



Department of Biotechnology

M.Sc. Biotechnology

S.No	Course code	Course Name	Course Outcomes
SEMESTER - I			
1.	21PBTC11	Core Course - I: Cell and Developmental Biology	CO1[K2]: illustrate the structure of cell organelles and their function CO2[K3]: determine the stages in development of Zygotes CO3[K4]: compare and contrast the events of cell cycle and its regulation CO4[K4]: analyse the transport mechanism across plasma membrane CO5[K5]: assess the role of hormones and receptors in cell signalling
2.	21PBTC12	Core Course - II: Biomolecules	CO1[K2]: explain the structure, properties and functions of biomolecules CO2[K3]: determine the metabolic pathways and its energetics CO3[K4]: classify biomolecules based on their structure CO4[K4]: appraise the role of enzymes in different metabolic pathways CO5[K5]: assess the different metabolic process of biomolecule level in cell
3.	21PBTC13	Core Course - III: Microbiology and Microbial Genetics	CO1[K2]: explain the structure and nutritional requirements of microorganisms CO2[K3]: determine the role of microbial pathogens in human diseases CO3[K4]: analyse the microbial mechanisms to regulate gene expression CO4[K5]: appraise the methods involved in gene transfer CO5[K5]: justify the microbial role in bioremediation and pollution control
4.	21PBTC1P	Core Course - IV: Practical: Biomolecules, Microbiology and	CO1[K2]: illustrate the principles of bioanalytical instruments CO2[K3]: perform the analytical techniques for the estimation of biomolecules CO3[K4]: classify the bacteria based on morphology by staining techniques



		Microbial Genetics	CO4[K5]: perform the biochemical tests for characterization of bacteria CO5[K6]: elaborate the microbial gene transfer techniques
5.	21PBT011	Elective Courses - I: 1.Inheritance and Evolutionary Biology	CO1[K2]: illustrate the concepts of inheritance with Mendelian principles CO2[K3]: apply the principles of inheritance at the molecular, cellular and organism levels CO3[K4]: analyse the major events in the evolutionary time scale CO4[K4]: examine the approaches and methods in human behaviour CO5[K5]: assess historical and current knowledge regarding human heredity
6.	21PBT012	Elective Courses - I: 2. Stem Cell Biology	CO1[K2]: explain the structure and functions of stem cells CO2[K3]: determine therapeutic applications of stem cells CO3[K4]: analyse different pattern of stem cell niches CO4[K4]: discriminate the stem cell pathways in cell cycle control CO5[K5]: justify ethical considerations in stem cell research
7.	21PBT013	Elective Courses - I: 3. Enzymes and Enzyme Technology	CO1[K2]: illustrate the nomenclature of enzymes and its types CO2[K3]: determine the mechanism of enzyme inhibition CO3[K4]: analyse the significance of active sites and its orientation effects CO4[K4]: differentiate competitive and non-competitive inhibition of enzymes CO5[K5]: prove Michaelis - Menton equation
SEMESTER - II			
8.	21PBTC21	Core Course - V: Immunology and Immunotechnology	CO1[K2]: illustrate the organization of the immune system and its functions. CO2[K3]: apply immunotechniques in Molecular diagnosis and Vaccine development CO3[K4]: analyse the immunological factors responsible for Immunodeficiency CO4[K5]: appraise the action of immune system towards infecting agents. CO5[K5]: evaluate the role of monoclonal antibodies in diagnosis and therapeutics
9.	21PBTC22	Core Course - VI: Genetic	CO1[K2]: explain the strategies of genetic engineering.



		Engineering	<p>CO2[K3]: apply suitable Bio analytical tools in gene expression studies.</p> <p>CO3[K4]: compare the central dogma of cell in prokaryotes and eukaryotes.</p> <p>CO4[K5]: choose the appropriate gene transfer method for prokaryotes and eukaryotes</p> <p>CO5[K5]: appraise the applications of genetic engineering in the generation of recombinant molecules</p>
10.	21PBTC23	Core Course - VII: Bioinformatics	<p>CO1[K2]: explain the concept of genomics and Proteomics</p> <p>CO2[K3]: apply the knowledge to address frontline problems in bioinformatics</p> <p>CO3[K3]: compute the steps in drug designing</p> <p>CO4[K4]:analyse the structure of protein using bioinformatics tools.</p> <p>CO5[K5]: assess sequence alignment tools</p>
11.	21PBTC2P	Core Course - VIII: Practical: Immunology and Genetic Engineering	<p>CO1[K2]: demonstrate the methods of immunization and bleeding</p> <p>CO2[K3]: apply the suitable immunetechniques to study antigen-antibody interactions</p> <p>CO3[K4]: separate nucleic acids and proteins from biological sources</p> <p>CO4[K5]: asses the gene expressions using screening techniques</p> <p>CO5[K6]: design primers using computational approaches</p>
12.	21PBTN21	Non Major Elective Course - I: Food Science	<p>CO1[K2]: explain the concepts of nutrition and functions of food</p> <p>CO2[K3]: calculate the basal metabolic,carbohemic and glycemc index</p> <p>CO3[K3]: articulate the nutritive value of food</p> <p>CO4[K4]: examine the quality and adulterations of food</p> <p>CO5[K5]: perceive common nutritional problems in India</p>
SEMESTER - III			
13	21PBTC31	Core Course - IX: Plant and Animal Biotechnology	<p>CO1[K2]:demonstrate Plant and Animal tissue Culture</p> <p>CO2[K3]:use gene transfer techniques for developing disease and Pest resistance plants</p> <p>CO3[K4]: analyze the role of Reporters and Marker genes in gen transfer</p>



