ol style="list-style-type: none"> <li>1. understand the problems of environments and they can tackle environmental problems using recent Biotechnological advances.</li> </ol>

2.Understand aspects of environmental science and techniques implemented to solve environmental problems
<b>Plant transgenesis</b> 1. Acquire the knowledge about the techniques of Plant Tissue Culture, Lab. organization & measures adopted for aseptic manipulation and nutritional requirements of cultured tissues. 2.Learn the techniques of culturing tissues, single cells, protoplasts & anther culture, germplasm conservation and cryobiology
<b>Bioresource Technology</b> Students will be able to 1.Know various methods for utilization of biological resources 2. Know uses of biological resources
<p style="text-align: center;"><b>M.Sc Biotechnology I Year</b> <b>Learning outcome</b></p>
<b>Cell and Developmental Biology</b> 1.Students will understand the basics of Cell Biology and developmental Biology and fundamentals of Cancer genetics. 2.They will Identify the characteristics and basic needs of living organisms and ecosystems
<b>Microbiology and Virology</b> 1.Students will understand the development of Microbiology and Virology. Also will learn the growth pattern of Microorganisms. 2.They will know the methods of cultivation of bacteria and Viruses for Industrial and Human use
<b>Biochemistry</b> 1.Students will understand the Structure, classification and the properties of Biomolecules. 2.They will acquire the basic laboratory skills for the isolation and separation of biomolecules
<b>Techniques in Biology</b> 1.Students will learn the working principles of biological techniques like microscopy, electrophoresis, chromatography and spectroscopy. 2.They will use these biological techniques in research and development.
<b>Plant Metabolism and Development</b> 1.Students will learn the plant water relationship, mechanism of photosynthesis and respiration. 2.They will explain the mechanism of plant reproduction.
<b>Molecular Genetics</b> 1.Students will acquire the laboratory skills for the isolation if genetic material. They will learn the biochemistry of DNA and RNA. 2.Students will analyze the gene interactions
<b>Immuno-technology</b> 1.Students will learn the various components and working of immune system. 2.They will acquire the techniques for the development of vaccines
<b>Process Biotechnology</b> 1.Students will understand the various laboratory methods for the isolation and preservation of Microorganisms. 2.They will learn the Industrial use of bioreactor and also become aware about the media optimization.
<b>Enzymology</b> 1.Students will learn the role of enzyme in human health and their industrial applications. 2.They will acquire the laboratory knowledge for the industrial enzyme products.
<b>Nano-biotechnology</b> 1.Students will understand the use of Nano-biotechnology in various areas like agriculture, medicine, cosmetics and environment. 2.They will learn the rights of Intellectual properties

<p style="text-align: center;"><b>M.Sc Biotechnology II Year</b> <b>Learning outcome</b></p>
<p><b>Genetic Engineering</b> Students will be</p> <ol style="list-style-type: none"> <li>1.Able to improve the knowledge of genomic structure of microbes,techniques useful in genetic engineering and application of genetic engineering.</li> <li>2.This course will help to understand the concept of blotting and sequencing of biomolecules. This course will help to become skilled in DNA extraction, purification and quantification</li> </ol>
<p><b>Industrial Biotechnology</b> Students will be able to</p> <ol style="list-style-type: none"> <li>1.Get knowledge of many procedures in industries, role of microorganisms in industries and techniques used to improve product formation in industries</li> </ol>
<p><b>Animal Biotechnology</b> 1.Students will learn to use techniques in biotechnology to utilize animal resources</p>
<p><b>Plant and Agricultural Biotechnology</b> 1. 1.Students will learn to use techniques in biotechnology to utilize plant resources</p>
<p><b>Pharmaceutical Biotechnology</b> Students will be able to</p> <ol style="list-style-type: none"> <li>1. Understand the role of different herbal and pharma products in cure of diseases.</li> <li>2.To understand the role of various pharmaceutical product in cure and presentation of human diseases and to provide knowledge of drug discovery and designing</li> </ol>
<p><b>Computational Biology</b> 1.It will help students to learn the application of computational approaches in drug discovery</p>
<p><b>Environmental Biotechnology</b> Students will be able to</p> <ol style="list-style-type: none"> <li>1.Understand the problems of environments and they can tackle environmental problems using recent Biotechnological advances.</li> <li>2.Understand aspects of environmental science and techniques implemented to solve environmental problems</li> </ol>
<p><b>Applied Biotechnology</b> 1. Students will get knowledge of physics, physical chemistry, organic chemistry, molecular biology, genetic engineering, biochemistry, basic fundamental knowledge about computer.</p>