



ACHARYA INSTITUTE OF TECHNOLOGY

Affiliated to Visvesvaraya Technological University, Belagavi,
Approved by AICTE, New Delhi, Recognized by Govt. of Karnataka and
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DEPARTMENT OF BIO TECHNOLOGY

2022 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
CELL BIOLOGY AND GENETICS	BBT301	CO1	Explain the various structural-functional bio-molecules within a cell
		CO2	Identify the enzymes that find applications in industries
		CO3	Categorize the exocytosis and endocytosis pathways with examples
		CO4	Relate the principle of Mendelian genetics and gene interactions, their inheritance and expressions in nature.
		CO5	Analysis of genetically inherited disorders with pedigree analysis and conceptual numericals.
UNIT OPERATIONS LAB	BBT302	CO1	1.Summarize the concepts of fluid dynamics, solid liquid separation.
		CO2	2. Describe principles in characterizing the flow of fluid and particle size
		CO3	3.Implement the concepts of heat transfer through the material and fluids in contact
		CO4	4. Predict mass transfer rates and co efficient in the binary mixtures based on diffusion
		CO5	Compare the principles of extraction, distillation and drying
		CO6	6.Implement the McCabe Thiele's method in the design of distillation column
		CO7	7.Conduct experiments on fluid, solid – liquid separation process, heat – mass transfer and interpret the data
		CO8	8. Organize the applications of fluid mechanics, solid-liquid separation operations, heat and mass transfer by oral presentations and report submission .
BIOCHEMISTRY + LAB	BBT303	CO1	Explain the structures, functions and interactions of bio-molecules along with basics of biochemical reactions.
		CO2	Comprehend the biological pathways with energy production/consumption in vivo.
		CO3	Explicit the concepts of metabolic pathways, regulation and disorders of carbohydrates.
		CO4	Explicit the concepts of metabolic pathways, regulation and disorders of lipids.
		CO5	Explicit the concepts of metabolic pathways, regulation and disorders of amino acids and nucleic acids.
		CO6	Illustrate basic biochemical experiments
		CO7	Qualitatively/quantitatively analyze the biomolecule



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			present in the given unknown.
MICROBIOLOGY	BBT304	CO1	Describe microbes and its role in environment
		CO2	Apply the principles microscopy and imaging techniques in microbiology
		CO3	Illustrate the metabolic pathways of microbes during growth and respiration
		CO4	Describe the disease causing bacteria and its mode of infection
		CO5	Analyse the role of beneficial bacteria in environmental and industrial microbiology
BIO-LAB MANAGEMENT AND RISK ASSESSMENT	BBT358A	CO1	Outline the essentials of bio-lab management for an organization / bioprocess
		CO2	2.cIdentify the levels of biosafety levels and risk assessment
		CO3	3.Implement the risk assessment methodologies for the identified biosafety levels
		CO4	Demonstrate the range of risk management challenges for the product / process
		CO5	Recognize the importance of ethical, legal, and social implications of health privacy and policy laws for risk reduction
MICROBIOLOGY LAB	BBT305	CO1	Demonstrate the techniques to culture microbial cells
		CO2	Apply the principles of microbiology to identify the quality of a given sample
		CO3	Conduct and Analyse the biochemical assay to identify the bacteria and its organelle
MOLECULAR BIOLOGY & GENETIC ENGINEERING	BBT401	CO1	Summarize the concepts and importance of central dogma of molecular biology and tools of genetic engineering with focus on their applications.
		CO2	Sketch the mechanism of prokaryotic and eukaryotic replication, transcription and translation and mode of action of enzymes in genetic engineering
		CO3	Correlate the genetic information flow pathway in biological systems in replication, transcription, translation, and its proteomics.
		CO4	Differentiate between the physical, chemical, and biological methods of gene transfer
BIOSTATISTICS AND TOOLS + LAB	BBT402	CO1	Gather data, present appropriately and perform uni-variate, bi-variate analysis of data.
		CO2	In order to address engineering challenges, define and use probability distributions like the Poisson, normal, and binomial.
		CO3	Recognize the fundamentals of the several study designs that are employed in epidemiological research and discuss the benefits and drawbacks of each.
		CO4	To become knowledgeable about developing



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			hypotheses, testing them, and using sample data to draw conclusions about a population.
		CO5	Apply one -way ANOVA and two-way ANOVA to datasets with multiple factors in the Relevant field.
		CO6	Application of experimental design in laboratory experiments.
IMMUNOTECHNOLOGY + LAB	BBT403	CO1	Outline the molecular and cellular mechanisms involved in the development and regulation of the immune response
		CO2	Illustrate the cause, challenges and treatment for Immune System Pathologies and Dysfunctions
		CO3	Apply the major immunological laboratory techniques and their application to both clinical analysis and experimental research
		CO4	Analyze the immunological conditions, disorders and its diagnostics.
		CO5	Demonstrate various Immunodiagnostic techniques like agglutination, precipitation and various Ag-Ab reaction etc
		CO6	Analyse and Interpret test result of various Ag-Abreaction
MOLECULAR BIOLOGY & GENETIC ENGINEERING LAB	BBTL404	CO1	Comprehend the basic genetic engineering and molecular biology techniques in vitro.
		CO2	Conduct the experiments to isolate/quantify genetic material from the given source. 2
		CO3	Analyze and interpret the effects of physio-chemical factors/enzymes/ on genetic materials/cells in vitro
		CO4	Apply the skills of Isolation, identification and quantification of genetic material for genetic engineering applications
STRUCTURAL BIOLOGY AND BIOPHYSICAL TECHNIQUES	BBT405D	CO1	Articulate the structural and functional aspects of proteins.
		CO2	Outline the structure and functional aspects of nucleic acids and biomembranes.
		CO3	Apply the specific analytical tools and techniques for identification of biomolecules.
		CO4	Analyse the working principle of spectroscopic techniques and its applications
		CO5	Demonstrate the various electrophoretic and chromatographic techniques used in analyzing the biomolecules
HYDROPONICS, AQUAPONICS AND AEROPONICS	BBT456A	CO1	Interdisciplinary applications of Hydro/aero/aquaponics in farming with emphasis to revenue generation and entrepreneurial process
		CO2	Evaluate the requirements of traditional and innovative farming in terms of resources



