

Department of Biotechnology
Name of Programme: B.Sc. Biotechnology
Programme Outcomes

- PO 1: Critical Thinking:** The programme aims to give knowledge with facts and figures related to various subjects in pure sciences such as Physics, Chemistry, Botany, Zoology, Mathematics, Computer Science, Economics, Quantitative Techniques, Bio-informatics, Bio-technology etc.
- PO 2: Lifelong learning:** Enable the students to understand the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in the day-to-day life.
- PO 3: Logical experimentation:** The learners acquire the abilities in handling scientific instruments, scheduling and executing the experiments in laboratories and to draw logical inferences from the scientific experiments.
- PO 4: Creative thinking:** They become capable of thinking creatively, to propose innovative ideas in clarifying facts and figures and providing new solution to the problems.
- PO 5: Interdisciplinary approach:** To give them knowledge about developments in any science subject and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.
- PO 6: Scientific aptitude:** The programme targets to develop scientific aptitude among the students to make them open- minded, critical and curious in order to deal with all aspects related to life.
- PO 7: Self reliant:** To make them capable of applying their acquired knowledge and able to work on their own hence make themselves self-reliant and self-sufficient.

Mapping of Course Outcomes

Semester- I Paper General Microbiology-A

COURSE OUTCOMES	SKILL	POs	BLOOM'S LEVEL	ASSESSMENT
CO1- The students will be acquainted with the basic concept of Microbiology and its relevance in daily life	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2 – Students will be able to identify and analyze regarding the basic techniques such as bright field, dark field phase contrast, fluorescence & immunofluorescence, electron microscopy	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3- The students will be able to learn about the general features of different microorganisms like bacteria, viruses, fungi etc.	Remember, Apply	PO1,PO2,P O4	L1,L3	Assignment/ Class test/
CO4- Students will be able to illustrate regarding the various biochemical and metabolic characteristics of microorganism.	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation
CO5 – Students will learn the different methods of bacterial classification.		PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- I Paper: BT-9 Biochemistry A

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1. The students will be made to define biochemistry and tell its role in plant and animal life	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2. Students will be able to interpret different bio molecules such as proteins, Carbohydrates etc in daily life.	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3. Students will be able to illustrate various procedures for determining sugars, carbohydrates, etc in various samples	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4. Students will be able to identify and analyze the importance of water in life.	Understand Analyse	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- II Paper General Microbiology-B

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
Co1 - The students will be able to learn about the process of microbial growth	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
Co2 – Students will be able to identify and analyze various methods used for cultivation of different viruses and life cycle of various plant and animal viruses	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
Co3 - Students will be able to the illustrate various diseases and their mechanism caused by microorganisms	Remember, Apply	PO1,PO2,P O4	L1,L3	Assignment/ Class test/
Co4 - Students will be able to identify and analyze the different characteristics and mechanism of various fungal diseases, their mechanism of action and diagnosis	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- II Paper: BT-9 Biochemistry B

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1. Students will be able to define basic concept of metabolism	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2. Students will be able to identify and analyze different types of energy rich compounds	Understand Analyze	PO1,PO6	L2,L4	Assignment
CO3. Students will be able to illustrate different types of enzymes there mechanism of action	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4. Students will able to identify and analyze different processes used for the Separation of lipids using Various chromatography techniques.	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- III Paper Agro and Industrial Applications of Microbes-A

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1- Students will be able to define the basic concept of agro industrial microbiology.	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2- Students will be able to identify and analyze different approaches used for genetic manipulations of microorganisms	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3- Students will be able to illustrate the presense of different industrial important microbes, its isolation, screening, selection and identification	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO 4 - Students will be able to identify and analyze Microbial association and their interaction with plants and role of microbes in sustainable agriculture	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- III Paper: BT-3 Biochemistry – III

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1. The learners will define metabolism and understand the basic concept of metabolism.	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2. Students classify various metabolic pathways of carbohydrate metabolism and their regulation.	Understand Analyze	PO1,PO2	L2,L4	Assignment
CO3. : Students will be able to illustrate concept of electron transport chain and oxidative phosphorylation.	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4. Students will able to identify and analyze different processes used for the Separation of lipids using Various chromatography techniques.	Understand Analyze	PO1,PO2	L2,L4	Assignment,/Project/ PPT Presentation

Semester- IV Paper Agro and Industrial Applications of Microbes-B

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1- Students will be able to learn about the general characteristics of industrial and agro industrial microbes and microbes involved in antibiotics production	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2- Students will be able to identify and illustrate about the various mechanisms involved in the production of different microbial products like wine, beer etc.	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3- Students will be able to identify and analyze microbial process in agro biotechnology like BT crops etc	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4-Students will illustrate about the different microbial process in industrial biotechnology	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- IV Molecular Biology

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1- The students will be able to learn the Molecular basis of life: DNA and its replication	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2 – The students will understand the concept of DNA recombination molecular mechanisms	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3 – students will be able to learn the Process of transcription and translation in organisms	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/

Semester- IV Paper: BT-3 Biochemistry – IV

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1: Students will define what the metabolic pathways of lipid catabolism and its regulation	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2.Students will be able to classify metabolism and explain concept of lipid anabolism	Understand Analyse	PO1,PO2	L2,L4	Assignment
CO3. Students will illustrate various metabolic pathways of amino acid metabolism along with its regulation.	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4. Students will analyze the detailed concept of nucleic acid metabolism.	Understand Analyse	PO1,PO2	L2,L4	Assignment,/Project/ PPT Presentation

