Kristu Jayanti College
AUTONOMOUS Bengaluru
Reaccredited 'A' Grade by NAAC | Affiliated to Bengaluru North University

FACULTY OF SCIENCE

M.Sc. Biotechnology

Programme Educational Objectives

PEO1: To impart advanced knowledge and technical skills in Biotechnology.

PEO2: To inculcate professional ethics for careers in Biotechnology and entrepreneurial ventures.

PEO3: To provide training in pure and applied scientific research.

Programme Outcome

After the successful completion of the two year M.Sc. Biotechnology Programme, the student will be able to:

PO1: Demonstrate professional skills and scientific prowess to meet agricultural, medical and environmental needs.

Programme Specific Outcomes

After the successful completion of the two year M.Sc. Biotechnology Programme, the student will be able to:

PSO1: Apply tools and techniques ethically to identify and solve issues in the fields of medicine, agriculture and environment.

PSO2: Appraise scientific concepts and research in a multidisciplinary global environment.

PSO3: Demonstrate the potential for independent research, industrial development and entrepreneurial ventures.

I - SEMESTER

Course Type	Course Code	Course Title	Course Outcomes
DSCC	**MBT204A11**	**Cell Biology**	1. Appraise the organization and functions of specialized cells 2. Evaluate the structure and functions of the cell wall and plasma membrane 3. Illustrate the structure and composition of the scaffolds and appendages involved in cell motility 4. Differentiate the process of transport of nutrients, ions and macromolecules across membranes 5. Summarize intercellular interactions and mechanisms of signal transduction 6. Integrate the processes of cell growth, division, differentiation, regulation and death
DSCC	**MBT204A1**	**Molecular Genetics**	1. Evaluate the organization of the hereditary material in different classes of organisms 2. Compare the chromosomal mechanisms of sex determination and dosage compensation in *drosophila* and mammals 3. Appraise the molecular mechanisms of genetic recombination and their applications in gene mapping 4. Summarize the mechanisms of transposition in bacteria, yeast, maize, *drosophila* and humans 5. Contrast the types of mutagens and molecular mechanisms of mutations 6. Infer the role of genetic polymorphisms in speciation and evolution
DSCC	**MBT204A13**	**Biochemistry**	1. Compare the structure, properties and functions of carbohydrates, amino acids, lipids and nuclei acids. 2. Sketch the pathways involved in the synthesis and degradation of bio-molecules 3. Evaluate themetabolic disorders associated with 4. Bio-molecules 5. Connect the concepts of thermodynamics bioenergetics and oxidation
DSCC	**MBT204A14**	**General Microbiology**	1. Summarize the conventional, and molecular methods of classification of bacteria 2. Explain the characteristics, structure classification, and life cycle of viruses and the methods for their isolation, identification and propagation 3. Discriminate the characteristics, structure and reproduction of prokaryotic and eukaryotic microorganisms 4. Develop methods to isolate and culture microorganisms from natural sources

			5. Appraise the physical and chemical parameters of microbial growth and control
DSCL	**MBT2L4A11**	**Cell Biology And Molecular Genetics Practical**	1. Perform experiments to observe the stages of mitosis and meiosis 2. Demonstrate the ability to distinguish between a normal and an abnormal karyotype 3. Adopt a method to study gene transfer in e. Coli 4. Master the skill to isolate and purify cell organelles 5. Design assays for the quantitative estimation of cellular enzymes
DSCL	**MBT2L4A12**	**Biochemistry And General Microbiology Practical**	1. Calibrate the concentration of reducing sugars, amino acids and proteins 2. Execute the isolation and cultivation of microorganisms from air, water and soil 3. Perform staining and biochemical tests for the identification of microorganisms 4. Demonstrate the ability to assess bacterial growth by turbidimetry
SEC	**MLS402A11**	**Biostatistics**	1. Integrate the concepts and techniques of statistics to understand biological data 2. Assess the role of probability in predicting experimental outcomes 3. Evaluate the significance of experimental results by applying statistical calculations

II SEMESTER (THEORY)