			<p>C04[K5]: assess the Impacts of Genetically Modified Organism</p> <p>C05[K5]: choose the appropriate vector for efficient gene transfer</p>
14.	21PBTC32	Core Course - X: Bioprocess Technology	<p>C01[K2]: demonstrate the screening of industrially important microbes</p> <p>C02[K3]: choose the appropriate media for different fermentation process</p> <p>C03[K4]: analyse the importance of enzymes in developing Biosensors</p> <p>C04[K5]: perceive the downstream processing</p> <p>C05[K5]: assess the structure and functions of different fermentors.</p>
15.	21PBTC33	Core Course - XI: Agricultural and Environmental Biotechnology	<p>C01[K2]: explain the biotechnology intervention in Agriculture and environment</p> <p>C02[K3]: apply the gene manipulation techniques in the production of GMO</p> <p>C03[K4]: analyse the role of Nitrogen fixing organism in crop production</p> <p>C04[K5]: assess the methods of Monitoring Pollution</p> <p>C05[K6]: elaborate the methods of Bioremediation to solve the pollution</p>
16.	21PBTC3P	Core Course - XII: Practical – III: Plant, Animal and Bioprocess Technology	<p>C01[K2]: explain the media composition for Plant and Animal tissue culture</p> <p>C02[K3]: determine the cell viability and Toxicity</p> <p>C03[K4]: analyse the importance of long term storage using Cryopreservation</p> <p>C04[K5]: resolve the problems associated with contamination</p> <p>C05[K6]: perform Protoplast isolation</p>
17.	21PBT031	Elective Course - II: 1. IPR, Bioethics and Biosafety	<p>C01[K2]: illustrate the basic principles and general requirements in patent filing</p> <p>C02[K3]: determine the importance of Biosafety practices and guidelines</p> <p>C03[K4]: analyse the importance of protecting the novel and innovative Biotechnology derived products</p> <p>C04[K5]: appraise the benefits of GMO's and its effect on human health</p> <p>C05[K5]: assess the ethical aspects of biological and biomedical research</p>
18.	21PBT032	Elective Course - II: 2. Molecular Oncology	<p>C01[K2]: explain the classification of cancer</p> <p>C02[K3]: choose the appropriate diagnostic method for detecting cancer</p>



			<p>C03[K4]: differentiate Oncogene, Proto oncogene and antioncogene</p> <p>C04[K5]: appraise the role of mutagens in causing cancer</p> <p>C05[K5]: perceive the different treatment procedures of cancer</p>
19.	21PBT033	Elective Course - II: 3. Industrial Safety and regulations	<p>C01 [K2]: illustrate Ergonomics and its Impacts.</p> <p>C02 [K3]: apply safety measures in various industries.</p> <p>C03 [K4]: analyze the impacts of industrial hazards in Environment.</p> <p>C04 [K5]: appraise the principles in Safety management.</p> <p>C05 [K5]: evaluate legislative measures in industrial safety</p>
20.	21PBTM31	Self-paced Learning (Swayam course) 1. Forests and their Management	<p>C01[K1]: identify the background and the key words in Forests and their Management</p> <p>C02[K2]: demonstrate independent and self-paced learning for clear Understanding of the concept</p> <p>C03[K3]: develop computer and communication skills to broaden their knowledge in the course</p> <p>C04[K3]: use high quality reading resources, communication tools and technology to send assignments and to take up test</p> <p>C05[K4]: analyse critically and apply technical skills to comprehend the ideas or theories in the video lectures</p>
21.	21PBTM32	Self-paced Learning (Swayam course) 2. Applied Environmental Microbiology	<p>C01[K1]: identify the background and the key words in Applied Environmental Microbiology</p> <p>C02[K2]: demonstrate independent and self-paced learning for clear Understanding of the concept</p> <p>C03[K3]: develop computer and communication skills to broaden their knowledge in the course</p> <p>C04[K3]: use high quality reading resources, communication tools and technology to send assignments and to take up test</p> <p>C05 [K4]: analyse critically and apply technical skills to comprehend the ideas</p>



			or theories in the video lectures
SEMESTER - IV			
23.	21PBTC41	Core Course - XIII: Bioinstrumentation and Biostatistics	CO1[K2]: demonstrate the working mechanism of bioinstruments CO2[K3]: apply the suitable statistical tools to interpret the biological data CO3[K3]: determine the level of significance for different variables CO4[K4]: analyse the applications of bioinstruments CO5[K5]: appraise the principles and applications of spectrophotometry
24.	21PBTC42	Core Course - XIV: Genomics and Proteomics	CO1[K2]: illustrate the genome organization of prokaryotes and eukaryotes CO2[K3]: use various mapping methods to identify the chromosomal landmarks CO3[K4]: analyse the expression and interaction of proteins using different methods CO4[K5]: evaluate drug targets using highthroughput screening CO5[K6]: elaborate the methods in DNA sequencing
25.	21PBTC43	Core Course - XV: Research Methodology	CO1[K2]: illustrate the significance and types of research and its methodologies CO2[K3]: determine issues and concepts salient to research process CO3[K3]: apply theoretical aspects of research methodology for a proposed project CO4[K4]: analyse the peer reviewed and indexed journals for publications CO5[K5]: appraise the application of electronic tools for checking plagiarisms
26.	21PBTJ41	Project	CO1[K2]: outline the concept of research with ethics CO2[K3]: apply academic skills to present the research study findings in a Formal academic oral presentations and a written research paper CO3[K5]: recommend valuable solutions to the betterment of society CO4[K5]: assess ways to collect, compile and conduct a data analysis CO5[K6]: develop laboratory skills and advanced biotechniques