PG & RESEARCH DEPARTMENT OF BIOTECHNOLOGY
PROGRAMME OUTCOMES AND COURSE OUTCOMES OF UNDER GRADUATE (2023 ONWARDS)

NAME OF THE PROGRAMME: BACHELOR OF BIOTECHNOLOGY– PROGRAMME OUTCOME	
PO1	**Disciplinary knowledge:** Capable of demonstrating comprehensiveknowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study
PO2	**Communication Skills:** Ability to express thoughts and ideas effectivelyin writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	**Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	**Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, ratherthan replicate curriculum content knowledge; and apply one's learning to real lifesituations.
PO5	**Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	**Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating;Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation
PO7	**Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team
PO8	**Scientific reasoning**: Ability to analyse, interpret and draw conclusionsfrom quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	**Reflective thinking**: Critical sensibility to lived experiences, with selfawareness and reflexivity of both self and society.
PO10	**Information/digital literacy:** Capability to use ICT in a variety of learning

	situations, demonstrate ability to access, evaluate, and use a variety ofrelevant information sources; and use appropriate software for analysis of data.
PO 11	**Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO 12	**Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PO 13	**Moral and ethical awareness/reasoning**: Ability toembrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstratingthe ability to identify ethical issues related to one"s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
PO 14	**Leadership readiness/qualities:** Capability for mapping out the tasks ofa team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.
PO 15	**Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

NAME OF THE PROGRAMME: BIOTECHNOLOGY – COURSE OUTCOMES	
SEMESTER I	
1. CELL AND MOLECULAR DEVELOPMENTAL BIOLOGY	1. Have an insight of the cell as the fundamental unit of life and to compare the structure of the Eukaryotic cell with the primitive prokaryotic cell. 2. Analyze the structure and obtain a strong foundation about the functional aspects of cell organelles and cell membrane. 3. Study the structure and functions of Nucleic acid and discuss the molecular mechanism of Replication, Transcription and Translation and post translational modifications of proteins. 4. Predict the response of cells to the intra and extracellular environment by studying about the intracellular signaling pathways. 5. Understand the principles and molecular mechanisms involved in cellular differentiation, morphogenesis, growth and Potency of the cell.
2. BIOLOGICAL CHEMISTRY	1. Comprehend the importance of Chemistry and Biochemistry through the concept of acids and bases, and chemical bonding. 2. Demonstrates the formation of different types of solutions, concentrations of solutions and preparation of buffer solutions 3. Recall the Structure, Classification, Chemistry and Properties of Carbohydrates and ExplainVarious Biochemical Cycles involved in Carbohydrate Metabolism. 4. Recall the Structure, Classification, Chemistry and Properties of Lipids, Nucleic acid and Explain Various Biochemical Cycles involved in Fatty acid and Nucleic acid Metabolism. 5. Understand the Structure, Classification, Chemistry and Properties of proteins amino acids and Identify and explain nutrients in foods and the specific functions in maintaining health.
3. CELL AND MOLECULAR DEVELOPMENTAL BIOLOGY - Practical	1. Demonstrate the operation of Light Microscope 2. Identify blood cells and its components. 3. Isolate and identify plant, and animal cells.. 4. Summarizes the concept of gametes 5. Develop skill to perform cell fractionations.

4. BIOLOGICAL CHEMISTRY - Practical	1. Perform and estimate the amount of chemical substance present in a solution qualitatively. To analyze and detect the nature of various organic class of compounds qualitatively. 2. Qualitatively analyze the carbohydrates and amino acids and report the type of carbohydrate based on specific tests. Differentiate the carbohydrates based microscopic examination of the crystal. 3. Understand the methods of acidimetry, alkalimetry and permanganometry. 4. Quantify Ascorbic acid in lemon by Dichlorophenol indo phenol dye method, Glycine by Sorenson's formal titration method. 5. Estimate Glucose, Cholesterol and Proteins.
5. PUBLIC HEALTH AND HYGIENE	1. can explain the importance of health and hygiene. 2. can analyze the importance of food and malnutrition 3. can understand the cause of diseases. 4., Will get know about lifestyle diseases. 5 Will get awareness about various Health Services Organizations
6**. BASICS OF BIOTECHNOLOGY**	1. The student can understand the basics of biotechnology. 2. Able to explain the basic concept of biotechnology. 3. Can differentiate various types of biotechnology 4. Can outline various biotech based products used in day to day life. 5. Apply the concepts of biotechnology in various fields.

