

- **Department of Biotechnology**

- **Course Outcomes:**

- **F Y B Sc**

<b>BT-111: Foundations of biotechnology</b>	<ul style="list-style-type: none"> <li>• Comprehend about the introduction and history of biotechnology.</li> <li>• Understand the scope in agriculture, medicinal, agriculture and environment.</li> <li>• Understand the scope of cell biology and basic structural and functional study of prokaryotic and eukaryotic cells</li> <li>• Understand the scope of growth, nutrition and factors affecting microbial growth</li> <li>• Understand the basic requirements of microorganisms and further its classification.</li> </ul>
<b>BT-112: Methods in Biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the scope and introduction to physiological properties of Water</li> <li>• Understand the Concept of pH and buffer</li> <li>• Understand the Principle of biological buffers</li> <li>• Understand the Stoichiometry principle and significance</li> <li>• Understand the Principle, general features and significance of biophysical terms like density, sedimentation, centrifugation, surface tension, adsorption</li> </ul>
<b>BT-113: Basic techniques in Biotechnology</b>	<p>Students should understand:</p> <ul style="list-style-type: none"> <li>• Understand the Safety measures in laboratory, handling and care of instruments</li> <li>• Understand the Determination of pKa, Standard solutions.</li> <li>• Understand the Monochrome staining, Negative staining , Gram's staining.</li> <li>• Understand the Biochemical test, specific gravity, Viscosity.</li> <li>• Understand the Motility testing by hanging drop method</li> </ul>
<b>BT-121: Biomolecules</b>	<ul style="list-style-type: none"> <li>• Understand the basic component or biomolecules of living organisms</li> <li>• Understand the Definition, classification, biological function and chemical and physical properties of carbohydrates</li> <li>• Understand the Definition, classification, biological function and chemical and physical properties of Lipids</li> <li>• Understand the definition, classification, biological function, chemical and physical properties, structural characteristic of proteins and nucleic acids</li> </ul>
<b>BT-122: Microbial Techniques</b>	<ul style="list-style-type: none"> <li>• Understand the Concept, principle and types of sterilization methods</li> <li>• Understand the Concept and characteristics of antiseptic, disinfectant and their mode of action</li> <li>• Understand the Concept of culture and type of culture</li> <li>• Understand the Cultivation methods of bacteria, yeast, fungi and virus</li> <li>• Understand the Principle, working and applications of instruments viz, pH meters, spectrophotometer, centrifuge, viscometer, and laminar air flow</li> </ul>