Semester- V Bioprocess Engineering-A

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1 - Students will be able to learn about the fundamental principle of bioprocess engineering and different types of microbial cultures.	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2 - The students will be acquainted with the various mechanisms of microbial growth kinetics.	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3 –The students will be able to identify and analyze the process of external and internal feed basic system of various microbial creatures	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4- Students will be able to illustrate the importance of sterilization in Bioprocess Engineering	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- V Patents Laws in Biotechnology

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1: Students will be able to learn the Conceptual knowledge regarding the Indian patent system, its history, further amendments objectives and along with patenting agencies will be enlisted.	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2: Students will be able to learn the format of the writing the patent and its specifications. Further, added guidelines include patentee rights, post grant opposition, infringement, etc.	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3: Students will be acquainted regarding the patenting system in biotechnology and articles related to it.	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4: Awareness will be created about the risks associated with the release of genetically modified microorganisms.	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- V Paper: BT-3 Animal Tissue Culture

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1. The students will be able to define animal biotechnology, animal cell culturing.	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2. students will be able to classify various cell lines and their characteristics.	Understand Analyse	PO1,PO2	L2,L4	Assignment
CO3. Students will be able to illustrate and experiment to isolate DNA and RNA from animal tissues and to analyze the DNA by electrophoresis and spectrophotometrically.	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4. The students will be able to analyze how to choose the various types of stem cells and their role in differentiation and organ culturing	Understand Analyse	PO1,PO2	L2,L4	Assignment,/Project/ PPT Presentation

Semester- V Paper: BT-3 Animal Biotechnology

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1. The students will be made to give names of the various types of cell lines and define them	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2. students will be able to classify various cell lines and their Characteristics.	Understand Analyse	PO1,PO2	L2,L4	Assignment
CO3. Students will be able to illustrate and experiment to isolate DNA and RNA from animal tissues and to Analyze the DNA by electrophoresis and spectrophotometrically.	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4. The students will be able to analyze how to choose the various types of stem cells and their role in differentiation and organ culturing	Understand Analyse	PO1,PO2	L2,L4	Assignment,/Project/ PPT Presentation

Semester- V Paper: R-DNA Technology-A

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1. The students will be able to define r-DNA	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2. students will be able to classify various types of vectors	Understand Analyse	PO1,PO2	L2,L4	Assignment
CO3. Students will be able to illustrate and experiment to isolate DNA and RNA from plant and microorganism tissues and to analyze the DNA by electrophoresis and spectrophotometrically.	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4. The students will be able to analyze various types of DNA sequencing techniques used in modern era.	Understand Analyse	PO1,PO2	L2,L4	Assignment,/Project/ PPT Presentation

Semester-VI Bioprocess Engineering-B

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1 - The students will be acquainted with the various features of different bioreactors and its kinetics.	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2- The students will learn about the various control and measurement equipment of bioreactors.	Understand Analyse	PO1,PO2	L2,L4	Assignment/Micrographs
CO3 - The students will be able to identify and analyze about the basic concept of down streaming processing	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4- Students will be able to analyze and identify various methods of ETP and fermentation economics	Understand Analyse	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- VI Intellectual property right and entrepreneurship

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1: The students will be imparted the knowledge of IPR; its history, benefits, problems and management.	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2: Students will be able to learn knowledge regarding World Trade Organization, its principle, objective, structure, function s and its related provisions, GATT	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3: Learners will be acquainted with TRIMs, TRIPs; its agreement, principle and objective, Berne convention, Budapest Treaty, WTO	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4: The students will be able to identify and analyze the knowledge regarding entrepreneur.	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester- VI Paper: R-DNA Technology-B

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1. The students will able to define cloning amd its various procedures	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2. students will be able to classify various techniques like PCR, Microarray	Understand Analyze	PO1,PO2	L2,L4	Assignment
CO3. Students will be able to illustrate the molecular techniques like isolation of Plasmid	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4. The students will be able to analyze and prepare Competent cells and transform the same gel electrophoresis etc.	Understand Analyze	PO1,PO2	L2,L4	Assignment,/Project/ PPT Presentation

Semester- V Biophysical and biochemical techniques-A

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1: The students will be able to learn centrifugation in detail which includes its principle, theory, types and application.	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2: The students will be acquainted with chromatographic technique; its principle, types and application.	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3: The learner will be able to illustrate methods regarding the advanced chromatography techniques like HPLC, TLC, and GC.	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4: Students will be able will be able to learn about spectroscopy, and instrumentation of NMR and ESR will be taught.	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation

Semester-VI Biophysical and biochemical techniques-A

COURSE OUTCOMES	SKILL	POs	BLOOM'S	ASSESSMENT
CO1: The students will be p able to learn the knowledge of mass spectroscopy, MALDI TOF and MALDI Q, its application and further fluorescence microscopy will be discussed	Understand Apply	PO2,PO4	L2,L3	Project, Quiz
CO2: Students will be ABLE to illustrate regarding electrophoresis, its types, principle, theory and applications	Understand Analyze	PO1,PO2	L2,L4	Assignment/Micrographs
CO3: The students will be able to identify and analyze regarding 2D gel and capillary electrophoresis and its applications	Remember, Apply	PO1,PO2,PO4	L1,L3	Assignment/ Class test/
CO4: The Students will be able to learn the radio isotopic techniques which includes concept of radioisotope, theory and safety rules for radio isotopic studies	Understand Analyze	PO1,PO6	L2,L4	Assignment,/Project/ PPT Presentation