SEMESTER-II	
GENETICS	1. Learn about the classical genetics and transmission of characters from one generation tothe next. 2. Obtain a strong foundation for the advanced genetics. 3. Explain the properties of genetic materials and storage and processing of genetic information. 4. Acquire knowledge about the Mutagens, Mutations, DNA Repairs and Genetic disorders in human. 5. Categories Eugenics, Euphenics and Euthenics and indepth Knowledge on population Genetics.

Genetics - Practical	1. Demonstrate the basic principles of important techniques in Molecular biology andGenetics. 2. Analyze the Polytene chromosome of the organisms 3. Identify Barr bodies from Buccal smear 4. Demonstrate the Preparations and maintenance of culture medium 5 .Demonstrate Human karyotyping
FUNDAMENTALS OF MICROBIOLOGY	1. Understand the classification of Microorganisms and structure of bacteria 2. Understand the various microbiological techniques, different types of media, andtechniques involved in culturing microorganisms. 3 Categorize the methods of sterilization and identify the significance of culture media in the growth of different microbes. 4. Exhibit knowledge in analyzing the importance of Bio insecticides, Bio fertilizersprebiotics and probiotics. 5. Distinguish between normal flora and pathogens and describe the role of microbes in food intoxications.
FUNDAMENTALS OF MICROBIOLOGY - Practical	1. Describe the general Laboratory safety & Sterilization Techniques 2. Develop Skills in Media Preparation, Isolation & Serial Dilution Techniques and PureCulture Techniques 3. Microscopically analyze the morphological features of Bacteria and fungi and definevarious Staining Techniques. 4. Perform the Motility of organisms. 5. Able to characterize and identify bacteria using Biochemical tests.
ORGANIC FARMING AND HEALTH MANAGEMENT	1. The student will value the concepts of ecology and environment 2. To know the techniques of Vermicomposting and enjoying the cultivation of common Medicinal Herbs 3. To gain the knowledge about Principles and Policies in Organic forming and Certification agencies 4. To realize the Concept of Health and importance of well being 5. To appreciate the Role of exercise and nutrition in Health related fitness

VERMITECHNOLOGY	1. To know the techniques of Vermicomposting and role of earthworms in soil fertility. 2. To practice the culturing techniques of earthworms and composting materials 3. To gain the knowledge about Small scale techniques of Vermicomposting 4. To realize the Concept of Large scale techniques of Vermicomposting 5. To appreciate the impact of Vermiwash and Economics
SEMESTER – III	
IMMUNOLOGY AND IMMUNOTECHNOLOGY	1. Explain the role of immune cells and their mechanism in body defense mechanism. 2. Demonstrate the antigen –antibody reactions in various immune techniques. 3. Gain new insights into Antigen -Antibody interactions and to demonstrateimmunological techniques. 4. Gain knowledge of production of vaccines. 5. Apply the knowledge of immune associated disease, hypersensitivity reactions.
BIOINSTRUMENTATION	1. Practice, experiment with and apply the basic instruments in the laboratory. 2. Predict the functionality of Beer – Lambert's law in identifying and quantifying abiomolecule. 3. Employ the separation techniques for separating biomolecules based on chromatographyand electrophoretic techniques. 4. Understand the clinical important isotopes and detection of isotopes. 5.Employ the separation techniques for separating biomolecules based on centrifugal forceby centrifugation.
IMMUNOLOGY AND IMMUNOTECHNOLOGY - PRACTICAL	1. Perform blood grouping and determine blood type. 2. Able to count WBC and RBC. 3. Conduct serological diagnostic tests such as ASO, CRP, RA and WIDAL test. 4. Acquire technical skills required for immunodiffusion and know the principle behind the techniques. 5. Able to Demonstrate ELISA, Handling of Laboratory animals.