- **S Y B Sc**

<b>BT-231: Cell Biology and Metabolism</b>	<ul style="list-style-type: none"> <li>• Understand the the eukaryotic cell cycle and mitotic and meiotic cell division</li> <li>• Understand the Structure and organization of cell membrane</li> <li>• Understand the Process of membrane transport and membrane models</li> <li>• Understand the Structure and general features of enzymes.</li> </ul>
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<b>BT-232: Molecular biology</b>	<ul style="list-style-type: none"> <li>• Understand the Concept of enzyme activity and enzyme inhibition</li> <li>• Understand the genomic organization or living organisms, study of genes genome, chromosome etc.</li> <li>• Understand the mechanism and essential component required for prokaryotic DNA replication.</li> <li>• Understand the fundamentals of DNA damage and repair, including types of mutation and repair mechanisms.</li> <li>• Understand the Transcription, enzymes involved in transcription and its inhibitors.</li> <li>• Understand the Translation, enzymes involved in translation and its inhibitors.</li> </ul>
<b>BT-233: Practical course in biotechnology -1</b>	<p>Students should understand,</p> <ul style="list-style-type: none"> <li>• Understand the determination of microbial size by micrometry</li> <li>• Understand the Microscopic examination of mitotic and meiotic stages of eukaryotic cells</li> <li>• Understand the Biochemical estimation of biomolecules like DNA, RNA etc.</li> <li>• Understand the Effect of physical parameters on enzyme</li> <li>• Understand the Enzyme catalytic action of enzymes like alkaline phosphatase</li> </ul>
<b>BT-241: Biophysics</b>	<ul style="list-style-type: none"> <li>• Understand the Concept of electromagnetic radiation, absorption spectrum, Beer's law and Lamberts law.</li> <li>• Understand the Principle, working and applications of spectrophotometer and AAS.</li> <li>• Understand the Concepts of chromatography and concept of partition coefficient.</li> <li>• Understand the Principle, methodology and application of various chromatographic techniques.</li> <li>• Understand the Principle, methodologies and application of electrophoretic separation of biomolecules</li> </ul>
<b>BT-242: Immunology and bioprocess technology</b>	<ul style="list-style-type: none"> <li>• Understand the Immunology, immune system, properties of immune system, types of immunity.</li> <li>• Understand the Concept of antigen, antigenic determinants, hapten, factors affecting antigenicity.</li> <li>• Understand the Immunoglobulin, structure, types and functions.</li> <li>• Understand the Basic of bioprocess technology, concept and significance of bioprocess technology, concept of bioreactor, designing of fermenter and types of fermentation.</li> <li>• Understand the Screening of microorganisms, storage and preservation of industrially important microorganisms.</li> <li>• Understand the Culture collection and culture collection centres, national: NCIM, MTCC and international ATCC</li> </ul>
<b>BT-243: Practical course in biotechnology II</b>	<ul style="list-style-type: none"> <li>• Understand the Determination of lambda max by using a suitable dye.</li> <li>• Understand the Separation of amino acids by paper chromatography.</li> <li>• Understand the Separation of amino acids/sugar by thin layer chromatography.</li> <li>• Understand the Ethanol production by using Saccharomyces</li> </ul>

	<p>cerevisiae.</p> <ul style="list-style-type: none"> <li>• Understand the Isolation of amylase/protease producing organisms.</li> <li>• Understand the Isolation of organic acid producing organisms.</li> <li>• Understand the Oil overlay method for preservation of industrially important organisms.</li> <li>• Understand the Determination of blood group with Rh typing.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>TY B Sc.</b></li> </ul>	
<b>BT-351: Genetics</b>	<ul style="list-style-type: none"> <li>• Understand the Mendelian and Neo-mendelian genetics</li> <li>• Study the phenomenon of dominance, laws of segregation, independent assortment of genes.</li> <li>• Understand the different types of genetic interaction, incomplete dominance, co-dominance, inter allelic genetic interactions, multiple alleles and quantitative inheritance etc.</li> <li>• Understand the principles and mechanisms of linkage and crossing over.</li> <li>• Study human sex anomalies including eugenics and euphenics, genetic drift and disorders due to mutant genes.</li> </ul>
<b>BT-352: Agricultural biotechnology</b>	<ul style="list-style-type: none"> <li>• Interpret Symbiotic-Non symbiotic nitrogen fixation in leguminous plant</li> <li>• Interpret Assimilation of sulphur and phosphorus by plants</li> <li>• Interpret Bio fertilizer, comparison between bio fertilizer and chemical fertilizer</li> <li>• Understand the Concept of plant pathology, classification of plant diseases based on symptoms</li> <li>• Understand Plant diseases- a) Bacterial blight of pomegranate b) Bacterial blight of cotton c) Whip smut of sugarcane</li> <li>• Understand Integrated pest management (IPM)- insect resistant crop</li> </ul>
<b>BT-353: Animal Biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the History, scope, principle, merits and demerits of animal cell and tissue culture.</li> <li>• Understand the Laboratory facilities and culture media for animal tissue culture.</li> <li>• Understand the Cell lines, application of animal cell and tissue culture, biohazards and Biosafety.</li> <li>• Get information about transgenic animals, cryopreservation, apoptosis, Animal cloning.</li> <li>• Understand the Cell transformation, DNA microinjection.</li> <li>• Understand the Economic aspects of transgenic animals and Ethical issues of animal welfare and animal rights.</li> </ul>
<b>BT-354: Industrial biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the Concept and types of strain improvement techniques</li> <li>• Understand the Fermentative productions of representative biomolecules like Enzymes, antibiotics, vitamin, beverages</li> <li>• Understand the Recovery and purification of biomolecules</li> <li>• Understand the Quality control procedures like sterility, toxicity, carcinogenicity testing</li> </ul>
<b>BT 355: Food Biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the Primary Source of microbes in various foods</li> <li>• Understand the Definition, general features and different products of</li> </ul>

