Program: B.Sc. Biotechnology

Programme Specific Outcomes

Biotechnology is making immense contribution for the betterment of society. This course aims to provide experimental knowledge, analytical and conceptual skills to the learners in diverse areas like cell biology, microbiology, molecular biology, animal and plant tissue culture, genetics, RDNA technology, biochemistry, environmental biotechnology, fermentation technology, immunology, microbial technology etc. The course opens many career options after its completion. Following are the various programme specific outcomes:

PSO1. Understanding the concepts of biotechnology with reference to cell biology, genetics and molecular biology, immunology, microbiology, biochemistry, microbial technology, fermentation technology, enzyme technology, environment biotechnology, chemistry, biophysics, statistics to appreciate how diverse phenomena observed in nature and in daily life.

PSO2. Students will be able plan, conduct experiments, analyse and interpret data for investigating problems in Biotechnology and allied fields.

PSO3. Learn to carry out experiments in basic as well as certain advanced areas of biotechnology such as biochemistry, plant biotechnology, animal biotechnology, enzyme technology and Bioinformatics.

PSO4. Understand the basic concepts of certain sub fields such as biochemistry and Industrial biotechnology, molecular biotechnology, Environment biotechnology, Agri-biotechnology, general theory of Bioremediation and Fermentation.

PSO5. Gain hands on experience to work in applied fields of biological sciences. Learn different techniques pertaining to diverse field of biotechnology at theoretical and experimentation/practical level

PSO6. Gaining knowledge to transform theoretical concept to practical products/process and learning laws concerning to patents and IPR

PSO7. Gain a thorough Knowledge in the subject to be able to teach it at school level

PSO8. Relate the global scenario and interdisciplinary science areas and opportunity for development of technology in India abroad

PSO9. Viewing biotechnology as a tool the developing mind and critical attitude and the faculty of logical reasoning that is prepared to serve in diverse fields.

PSO10. Student can employ and implement their knowledge base in premium processes and applications which will profoundly influence or utilized for existing paradigm of agriculture, industry, healthcare and restoration of degraded environment to provide sustainable competitive edge to present society.

Course Outcomes

Semester-I

Course: Cell Biology I

CO1 This course outcome describes basic unit of living systems i.e. cell and a broad classification of cell types.

CO2 This course outcome explains about evolution of cell, and it's ultrastructure illustrating it's nucleus, cytoplasm and cell membrane.

CO3 This course outcome outlines the ultrastructure and function of various cell organelles from Endoplasmic reticulum to golgi bodies, ribosomes.

CO4 This course outcome states the ultrastructure and function of cell organelles such as mitochondria, chloroplast, lysosomes and cytoskeletal structures present in the cell.

Course: Microbiology I

CO1 This course outcome enlists historical developments of microbiology with its relevance in the field of biotechnology and status of microbiology in India.

CO2 This course outcome outlines Staining techniques used to study microorganisms under microscope, diversity as well as taxonomy of microorganisms.

CO3 In this course outcome students will understand about eukaryotes and prokaryotes and explains about their basic characteristics, cell structure and economic importance.

CO4 This course outcome states the Bacteriophages, animal and plant viruses with illustration of their examples.

CO5 This course defines role of microorganisms in geochemical cycles.

Course: Organic Chemistry

CO1: The main aim of this course is to provide the ground information of the organic chemistry. Learners will be able to understand the structure and bonding of the organic compounds by learning the various effects such as inductive effect, resonance effect, hyperconjucation etc.

CO2: To make students capable of understanding and studying the classification of the organic compounds and impart the students a thorough knowledge about the mechanism of the reactions which determines the completion of the reactions

Course: Inorganic Chemistry

CO1: This would facilitate students to get the knowledge about the planck constant and describes that how the wavelength of the particle is calculated. It describes the wave mechanical model of the atom. It helps to know that how many electrons are present in the particular space

CO2: Students will make understanding with the periodic table and the terms related with that and also describes the trends that how they vary with along the period and down the group.

CO3: This will provide the knowledge of the noble gas family and their compound formation as well as reactivity

CO4: It intends the chemical bonding.

