

M.Sc. Biotechnology I Semester

Paper 1- Cell Biology

Course Learning Outcome

At the end of the paper, a student should be able to

1. Understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles.
2. Students will understand how these cellular components are used to generate and utilize energy in cells.
3. Students will understand the cellular components underlying mitotic cell division.
4. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.
5. Students will understand the process of cell signalling and various process of apoptosis and their pathways.

Paper 2-Structure, Function and Metabolism of Biomolecules

Course Learning Outcome

At the end of the paper, a student should be able to

1. Understand in detail the structure and physico chemical properties of carbohydrates from monosaccharide to polysaccharides.
2. Understand in detail about amino acid structures, types of amino acids, classifications, structure of proteins and types of proteins.
3. Understand the relationship between the properties of macromolecules and cellular activities, cell metabolism and chemical composition.
5. Should be able to explain the metabolism of carbohydrates through various anabolic and catabolic pathways like glycolysis, Krebs's cycle, Glycogen metabolism, glucuronic acid cycle etc.

Paper 3-General and Applied Microbiology

Course Learning Outcome

At the end of the paper, a student should be able to

1. Gain knowledge about the different types of microorganisms and their significance.
2. Students will study different techniques used in microbiology.
3. They will study about the growth of different types of microorganisms based on various environmental factors.
4. Could explain the concept, principle and types of sterilization methods.
5. Students can also go in for Medical Laboratory Technique Courses, opening opportunities in hospitals and pathological laboratories.

Paper 4-Bioinstrumentation

Course Learning Outcome

At the end of the paper, a student should be able to

1. Understand the Principle, instrumentation and applications of various instruments used to identify different biomolecules.
2. Exhibit a knowledge base in handling different chromatographic techniques and knowing the sequences of different proteins.
3. Learn fundamental principles behind centrifugation and electrophoresis and apply them practically.
4. Capable to choose and apply suitable separation techniques to identify different biomolecules.
5. Understand the difference between UV visible and fluorescence spectroscopy and colorimetry.

M.Sc. Biotechnology II Semester

Paper 1- Molecular Genetics

Course Learning Outcome

At the end of the paper, a student should be able to

1. Understand “ Gene Regulation mechanism in Prokaryotes, Viruses and Eukaryotes”.
2. Gain knowledge about Recombinant DNA technology by studying about various Vectors and Restriction Enzymes involved.
3. Should be able to understand Various Expression Systems and Molecular Markers.
4. Should be able to know the application of R-DNA technology and use of Restriction enzymes in construction of various vectors and libraries such as c-DNA & Genomic libraries.
5. Screening of the libraries with the help of “ Reporter Genes” and Molecular Markers such as RFLP,RAPD, AFLP.

Paper 2- Basic Enzymology and Enzyme Technology

Course Learning Outcome

At the end of the paper, a student should be able to

1. Explain the nomenclature, structure, classification and functions of enzymes.
2. Explain the purification and crystallization techniques of enzymes.
3. Understand the kinetics of enzymes easily.
4. Will be able to explain enzyme activators and inhibitors.
5. Could define factors that effect enzyme activity.

Paper 3- Molecular Biology

Course Learning Outcome

At the end of the paper, a student should be able

1. It deals with understanding the molecular aspects of the biology.
2. It majorly emphasizes the concepts of central dogma of molecular biology spanning from DNA Replication till Protein Synthesis and Reverse transcription.
3. It also helps in understanding the concepts of cellular function.
4. To gain insight into the most significant molecular and cell-based methods used today to expand our understanding of biology.
5. Will be able to design and implement experimental procedures using relevant techniques.

Paper 4- Immunology and Animal cell culture

Course Learning Outcome

At the end of the paper, a student should be able

1. To explain about various cells and organs of immune system.
2. Could explain antigen, antibody their structure and functions properly.
3. Understand about autoimmune diseases, about vaccines their types and functioning.
4. Student of this course have knowledge on gene manipulation, gene expression, etc which prepares them for further studies in the area of cell and tissue engineering.
5. Explain various immunodiagnostic procedures and monoclonal antibodies.

M.Sc. Biotechnology III Semester

Paper 1- Genetic Engineering

Course Learning Outcome

At the end of the paper, a student should be able

1. To explain various cloning and expression vectors.
2. Understand methods of gene isolation, DNA sequencing techniques and their synthesis.
3. Could explain about molecular markers, molecular probes and PCR techniques.
4. Understand applications of genomics and proteomics with special reference to Arabidopsis and Rice.
5. Student of this course have knowledge on gene manipulation, gene expression, etc which prepares them for further studies in the area of genetic engineering.

Paper 2- Biostatistics and Bioinformatics.

Course Learning Outcome

At the end of the paper, a student should be able

1. Know and remember the basic concepts of statistics and probability.
2. learn classification and description of the data.
3. Understand the meaning of correlation coefficient between two variables.
4. To utilize and understand biological databases to gather, store, retrieve, manage, analyze and integrate biological data for generating new knowledge.
5. To apply mathematical and statistical logic in programming languages aiding life science research

Paper 3- Plant Biotechnology

Course Learning Outcome

At the end of the paper, a student should be able

1. Explain different types of plant cultures.
2. Know about various plant cloning vectors and genetic and molecular markers.
3. Compare the pros and cons of transgenic plants on environment.
4. Explain the production of useful secondary metabolites using plant tissue culture techniques.
5. Explain the concepts of intellectual property management and handling of GMOs.

Paper 4- Bioprocesses and Biochemical Engineering

Course Learning Outcome

1. Able to understand and explain the principles of science (fermentation) in identifying, formulating and solving problems in the field of bioprocess technology.
2. Able to analyze and design bioreactors (fermenters) and their components, systems and processes.
3. Able to understand the kinetics of product synthesis and energy balance in bioprocess system.
4. Able to understand and explain problems related to fermentation technology in the field of bioprocess technology.
5. Able to explain the process of downstream processing easily.

Paper 5- Applied Biotechnology

Course Learning Outcome

1. This course presents the utility of Microbes.
2. On successful completion of the subject the student should have understood: Fermentation, Microbial products, Vaccine and antibiotics.
3. This course also presents about waste water environment. Domestic and industrial waste water flow rate and characteristics. Design of waste water network, waste water treatment process. Waste water pretreatment – screenings, grit channels, filtration and equalization, primary treatment-chemically enhanced primary sedimentation, sludge quantity from primary settlings.
4. Should have knowledge of nanoscience and tools for measuring nanostructure.
5. Know about SNP's genomics and proteomics.

M.Sc. Biotechnology IV Semester

Dissertation Outcome

On completion of Dissertation work students should

1. Have deeper understanding of a subject for its application in addressing social and scientific issues.
2. It helps in laboratory training of students.
3. Students will be able to handle research problems independently.
4. Vigorous laboratory training will help students to boost their research carrier.
5. Should be able to write a good research report and acquires the skill of presenting data in graphical form.