Course Type	Course Code	Course Title	Course Outcomes
DSCC	**MBT204A21**	**Biochemical Techniques And Enzymology**	1. Distinguish the principles and applications of biophysical techniques 2. Explain the principles, types and applications of chromatographic, electrophoretic and spectrophotometric techniques 3. Summarize the properties, classification, activity, specificity and purification of enzymes 4. Integrate the principles of enzyme kinetics to understand the mechanism of action and regulation 5. Appraise the structure and mechanism of action of the important co-enzymes
DSCC	**MBT204A22**	**Molecular Biology**	1. Summarize the structure, types, properties and functions of nucleic acids 2. Appraise the events in dna replication, damage and repair 3. Compile the mechanisms of transcription and translation in prokaryotes and eukaryotes 4. Compare principles of gene regulation and silencing in virus, prokaryotes and eukaryotes 5. Infer the applications of double stranded rna, antisense rna, ribozymes in gene silencing 6. Sketch the pathways of protein targeting to intra and intercellular destinations
DSCC	**MBT204A23**	**Immunology And Immunotechnology**	1. Explain the humoral and cell mediated immune response, cells and organs of the immune system 2. Illustrate the types and properties of antigens, structure and classes of immunoglobulins and mechanisms of antigen and antibody interactions 3. Appraise the concepts of autoimmunity and autoimmune disorders 4. Explain the MHC complex and their role in tissue transplantation and tumor immunology 5. Categorize the different hypersensitivity reactions and their disorders 6. Compile the concepts of immune technology and vaccine production
DSCC	**MBT204A24**	**Environmental Biotechnology**	1. Compile the types of chemical pollutants, their behavior and degradation 2. Summarize methods for air quality assessment, air borne infections,

			detection and enumeration 3. Assess the use of microorganisms in biodegradation and treatment of industrial effluents 4. Categorize sensing methods and their interpretation 5. Evaluate environmental problems , their socio economic impacts, and management
DSCL	**MBT2L4A22**	**Molecular Biology And Environmental Biotechnology Practical**	1. Perform isolation of DNA from plant, bacteria and animal tissue. 2. Execute gel electrophoresis for the separation and analysis of DNA 3. Trace the concentrations of DNA and RNA by colorimetry 4. Demonstrate the isolation of plasmid DNA from bacteria 5. Adopt methods for the estimation of chromium, calcium, nitrogen, phosphorus and potassium from water samples 6. Perform experiments on biological oxygen demand, chemical oxygen demand and most probable number to check water quality
DSCL	**MBT2L4A21**	**Biochemical Techniques, Enzymology, Immunology And Immunotechnology Practical**	1. Trace the activities of amylase, urease and phosphatase 2. Perform immobilisation of enzyme by gel entrapment method 3. Demonstrate the method for the separation of amino acids by chromatographic techniques 4. Execute the agglutination and precipitation reactions. 5. Adopt a method for the separation and staining of lymphocytes from blood
SEC	**MLS402A21**	**Bioinformatics**	1. Explain the basics of computer architecture, software's and programming languages 2. Compile the biological databases and their applications 3. Analyze the protein structure, interactions, modelling and applications using bioinformatics tools

III SEMESTER (THEORY)

Course Type	Course Code	Course Title	Course Outcomes
DSCC	**MBT204A31**	**Genetic Engineering**	1. Interpret the types, functions of restriction enzymes, and cloning vectors 2. Summarize the physical, chemical, biological methods of gene transfer and selection of recombinants 3. Describe the construction of cdna and genomic libraries 4. Assess the methods and applications of electrophoresis, blotting techniques, molecular markers and dna fingerprinting 5. Develop the chemical and enzymatic synthesis and sequencing of gene 6. Compile the applications of rdna technology for the development of transgenic plants , animals and gene therapy
DSCC	**MBT204A32**	**Medical Biotechnology**	1. Summarize the etiology, pathology, symptoms and control measures for genetically inherited and microbial diseases 2. Compile the types, causes, molecular mechanisms, diagnosis, and treatment of cancer 3. Appraise the types, methods for synthesis and applications of nano-materials 4. Describe the concepts and principles of pharmacodynamics and pharmacokinetics 5. Compare the conventional and novel approaches to drug discovery 6. Analyze the concepts and applications of gene therapy and recombinant therapeutics
DSCL	**MBT2L4A31**	**Genetic Engineering And Medical Biotechnology Practical**	1. Demonstrate digestion, ligation of DNA, transformation and selection of recombinants 2. Execute DNA amplification through PCR 3. Trace the concentrations of acid and alkaline phosphatase, cholesterol and creatinine in serum samples 4. Demonstrate the biochemical test to monitor live function 5. Adopt a method to test the drug susceptibility by MIC and Kirby Bauer