Course: Physical Chemistry

CO1: The main outcome of this course is to provide information about Mathematical concepts so that medical students would not face any difficulty in derivations and Students learn to solve differentiation, Integration of different functions which enhance their problem solving ability

CO2: Students learn to find out errors in their Practical and how to correct them .Moreover, Students learn to find out errors in their Practical and how to correct them .This course aims at knowledge of problems related to standard deviation and applicability of F-test and Q-test

CO3: This course facilitates how to differentiate between different states of matter. Students also develop an idea of liquid and gaseous states in which they learn the structural differences in solids, liquids and gases.

CO4: This course aims at knowledge of gases and the most important vanderwaals equation. The most interesting and useful topic 'Joule-Thomson effect' of this course tells the liquefaction of gases and the concept of Inversion Temperature.

Semester-II

Course: Cell Biology II

CO1 This course outcome outlines the biochemical composition of cells, process of cell division and cell cycle.

CO2 This course outcome describes how interactions occur in cells and cells locomote.

CO3 This course outcome illustrates how cells differentiation occurs in both plant and animal cells, followed by cell senescence and cell death.

CO4 This course outcome students will understand cellular and molecular neurobiology and how coordination of muscles in cells.

Course: Microbiology II

CO1 This course outcome discuss about microbial nutritional media, categories of microbes on the basis of nutritional basis, characteristics of culture for isolation of microbes.

CO2 In this course outcome students will understand the concept of pure culture techniques of microbes and microbial growth along with illustrates the strain improvement techniques.

CO3 Students will learn microbial genetics and the mutations that are caused by various mutagens by the process of mutagenesis.

CO4 This course outcome states how biological nitrogen fixation is carried out by microbes.

CO5 This course outcome enlists food poisoning with special reference of microbes that cause them.

CO6 This course outcome defines the role of microorganisms as normal microflora

Course: Organic Chemistry

CO1: To make students capable of understanding and studying the classification of the organic compounds. To impart the students a thorough knowledge about the mechanism of the reactions which determines the completion of the reactions.

CO2: It provides the description of the allyl and aryl halides and their uses in various fields.These properties helps to describes the melting and boiling points of many compounds and their reactivity towards various reactions.

CO3: It Intends the naming reactions with different functional groups.The Concept of isomerism deals with the nature of organic compounds. It gives the knowledge about the Chirality which is the necessary condition for the chirality of the molecules,It deals with the different orientations of the compounds and with different names of the compounds. By using these configurations we can find the nature of compounds

Course: Inorganic Chemistry

CO1: Students will understand concept of close packing, ionic structures and factors affecting ionic solids which help them to identify and distinguish between different crystals.

CO2: students will develop understanding about the properties of alkali and alkaline earth metals.

CO3: it would enable the learner to learn about the structure of diborane, lewis acid nature of boron trihalides, preparation of carbides, nitrides & other relevant block compounds.

CO4: This course helps in understanding preparations and applications of fullerene, fluorocarbons, silicate compounds.

CO5: It makes the students to learn and understand about types of oxides and oxyacids, their structure and reactivity in s block & p block elements, interhalogen compounds, polyhalides compounds.

Course: Physical Chemistry

CO1: The main outcome of this course is to enable the students to understand about solutions used in daily life and methods of expressing their concentration.

CO2: By studying this course learners will be able to think about the nature of solutions and their stability which would be help them about the advantages and applications of various types of solutions.

CO3: This course aims at knowledge of different factors affecting rate of reaction and role of acid and base as a catalyst

Semester-III

Course: Biochemistry

CO1 This course illustrates the basic knowledge about water, amino acids and proteins with special reference to their basic structure, function and special properties.

CO2 This course explains the concept of carbohydrates and Lipids with reference of their structure, function and properties as biomolecules.

CO3 This course describes the biosynthesis and metabolism of carbohydrates, and nucleic acids that occur inside the living organisms.

CO4 This course explains the details of enzymes, their activity and importance as biomolecules in living organisms.

Course: Genetics

CO1 The goal of the course is to provide basic understanding of genetic material i.e. DNA and RNA.

CO2 This course provides the basic knowledge about genome concept with reference of both prokaryotic and eukaryotic organisms.