BIOINSTRUMENTATION Practical	1.Practice, experiment with and apply the basic instruments in the laboratory such asweighing balance, pH meter, shaker, incubator etc. in various research processes. 2. Predict the functionality of Beer – Lambert's law in identifying and quantifyingbiomolecules. 3. Employ the separation techniques for separating biomolecules based on paper chromatography. 4. Employ the separation techniques for separating biomolecules based on Thin layer chromatography. 5. Employ the separation techniques for separating biomolecules based on centrifugal force by centrifugation.
HERBAL MEDICINE	1. The student can analyses the importance of herbal medicine 2. can learn the role of herbal medicines for health 3. Can explain about Tribal medicine 4. can analyses the role of traditional medicine for today's health 5. can demonstrate the use of medicinal herbs to health
MUSHROOM CULTIVATION	1. The student can understand the biology and economy of mushrooms 2. can learn the Mushroom cultivation 3. Can explain Life cycle of Pleurotus spp and Agaricus spp. 4. can analyses the Spawn production 5. can demonstrate the Diseases and post harvest technology
SEMESTER –IV	
Genetic Engineering and rDNA Technology	1.Demonstrate the basic principles of genetic engineering techniques and illustrate thespecificity of vectors for cloning and advantages. 2. Enumerate various recombinant techniques and gene probes and molecular markersidentification. 3. Understand Gene transfer techniques by Viral and Nonviral mediated gene transfermechanisms. 4. Exhibit knowledge in sequencing technologies and protein engineering techniques 5. Explore the strategies of Recombinant DNA Technology in r medicine, Industry andagriculture.

BIOINFORMATICS AND BIOSTATISTICS	1. Acquire knowledge about the Developments and Applications of Bioinformatics. 2. Gain knowledge about the importance of the bioinformatics, databases, tools andsoftware of bioinformatics and explain different types of Biological Databases. 3. Understand the basics of sequence alignment, sequence analysis and Protein structureprediction method 4. Demonstrate the basic methods of data collection, graph construction and sampling techniques and Calculate measures of central tendency 5. Correlate and analyze biological data through various statistical methods and interpretbiological data via various probabilistic distribution methods.
Genetic Engineering and rDNA Technology PRACTICAL	1. Isolate the Plasmid DNA and Genomic DNA. and predict the molecular weight of DNAby agarose gel electrophoresis. 2. Demonstrate working principles of PCR, RFLP and other important GeneticEngineering techniques. 3. Prepare the competent cells and perform bacterial transformation. 4. Determine the restriction digestion of DNA 5. Determine the restriction fragment length polymorphism.
BIOINFORMATICS AND BIOSTATISTICS PRACTICAL	1. Analyse the Biological databases 2. Able to perform BLAST and FASTA 3. Represent data in to graphical form 4. Test the level of significance of biological data and interpret the results. 5. Determine averages of the biological data
FOOD AND NUTRITION	1. The student can determine the relationship between food , health and immunity 2. Able to explain the classification of foods and their deficiency 3. Can analyse the importance of BMR 4. Can outline the basic food groups and their adulteration 5. Apply the concepts of food to prepare different food plans

AQUACULTURE	1. The student can understand the pond construction and commercial characteristics of fishes 2. Can learn the fin fish and shell fish culture techniques 3. Can explain Live feed organisms 4. Can analyses the Spawn production 5. Can demonstrate the Diseases caused by microbes in aquaculture
SEMESTER –V	
PLANT BIOTECHNOLOGY	1. Explore the history of Biotechnology and state the importance of organization of plantgenome 2. Be acquainted with the molecular basis of action of plant hormones and gene expression 3. Illustrate about various culture medium preparations, haploid, triploid plant production and its applications 4. Exploit symbiotic organisms as a vector for gene transfer to produce transgenic plants 5. Develop molecular technique skills for crop improvement.
ANIMAL BIOTECHNOLOGY	1. Understand the basic concepts of Animal cell culture and cell laboratory 2. Describe the media preparation, preservation, trypsinization, counting, maintenance andapplication of cell lines 3. Discuss the strategies for gene transfer and gene expressions with their applications. 4. Be acquainted with genetic modification and stem cell technology in production oftransgenic animals. 5. Learn the Assisted reproductive technology and its applications.
ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY	1. Know about the environment, its issues and management of the environment. 2. Explain the process of waste water treatment, drinking water treatment and solid waste management in various industries. 3. Illustrate the significance of bioreactors in bioprocess engineering and culture methods. 4. Explain Downstream processing, Fermented Products production and advanced methods 5. Speculate the role and importance of microorganisms behind the ore leaching,production of food products and Biofertilizers.