			method
DSEC	**MBTA04A31**	**Animal Cell Culture And Biotechnology**	1. Explain the specifications of animal cell culture laboratory design and equipment 2. Appraise the components and functions of natural and synthetic media, techniques of animal cell culture and applications 3. Relate to transgenesis and technology integration in animal reproduction, and its applications 4. Summarize the role of animal cell culture in the production of biopharmaceuticals.
DSEL	**MBTAL2A31**	**Animal Cell Culture And Biotechnology Practical**	1. Formulate the media for animal tissue culture 2. Demonstrate the techniques of culturing animal cells 3. Trace the toxic effects of chemicals on cultured mammalian cells
SEC	**MBT402A31**	**Essentials Of Plant Biotechnology**	1. Compile the components and techniques of plant tissue culture 2. Differentiate the physical, chemical and biological methods for gene transfer 3. Describe the application of transgenic technology to crop improvement and agriculture
DSEC	**MBTB04A31**	**Plant And Agricultural Biotechnology**	1. Appraise the components and techniques of plant tissue culture 2. Summarize physical, chemical and biological methods for gene transfer 3. Formulate methods for *in vitro* production of secondary metabolites 4. Assess the types, methods of production and applications of bio fertilizers and bio pesticides in agriculture 5. Describe the application of transgenic technology to crop improvement.
DSEL	**MBTBL2A31**	**Plant And Agricultural Biotechnology Practical**	1. Formulate plant tissue culture media and propagate callus, organs, and anther. 2. Demonstrate the methods for isolation and culture of protoplasts. 3. Adopt a method for the preparation and regeneration of artificial seeds. 4. Master the technique of plant genomic dna isolation. 5. Design experiments to assay the antifungal, antibiotic and fungicidal activity of molecules against plant pathogens.

SEC	**MBT402A32**	**Essentials Of Animal Cell Culture And Biotechnology**	1. Explain the specifications of animal cell culture laboratory design and equipment. 2. Describe the components and functions of natural and synthetic media, technique of animal cell culture and application. 3. Appraise the role of biotechnology in improvement of animals and human reproduction.
	MLS402A31	**Research Methodology**	1. Evaluate the concept and scope of pedagogical techniques in research design 2. Summarize the experimental design, methods and significance of research 3. Interpret the outcomes of research in the form of report 4. Prepare research articles for report writing and publication

IV SEMESTER (THEORY)

Course Type	Course Code	Course Title	Course Outcomes
DSCC	**MBT204A41**	**Bioprocess Engineering And Biosafety**	1. Demonstrate thorough understanding of the design of a bioreactor and specialized bioreactors 2. Assess the upstream process, bioprocess control and downstream processing aspects of fermentation products 3. Appraise the production of industrially important products 4. Explain the importance of biosafety, regulations and bioethics
DSCC	**MBT204A42**	**Genomics And Proteomics**	1. Illustrate the concept of genomics, transcriptomics, proteomics and metabolomics 2. Describe genome sequencing, sequencing projects, genotyping and gene prediction 3. Appraise the methods of genetic mapping and molecular breeding 4. Analyze the techniques of transcriptomics, proteomics and gene expression 5. Summarize the concept, methods and regulation in metabolomics
DSEL	**MBT2L4A41**	**Bioprocess Engineering And Proteomics**	1. Perform fermentations to produce antibiotics, single cell proteins and

		Practical	organic acids 2. Execute lab scale production of wine and estimation of total and volatile acidity 3. Adopt a method for the production, purification and immobilisation of alpha-amylase 4. Develop methods for protein analysis
SEC	**MLS402A41**	**Intellectual Property Rights And Bioethics**	1. Identify the implications of appropriate intellectual property rights and the procedures involved in application 2. Summarize the types, specifications, applications and laws of patenting 3. Describe the ethical issues related to gm crops, human genome project, stem cell research, drug testing and use of animals in research