CO3 Course illustrates the concept of chromosome number and chromosomal morphology of both prokaryotic and eukaryotic organisms.

CO4 This course outcome identifies the inheritance of mendel's laws of genetics.

CO5 In this students understand the process of replication, mutations as well as DNA repair system.

CO6 This course explains students DNA is been transcripted to mRNA to proteins with reference of various enzymes and steps involved in both prokaryotes as well as eukaryotes.

CO7 This course enlists the concept of regulation of gene expression in prokaryotes.

CO8 This course outlines the concept of population genetics.

Course: Inorganic Chemistry

CO1: Develop the knowledge of transition metals to understand the trends in properties and reactivity of the first series of d-block elements and to know the typical physical and chemical properties of the transition metals.

CO2: To study the lanthanide elements to understand the trends in properties and reactivity and to develop the understanding of the typical physical and chemical properties of the transition metals.

CO3: To explain the typical physical and chemical properties of the transition metals especially from second and third transistion series. To identify simple compound classes for transition metals and describe their chemical properties

CO4: In order to study transition metals to understand the trends in properties and reactivity of the actinides and its typical physical and chemical properties to understand its applications

Course: Organic Chemistry

CO1: This course will facilitate the learners to classify the types of these functional groups by nomenclature.

CO2: Through the structure and classification of the compounds containing these functional groups, they would be able to make comparison between the reactivity of these compounds.

CO3: This course allows the students to outline the mechanism of various reactions of organic molecules containing the above mentioned functional groups.

CO4: It would help in research work and to develop new chemical reaction with different methods.

CO5: They would be able to grab the knowledge about various naming reactions and they will learn about their applications in field of chemistry.

Course: Physical Chemistry

CO1: They will grab knowledge of the basic concept of thermodynamics

CO2: They will learn how to solve exact and inexact functions

CO3: Students will get information regarding thermochemistry in daily life activities

CO4: Students will be able to get knowledge of the conversant processes of steam dryness

CO5: They will learn about uses of thermodynamics in daily life like in window A.C and refrigerators.

Semester-IV

Course: Biophysics

CO1 This course describes the fundamental concepts in physics and chemistry that underlines biological processes.

CO2 Students will be able to identify the reaction order for a chemical change and understand the concept of rate of change associated with chemical change and how it can be measured.

CO3 This course adequate knowledge on principle, measurement & working of sophisticated research techniques with their applications.

Course: r-DNA Technology

CO1 This course states the students about the basic tools and enzymes of R-DNA technology.
CO2 The student will able to describe, illustrate and analyses the applications of the techniques of R-DNA technology include electrophoresis, PCR, Blotting, Sequencing etc.
CO3 This course explains and generalise the methods of Genomic and cDNA library
CO4 The student will able to enlist application are of the various kinds of Vectors involved in Molecular Biology and recent research.
CO5 The student will able list the Various Gene Transformation Techniques used in various Molecular Biology.
CO6 The student will able explain the various theoretical aspects of Transgenic Plant production and its application.
CO7 The student will able to identify the recent advancement in Biotechnology and various application fields and role of rDNA technology In the Agriculture, Medicine and food industries.

Course: Inorganic Chemistry

CO1: Students will be able to understand the applications of various types of complex and their properties

CO2: Develop the knowledge of various process which proceed through the oxidation and reduction and they will able to know the applications of these reactions

CO3: It will develop the understanding of all type of acid and bases and explain the behaviour of these

CO4: Students will be able to understand the applications of various non aaqueous solvents and their properties with chemical behavior

Course: Organic Chemistry

CO1: Students will learn about the method of preparation, properties and uses of carboxylic acid along with their characteristic test

CO2: Students will learn about the method of preparation, properties and uses of derivatives of carboxylic acid along with their characteristic test

CO3: Students will learn about the method of preparation, properties and uses of ether along with epoxides.

CO4: Students will learn about the method of preparation, properties and uses of fats along with their commercial application.