NANO BIOTECHNOLOGY	1. The students will get an outline about Nano biotechnology and its research in India. 2. To know about nanoparticles and their analysis using Advanced Instrumentation. 3. To get an insight about Nano devices 4. The students will know about the Applications of Nano biotechnology 5. The students will know about the Nano Biosensors and their applications.
ENZYMOLOGY	1. The students will learn the Fundamentals of Enzymology. 2. The students will study about the characteristic features of Enzymes. 3. The student will know about the details of Enzyme Kinetics. 4. The student will apply the biochemical techniques for enzyme isolation 5. The Student will understand the process of Immobilization of enzymes , Enzymeengineering and Designer enzymes in various Industrial purposes.
BIOETHICS & BIOSAFETY	1. The students will understand the concepts of Bioethics and Biosafety. 2. The students will realize the impact of Gene cloning in societal problems and also understandthe need of the Bioethics. 3. The students will know about the importance of Ethical Clearance. 4. The students will get knowledge about Patents Rights in the field of Research. 5. The students will know about Biosafety and GLP
CANCER BIOLOGY	1. The students will understand the Basics of Cancer Biology. 2. The students will comprehend the Cancer at the Molecular level. 3. The students will learn about the types of Cancer. 4. The students will realize the different techniques of Detection and Treatment of Cancer. 5. The students will know about the Prevention of Cancer.

PLANT BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY - PRACTICAL	1. Explain plant tissue culture and Illustrate Callus development. 2. Develop technical skills in Protoplast isolation and Nucleus localization. 3. Make use of the techniques used in preparing tissue culture medium and membrane filtration in culturing animal cells and prepare single cell suspension and evaluate cell counting and viability. 4. Develop technical skills in isolation of DNA and RNA from plants andmicroorganisms. 5. Examine the importance of trypsinization in monolayer and subculture andcryopreservation
SEMESTER- VI	
BIOENTREPRENEUSHIP	1. Students will be able to identify the challenges of being a Bioentrepreneur. 2. Will understand the Business proposal for starting a company 3. Will learn about Vermicomposting and Sericulture 4. Will aspire to set up Mushroom Cultivation 5. Will learn the technique of Single cell protein Cultivation
PHARMACEUTICAL BIOTECHNOLOGY	1. Students will understand the series of processes involved in drug development,patenting and drug approval. 2. Will learn about Biopharmaceuticals 3. Will become familiar with Biotech protein drugs 4. Will understand about management of drugs 5. Will be familiar with Pharmaceutical sectors
ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY PRACTICAL	1. Students can able to isolate the microorganisms and determine their growth curve,generation time. 2. To analyze the water samples, perform immobilization and production of Wine, Biogas and compost. 3. Develop skills in bio fertilizer production and microbial identification. 4. Gain basic skills to analyze raw milk and determine the pasteurization efficacy. 5. Develop skills to perform efficiency tests of biofertilizers and biopesticides, microbial polysaccharide production.

MARINE BIOTECHNOLOGY	1. Students will gain knowledge about Marine Ecosystem and Resources. 2. Will learn about bioactive compounds from Marine sources 3. Will learn about medicinal seaweeds 4. Will know about culture of seaweeds and Aquaculture 5. Will know about Marine biotech products
FOOD TECHNOLOGY	1. Students will be able to understand the basic concepts of the food industry 2. Will learn about classification of food 3. Will learn about fruits, vegetables and horticulture 4. Will learn about Non vegetarian food 5. Will learn about food adulteration and biosensors to detect them
MEDICAL BIOTECHNOLOGY	1. Student will be able to obtain knowledge on Vaccines, Antibody therapy anddiagnostics 2. Will know the Molecular basis of diseases 3. Will know about cytokines and interferons 4. Will learn about clinical trials 5. Will learn about ethics in clinical trials
FORENSIC SCIENCE	1. Students will gain insight into Forensic science 2. Will know about various investigations protocol 3. Will know about blood related issues 4. Will know the use of molecular approaches to investigation 5. Will understand DNA fingerprinting
GOOD LABORATORY PRACTICES (GLP)	1. The student will know the types of labs associated with Biotechnology 2. Will know to use and maintain lab Instruments 3. Will know the calculations needed in a laboratory 4. Will know about good lab Guidelines 5. Will know how to safely dispose bio waste
PREPARATION FOR COMPETITIVE EXAM	1. Ability to use numbers at an appropriate level of accuracy 2. Develops skills of analysis and critical evaluation 3. Identifies the Sentence Rearrangement, Antonyms andSynonyms. Error Detection. Idioms and Phrases 4. Ability to learn the patterns and techniques to solve thequestions 5. Develops knowledge in various issues of country