	<p>milk</p> <ul style="list-style-type: none"> <li>• Understand the Microbial analysis of milk</li> <li>• Understand the Microbial production of fermented food viz. cheese, bread etc.</li> <li>• Understand the Causes of food spoilage, Spoilage of fruit, Vegetables, Dairy product</li> <li>• Understand the Food Preservation –Chemical Method, Physical method</li> </ul>
<b>BT 356: Environmental Biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the domestic waste water treatment, classification of waste water treatment</li> <li>• Understand the Biodegradation-Concept, Biodegradation of hydrocarbon, Measurement of biodegradation</li> <li>• Understand the Bioremediation-Concept, Methods of Bioremediation (In-situ and Ex-situ Bioremediation)</li> <li>• Understand the Phyto remediation-Concept (Rhizofiltration, Phyto transformation, Phytostimulation)</li> <li>• Understand the Xenobiotics and recalcitrant ,Generalize Fate of xenobiotic Degradation</li> <li>• Understand the Xenobiotic biodegradation, Herbicide Degradation, Metabolism of Xenobiotics</li> </ul>
<b>BT-357: Industrial Biotechnology</b>	<p>Students should understand,</p> <ul style="list-style-type: none"> <li>• Understand the Fermentative production of biomolecules like vitamin, antibiotics, ethanol etc</li> <li>• Understand the Biochemical estimation of fermentative products like organic acids, vitamin, antibiotics etc.</li> <li>• Understand the Chemical estimation of penicillin</li> <li>• Understand the Industrial visit and demonstrative session at outdoor industryStudy of polytene chromosome from Chironomus larvae.Isolation of</li> </ul>
<b>BT-358: Animal Biotechnology and Immunology</b>	<p>Student should understand,</p> <ul style="list-style-type: none"> <li>• Understand the Blood film preparation and identification of blood cells, human blood grouping</li> <li>• Understand the Immunological techniques, double diffusion, widal test, ELISA.</li> <li>• Understand the Animal cell culture media preparation and sterilization</li> <li>• Understand the Survival curve of bacteria against UV radiation</li> <li>• Understand the Immobilization of whole cell .</li> <li>• Understand the Nucleic acid separation using Agarose gel electrophoresis.</li> </ul>
<b>BT-359: Food and environment biotechnology</b>	<p>Students should understand,</p> <ul style="list-style-type: none"> <li>• Understand the Isolate and characterize food fermenting organisms</li> <li>• Understand the Analyse the mycotoxin from fungus contaminated food materials</li> <li>• Understand the Microscopic examination of food and milk by breed methods</li> <li>• Understand the Qualitative checking and evaluation of pasteurization of milk by MBRT test and phosphatise test</li> </ul>