CO5: Students will learn about the method of preparation, properties and uses of Organic compounds containing Nitrogen along with their distinguishable test

Course: Physical Chemistry

CO1: Phase diagrams are useful because they allow us to understand in what state matter exists under certain conditions.Phase equilibrium has wide range of applications in industries including production of different allotropes of carbon, lowering of freezing point of water by dissolving salt, purification of components by distillation, usage of emulsions in food production, pharmaceutical industry

CO2: Conductivity measurements are used routinely in many industrial and environmental applications as a fast, inexpensive and reliable way of measuring the ionic content in a solution.

CO3: These articles are depends on the movement of the boundary between two adjacent electrolytes under the influence of an electric field and the speed of the moving boundary can be measured and used to determine the ion transference numbers.

CO4: Nernest equation can be used to find the cell potential at any moment in during a reaction or at conditions other than standard-state,by knowing this students can determine the equilibrium constant or Gibbs free energy.In Concentration Cell students can know about how we can select anode or cathode.Nernest equation can be used to find the cell potential at any moment in during a reaction or at conditions other than standard-state, by knowing this students can determine the equilibrium constant or Gibbs free energy. In Concentration Cell students can know about how we can select anode or cathode and also how e.m.f be calculated from those.Students will also learn about that how we can prevents our metallic things from corrosion.

Semester-V

Course: Environment Biotechnology

CO1 The main aim of this course is to provide knowledge about Environment pollution with reference to soil, water as well as air pollution, and practical applications of environment technology through vermicomposting and biogas production.

CO2 Student will learn about the techniques of monitoring the pollutants in environment by biosensors, GC & HPLC. And the removal of these pollutants such as heavy metals, textiles dyes,paper, xenobiotics, pesticides and insecticides by using microbes.

CO3 This course states the students a basic understanding about water treatment technology by using various indicators such as Dissolved oxygen, Biological oxygen demand, Chemical Oxygen Demand, Total dissolved solid.It also includes aerobic and anaerobic waste water treatment.

Course Name: Immunology

CO1 This course discusses study of immune system, types of immunity:active, passive innate, adaptive, cell mediated and humoral immunity that helps us to protect our body from antigens alongwith a brief description about antigen.

CO2 The course provides a detailed discussion about immunoglobulins, immunotechniques and cells as well as organs involved in immune system.

CO3 This course also gives explanation about types and mechanism of hypersensitivity and autoimmunity.

CO4 This courseIllustrates about AIDS, Major Histocompatibility, Vaccines, Immunosuppression, Immunomodulation, Immunopotentiation and Hybridoma Technology with it's applications.

Course: Biochemical Engineering

CO1 The objective of this branch is to train students in biochemical engineering, biotechnology, microbial and enzyme systems.

CO2 This course will explains students about understanding the biological or biochemical phenomena of batch, continuous and fed batch systems with their sterilization.

CO3 This course is about to select suitable bioreactor and to analyse the bioprocess design and operation in terms of mass transfer in the reactions.

CO4 In this course students learn to develop scale up techniques for chemical engineering unit operations and process for both batch and continuous process

CO5 This course of biochemical Engineering illustrates the purification and recovery of products.

CO6 This course student illustrates basic concepts of economic analysis for process, involving equipment cost, and profitability.

Course: Inorganic Chemistry

CO1: Students will be able to use Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds which facilitate them to describe the shapes and structures of coordination complexes with coordination numbers 6 and 4

Co2: Learner will develop the understanding of the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them. They will be able to describe rate of reactions of complexes and type of reactions in complexes

CO3: Student will be able to describe magnetic properties of complexes, various kind of magnetic materials and effect of temp on magnetic characters. They will also able to describe methods of determining magnetic magnetic moments

CO4: Student will be able to describe quantum numbers, orbital and spin angular momenta of electrons. And To understand electronic transition, term symbol and concept of spectra.

Course: Organic Chemistry

CO1: It will make the learner to develop interest about the Synthesis, Properties and applications of Organo-metallic compounds

CO2: Students will learn about the Synthesis and Properties Organo-Sulphur compounds and their comparison with analogous compounds

CO3: Students will learn about the Principle, working and application of UV-Vis spectroscopy which will help them study the conjugation in organic compounds

CO4: Students will learn about the Principle, working and application of IR spectroscopy which will enable them to detect the various Functional group in organic compounds

CO5: Students will get knowledge about Principle, working and application of NMR spectroscopy which will help them in structure elucidation through C13-NMR & PMR

Course: Physical Chemistry

CO1: The main outcome of this course is to provide information about Quantum Mechanics and Spectroscopy .and Quantum Chemistry enables them to know about Schrodinger equation and its application

CO2: Students learn about rotation & vibration spectroscopy and the electromagnetic radiations used in these spectra. And Through rotational spectroscopy they will learn the energy level diagrams of rigid & non rigid rotors. This course aims at applications of rotational and vibrational spectroscopy

Semester- VI

Course: Microbial Technology

CO1 This course describes about the historical development of microbial technology.