DEPARTMENT OF BIOTECHNOLOGY
PROGRAMME OUTCOMES AND COURSE OUTCOMES OF UNDER GRADUATE & POST GRADUATE PROGRAMME (2023 ONWARDS)

NAME OF THE PROGRAMME: M.Sc. BIO-TECHNOLOGY – PROGRAMME OUTCOME	
PO1	**Problem Solving Skill** : Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context
PO2	**Decision Making Skill**: Foster analytical and critical thinking abilities for data-based decision making
PO3	**Ethical Value**: Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities
PO4	**Communication Skill** Ability to develop communication, managerial and interpersonal skills.
PO5	**Individual and Team Leadership Skill** Capability to lead themselves and the team to achieve organizational goals.
PO6	**Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment.
PO7	**Entrepreneurial Skill** Equip with skills and competencies to become an entrepreneur.
PO8	**Contribution to Society** Succeed in career endeavors and contribute significantly to society.
PO9	**Multicultural competence** Possess knowledge of the values and beliefs of multiple cultures and a global perspective.
PO10	**Moral and ethical awareness/reasoning** Ability to embrace moral/ethical values in conducting one's life.

NAME OF THE PROGRAMME: M.Sc BIOTECHNOLOGY – COURSE OUTCOMES	
SEMESTER I	
BIOCHEMISTRY	1. To understand the basics of pH and related principles and carbohydrate metabolism. 2. To provide basic knowledge about lipid metabolism and related significance. 3. To enlighten the students on Bio-energetics and Biological oxidation pathways. 4. To update the knowledge on Amino acids and Protein. 5. To assess and appraise the role of Nucleic acids.
MOLECULAR GENETICS	1.To acquire good knowledge about the molecular mechanisms of gene expression and understand the theories behind the organization and functions of genetic material in the living world. 2. Identify and distinguish genetic regulatory mechanisms at different levels and explain the processes behind mutations and other genetic changes and study various chromosomal

	abnormalities. 3. Make the students understand different range of DNA damage and range of their tools for their detection 4. Learn the concepts of the transposons and their applications. 5. Detects the Allele frequencies and genotype frequencies in populations and describe the concepts behind the theory of evolution
MOLECULAR CELL BIOLOGY	1. To understanding of the molecular machinery of living cells and the principles that govern the structures of macromolecules and their participation in molecular recognition. 2. Identify the structures and purposes of basic components in prokaryotic and eukaryotic cells and their molecular mechanism 3. Demonstrate knowledge and understanding of the principles and basic mechanisms of nuclear envelope and its functions. 4. Understand the metabolic pathways and the process of transmission of extracellular Signals 5. Demonstrate the operation of various microscopes and microtomy in the laboratory
CORE PRACTICAL-I (BIOCHEMISTRY, MOLECULAR GENETICS & MOLECULAR CELL BIOLOGY)	1. Illustrate basic biochemistry procedures 2. study the methods of estimation of biomolecules 3. isolate & Analyze DNA, RNA & protein 4. critically analyze the isolated biomolecules 5. evaluate the quality and purity of DNA, RNA & Protein
BIOINSTRUMENTATION	1. Introduction and various types of Microscopic techniques 2.Impart understanding on centrifugation instruments and techniques 3.Separation of Biomolecules 4. Analytical methods on Spectroscopic Analysis 5. Understand the application and Detection on Bioinstrumentation
ENZYMOLOGY	1. Explain the basics of enzyme nomenclature and properties 2. Classify and Cognize the native and immobilized enzyme 3. Examine the equations of steady state kinetics 4. Assess extraction and downstream processing of enzymes 5.Compile the uses of enzymes and design enzymes for Industrial and Clinical application
SEMESTER-II	