	<ul style="list-style-type: none"> <li>• Understand the Study the quality of soil by determining the total carbohydrate, nitrogen and phosphorus.</li> <li>• Understand the Study the quality of water by determining the Biological oxygen demand and chemical oxygen demand.</li> </ul>
<b>BT-361: Gene biotechnology and bioinformatics</b>	<ul style="list-style-type: none"> <li>• Understand the Basic of rDNA technology, Concept and principle and application of genetic engineering.</li> <li>• Understand the Principles, material and methodology of techniques involved in rDNA technology, include Gel electrophoresis, blotting techniques, sequencing methods, PCR.</li> <li>• RFLP, RAPD, DNA fingerprinting.</li> <li>• Understand the Definition, history and scope of bioinformatics</li> <li>• Understand the Classification database used in bioinformatics Primary and secondary.</li> <li>• Understand the BLAST, gene bank, EMBL, DDBJ, NCBI</li> </ul>
<b>BT-362: Plant Biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the Preparation of media and sterilization of plant tissue culture material.</li> <li>• Understand the Methods of plant tissue culture.</li> <li>• Understand the Methods of secondary metabolites production.</li> <li>• Understand the plant pathogen and pathology concepts.</li> <li>• Understand the methods of embryo culture.</li> <li>• Understand the Methods of Biofertilizer preparation.</li> </ul>
<b>BT-363: Immunology</b>	<ul style="list-style-type: none"> <li>• Understand the Immune system, types of immunity, primary and secondary lymphoid organ .</li> <li>• Understand the Innate and acquired immunity, antigen, immuneresponse primary and secondary immune response, complement system, interferons.</li> <li>• Understand the Ag-abinteractions,precipitation, agglutination, RIA, ELISA, monoclonal antibodies.</li> <li>• Understand the Immunosuppresion, Vaccines, passive immunization, immunodeficiency disorder.</li> <li>• Understand the Immuneparmacology, nonsteroidalanti-inflammatory drugs and glucocorticoids.</li> </ul>
<b>BT -364: Advanced bioprocess Technology</b>	<ul style="list-style-type: none"> <li>• Understand concept and types of Biotransformation.</li> <li>• Understand the Enzyme immobilization types and applications.</li> <li>• Understand the Types and principles of biofules.</li> <li>• Understand the Biogas and conversion of lignocelluloses to biogas.</li> <li>• Understand the Biosorption and Bioleaching of metals.</li> </ul>
<b>BT 365: Pharmaceutical Biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the Concept, classification production and applications of secondary metabolites</li> <li>• Understand the Classification and production and characterization of antimicrobial ganets</li> <li>• Understand the Biological techniques to estimates antibiotics like MIC</li> <li>• Understand the Structure, mechanisms and applications of different antibiotics like sulfonamides, griseofulvin, quinolones etc.</li> <li>• Understand the Concept and principle of protein engineering</li> <li>• Understand the Molecular aspects of drug designing</li> </ul>
<b>BT-366: Biodiversity</b>	<ul style="list-style-type: none"> <li>• Understand the Concept of evolutionary, molecular taxonomy</li> </ul>

<b>and biometry</b>	<ul style="list-style-type: none"> <li>• Understand the Concept, characteristics of biodiversity and its conservation methods</li> <li>• Understand the Concept, types and applications of bio-indicators</li> <li>• Understand the Concept of biostatistics and samples</li> <li>• Understand the Techniques of sampling and data analysis</li> </ul>
<b>BT-367: Plant Biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the Isolation and identification of Xanthomonascitri, Rizobiumsp, Azotobactor.</li> <li>• Understand the Determination of IAA Activity.</li> <li>• Understand the Pereration of stocks and sterization of media for PTC.</li> <li>• Understand the Callus culture of medicinal plants.</li> <li>• Understand the Shoot tip culture of medicinal plants.</li> </ul>
<b>BT-368: Genetics and bioinformatics</b>	<ul style="list-style-type: none"> <li>• Understand the Monohybrid and dihybrid crosses, single point and two point crosses, Gene mapping</li> <li>• Understand the conjugation, competent cell system and transformation.</li> <li>• Understand the isolation of DNA from E. coli.</li> <li>• Understand the various domains of bioinformatics, database.</li> <li>• Understand the Gene and protein information searching and accessing from web.</li> <li>• Understand the Protein secondary structure prediction using Rasmol.</li> </ul>
<b>BT-369: Pharmaceutical Biotechnology</b>	<ul style="list-style-type: none"> <li>• Understand the Sterility testing of pharmaceutical products injectable / Ophthalmic solution, membrane filter technique.</li> <li>• Understand the Chemical assay of antibiotic (Streptomycin/penicillin), Microbiological assay of Streptomycin or Penicillin by cup plate/ paper disc method, Determination of</li> <li>• Minimum Inhibitory Concentration (MIC) of Antibiotic.</li> <li>• Understand the Microbial limit test (MLT) of pharmaceutical product, Isolation of antibiotic resistant bacteria population by gradient plate method.</li> <li>• Understand the Validation of laminar air flow cabinet, Validation of autoclave using biological indicato</li> </ul>