CO2 This course illustrates about the primary and secondary metabolites including vitamins, antibiotics etc.

CO3 Student will learn about the techniques of immobilization, enzyme technology, biotransformation, biofertilizers, biopesticides, single cell protein, genetically modified organisms, biosafety level guidelines & regulation.

Course: Tissue Culture Technology

CO1 This course expresses historical developments,culture media composition and basic concepts of plant tissue culture such as cellular totipotency,organogenesis, embryogenesis, virus free plant production and micro propagation.

CO2 The course defines a detailed understanding about Protoplast Isolation, and Transgenic Plants.

CO3 This course also discusses the knowledge about animal cell culture including media with serum and serum free media followed by establishment of primary culture to cell line and characterization of established cell culture.

CO4 In this course students are described about somatic cell fusion, embryo transfer technology , properties of monolayer & suspension culture. This course also focuses on a brief account on applications of animal as well as plant tissue culture.

Course: Fermentation Technology

CO1 This course explains enhanced understanding about the concepts of fermentation processes.

CO2 This course illustrates the biological or biochemical phenomena of batch, continuous and fed batch systems with sterilization.

CO3 In this course students will learn about different types of fermentation and recombinant microbes

CO4 This course outlines about Fermentative production of biofuels & alcoholic beverages

CO5 This course defines about Fermentative production of microbial polysaccharides

CO6 In this course students will learn about Fermentative production of food additives, and different microbial flavours by fermentation process.

Course: Inorganic Chemistry

CO1: On the completion of course the student will have knowledge of Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness.

CO2 : The aim of the course is the teaching and understanding of the basic principles of Biological Inorganic Chemistry - Bioinorganic Chemistry that are considered necessary for the completion of postgraduate students' education. Also, the aim of this course is to present and describe bioinorganic systems through the correlation of the function, structure and activity of inorganic elements within the organisms. In particular, this course will include: a) a systematic study of trace element biosystems; b) the effect of the concentration of trace elements on health and the environment;

CO3: On the completion of course the student have knowledge ofSilicones and Phosphazenes as examples of inorganic polymers,nature of bonding in triphosphazenes.

CO4: The focus of this course is on the synthesis, structure and bonding, properties and reactivity of main group organometallics (including Grignard reagents, organolithium reagents, organotin compounds, etc), organotransition metal chemistry and organometallic catalysis. And On the completion of course the student have knowledge of metal-ethylene complexes and homogeneous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

Course: Organic Chemistry

CO1: Students would have knowledge about the structure, preparation and properties of heterocyclic compounds after completion of this course.

CO2: The main focus of this course is to make theStudents familiar with the classification, synthesis and application of various polymers

CO3: Students will learn the importance of enolates as starting material in organic synthesis

CO4: Students will get knowledge about the classification, conversion and application of carbohydrates

CO5: Students will learn about the classification, conversion and application of protein

Course: Physical Chemistry

CO1: To make them familiar in the study of surfaces and of heterinterfaces between constituents layers

CO2: On completion of this course they will know about the orbital concept

CO3: Helpful in determination of the geometrical structure of molecules in triplet state

CO4: Study is helpful for structure identification

CO5: Student able to know how laser and masers are work which are used in wide range of field

CO6: Student would be able to study the structure using Xrays

CO7: Complete study about strucutre for the compounds used in daily life.

CO8: Students would be able to know the reactions occurane in which state

CO9: laws study helpful in research work

CO10: Mechanism of different processes is studying

CO11: Daily used light applications

CO12: Students able to know how the energy transfer in different processes

CO13: Student able to know how laser and masers are work which are used in wide range of field