MICROBIOLOGY	1. To understand the major discoveries of microbiology and describe microbial diversity, Microbial growth and metabolism 2. To provide basic knowledge about microbial culture, identification of microbes, principle and working of microscopes and sterilization techniques 3. To enlighten the students on host microbe interaction and Epidemiology of microbial disease 4. To update the knowledge on epidemic and pandemic diseases. 5. To assess and appraise the role of novel microbes in environment and integrate them in specific innovative approaches.
PLANT AND ANIMAL BIOTECHNOLOGY	1. To impart theoretical knowledge on various techniques of plant biotechnology like tissue culture, plant genetic transformation and their application in industries. 2. Importance of secondary metabolites and production in plants. 3. To develop concepts, principles and processes in animal biotechnology. 4. Concept and different types in Animal Cell Culture and animal cell lines. 5. Use of molecular biology techniques genetically engineer the animals to improve sustainability, productivity and suitability for pharmaceutical and industrial applications.
GENETIC ENGINEERING	1. Understanding the basic steps of gene cloning and the role of enzymes and vectors responsible for gene manipulation, transformation and genetic engineering. 2. Getting detailed knowledge of gene transfer methods and identifying suitable hosts for cloning. 3. Acquiring theoretical knowledge in the techniques, tools, and application and safety measures of genetic engineering. 4. Describes the genome mapping and sequencing and methods for gene therapy. 5. Elucidate different techniques involved in genetic engineering
CORE PRACTICAL - 2 (MICROBIOLOGY, PLANT AND ANIMAL BIOTECHNOLOGY & GENETIC ENGINEERING)	1. Isolate and identify microbes from various sources. 2. Characterize microbes. 3. Examine Plant and Animal cells and their functions. 4. Assess extracted DNA, RNA and protein for rDNA technology 5. To Study Cloning Tools.

REGULATORY AFFAIRS AND INDUSTRIAL STANDARDS	1. Elucidate the basic requirements of establish laboratory for testing samples as per the regulatory body's requirements 2. Describe the Scientific, technical knowledge about various food preservation techniques 3. Describe the basic concepts of packing of food materials, various parameters observed during packaging 4. Describe the testing of food materials and identifying of microbial food contaminant 5. Explain the basic of food safety management system, good manufacturing practice and good hygienic practices
PHARMACEUTICAL BIOTECHNOLOGY	1. Explain the basic components of pharmaceutical and biotechnology industry and methods and applications of biosensor 2. Describe the Scientific, technical and economic aspects of vaccine & rDNA technology 3. Describe the basic concepts of protein Engineering, therapeutic proteins and enzyme immobilization techniques 4. Describe the concepts of hybridoma technology, microbial biotransformation and microbial bio-transformed products 5. Explain the basic components of somatic gene therapy, Xeno-transplantation and fermenter and bio safety methods
ENVIRONMENTAL BIOTECHNOLOGY	1. Explain Various Waste Management Methods 2. Classify Potential Methods of Biodegrading Organic Pollutants. 3. Examine the Techniques Involved in Remediation of Polluted Environments 4. Assess Types of Pollution & Its Control 5. Compile Biotechnological Approaches to Degrade Xenobiotic Compounds
TISSUE ENGINEERING	1. Understand the basics of Basics of Tissue Engineering 2. Apply the knowledge to Create Tissue Culture Methods 3. Acquire Adequate Knowledge in the Use of Tissue in Medical Application 4. Evaluate the benefits of Tissue Engineering & Pharmaceutical Products 5. Analyze the importance of applications of Tissue Engineering
SEMESTER-III	
BIOINFORMATICS	1.To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis. 2. Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics. 3. Explain about the methods to characterize and manage the different types of Biological data. 4. Classify different types of Biological Databases. 5. Introduction to the basics of sequence alignment and analysis

IMMUNOLOGY	1. Illustrate various mechanisms that regulate immune responses and maintain tolerance 2 . describe key events and cellular players in antigen presentation, and how the nature of the antigen will shape resulting effector responses 3. learn the concepts of cellular and molecular processes that represents the human immune system. 4. elucidate the role of immunological regulation and tolerance at a cellular and molecular level 5. compile concepts on immunological principles and diagnosis
BIOPROCESS TECHNOLOGY	1. Outline the basis of Bioprocess Engineering 2. Relate reactors in fermentation 3. Differentiate fermentation processes 4. Assess Scale up and Scale down 5. Compile the output of fermentation processes
Practical-3 (Bioinformatics, Immunology & Bioprocess Technology)	1.to learn the Bioinformatics tools for sequence retrieval and alignment 2.to apply the learned tools for various applications 3.to isolate, identify & enumerate immune cells 4.to learn the technique of immunodiagnostics 5.to study upstream & downstream techniques
NANO BIOTECHNOLOGY	1.Understand the bases for Introduction to Nanotechnology 2.To impart understanding on Nanoparticle based Drug Delivery. 3.Fabrication of nanomaterials for bone tissue grafting 4.Methods of Nanofabrication 5.Understand the application of Nanotechnology

MOLECULAR DEVELOPMENTAL BIOLOGY	1.Illustrate the structure and function of developmental biology, Gametogenesis 2.Discuss basic fertilization process of animals 3. Demonstrate the functions of embryonic development process 4. Illustrate the organ development of vertebrate animals 5. Demonstrate the impact of gene in developmental biology and developmental disorders
GENE MANIPULATION TECHNOLOGY	1. Understand the basics of Basics of Gene Manipulation Technology 2. Apply the knowledge to create Constructions of DNA Libraries Constructions of DNA Libraries. 3. Acquire adequate knowledge in the use of Genome Sequencing and Transcriptomics 4. Evaluate the benefits of Protein Engineering & Pharmaceutical Products 5. Analyse the importance of Gene Cloning & Applications of Gene Cloning
INTERNSHIP	1.understand working principles and the techniques of various processes 2.apply standard operating procedures followed in industries 3.prepare to face challenges & gain confidence in the field of study. 4.critically assess the utilization of sophisticated instruments and expensive consumables 5.develop work ethics to be followed in a scientific laboratory
	SEMESTER-IV
RESEARCH METHODOLOGY	1. Understand the bases for research 2. To know about research proposal and dissertation writing. 3. To know about Statistical application in research 4. To know about office tools used in research 5. To know about search engines.

BIOSTATISTICS	1. To understand the major Methods of collection & presentation of data 2 .To provide basic knowledge about methods of analysis of variance 3. To enlighten the students about the methods of setting hypothesis and calculation of errors. 4. To update the knowledge on Tests of significance for large and small samples. 5. To assess and appraise the role of novel microbes in environment and integrate them in specific innovative approaches.
INDUSTRIAL EFFLUENT TREATMENT	1. Ability to plan minimization of industrial wastes 2 .Ability to design facilities for the processing and reclamation of industrial waste water. 3. Understand the design and working principle of various treatment methods. 4. Manage sewage and industrial effluent issues. 5. Develop the critical thinking on management of hazardous waste.
BIOFERTILIZER AND ORGANIC FARMING	1. To understand about the importance of biofertilizer. 2. To learn about the symbiotic relations of nitrogen fixers. 3. To demonstrate the knowledge of ecofriendly agricultural inputs in biofertilizer production. 4. To understand the importance of organic farming. 5 .Build the practical knowledge on biofertilizers and composting methods.
BIOENTREPRENEURSHIP	1. Students will be able to identify the Biotech based companies, products, services and IPR 2. Will understand the Business proposal for starting a company 3. Will know the funding of biotech business 4. Will aspire to set up Biotech enterprises 5 .Will analyse the Financial requirement for bioentrepreneurship

STEM CELL BIOLOGY	1. To understand the major discoveries of stem cell biology 2. To provide basic knowledge about stem cell niche and functions 3. To enlighten the students on Stem cell isolation and culture techniques 4. To update the knowledge on Stem cell cycle 5 .To assess and appraise Applications of Embryonic stem cells.
BIOETHICS, BIOSAFETY, CLINICAL TRIALS, IPR & ENTREPRENEURSHIP	1. Understand the basics of biosafety and bioethics and its impact on biological sciences and the importance of human life. 2. Apply the knowledge to recognize the importance of biosafety guidelines and good clinical practices. 3. Acquire adequate knowledge in the use of genetically modified organisms and its effect on human health. 4. Evaluate the benefits of GM technology and importance of IPR 5. Analyse the importance of protection of new knowledge and innovations and its role in business and entrepreneurship