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		CO3	Demonstrate various practices to maintain personal hygiene, cleanliness, and safety at the workplace.
		CO4	Lab-scale Design of setting up and maintaining the hydroponic system and plants/ crop
BIOLOGY FOR ENGINEERS	BBOK407	CO1	To describe cell, its properties, functions and requirements of cells in physiological conditions
		CO2	To articulate the biomolecular requirements of cells in physiological conditions and emphasizing their application
		CO3	Compare the working human organs to known equipments/machineries
		CO4	Relate various technologies on the principles of biomechanics
		CO5	Evaluate the design of bioengineering used in the solution of contemporary problems.
UNIVERSAL HUMAN VALUES COURSE	BUHK408	CO1	Understand oneself in a holistic way
		CO2	Apply principles of happiness and harmony to one's various aspects of life
		CO3	Analyse preconditioning and its effects on one's behaviour



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2021 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
MATHEMATICS	21MAT31	CO1	Understand the concepts of Laplace Transforms, Fourier series, Fourier transforms, Z-transforms, Numerical techniques and Calculus of variations.
		CO2	Demonstrate various physical phenomena using the concepts of Laplace Transforms, Fourier series, Fourier transforms, Z-transforms, Numerical techniques and Calculus of variations.
		CO3	Apply the knowledge of Laplace Transforms, Fourier series, Fourier transforms, Z-transforms, Numerical techniques and Calculus of variations in modelling various physical and engineering phenomena.
		CO4	Relate the concepts of Laplace Transforms, Fourier series, Fourier transforms, Z-transforms, Numerical techniques and Calculus of variations to their respective branches.
UNIT OPERATIONS + LAB	21BT32	CO1	Understand the classification of fluids, basic equation of fluid flow, flow measuring devices, crushing laws, modes of heat transfer and rate of diffusion
		CO2	Understand the principles fluid mechanics, mechanical operations, modes of heat transfer, steady-state conduction and convection, working of heat transfer exchanger
		CO3	Apply the equations of fluid based on pressure drop, velocity, mass, and volumetric flow rate in solving problems
		CO4	Apply the equations of crushing laws, heat transfer, diffusivity, and Mc Cabe Thiele's method in solving problems
		CO5	Demonstrate skill in safe operation of the laboratory experiment
BIOCHEMISTRY + LAB	21BT33	CO1	Explain the fundamentals of biologically important molecules such as structures, functions and interactions.
		CO2	Understand complex biochemical pathways within living cells and the associated metabolic disorders.
		CO3	Comprehend biochemical principles and apply them to biological systems/samples.
		CO4	Perform basic biochemical experiments, analyse, interpret and present the data.
MICROBIOLOGY	21BT34	CO1	Correlate the structure, function and metabolic pathways of microorganisms.
		CO2	Apply the principles of microbial culture and identify the appropriate technique used in culture and



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			characterization of microorganisms under aseptic conditions.
		CO3	Apply the knowledge of microscopy to identify various microorganisms and their organelles
		CO4	Analyze the role of microorganisms in environmental protection, industrial applications and infectious diseases.
MICROBIOLOGY LAB	21BTL35	CO1	Apply theoretical knowledge and execute experiments pertaining to methods of sterilization, microbial, identification and characterization.
		CO2	Apply the basic techniques of microbiology in various experiments related to agriculture, food and environment.
		CO3	Analyze the media requirements for the cultivation of particular microorganisms.
		CO4	Compare and contrast between microbes that are beneficial and harmful to mankind by assessing the biochemical pathway.
SOCIAL CONNECT AND RESPONSIBILITY	21BT36	CO1	Understand social responsibility
		CO2	Showcase planning and organizational skills
BIO-LAB MANAGEMENT AND RISK ASSESSMENT	21BT384	CO1	Understanding the bio lab management requirements , risk assessment, levels of biosafety and its assessment with control measures.
		CO2	Infer on the essentials of quality management in lab, risk assessment tools, levels of bio safety levels, assessment and its minimization
		CO3	Access on the requirements of quality management , risk assessment with case studies with biosafety levels and its mitigation
COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS	21MAT41	CO1	Understand the concepts of Complex variables & amp; Complex integration, Special functions, Statistical methods and Probability distributions & amp; sampling Theory.
		CO2	Demonstrate various physical phenomena using the concepts of Complex variables & amp; Complex integration, Special functions, Statistical methods and Probability distributions & amp; sampling Theory.
		CO3	Apply the knowledge of Complex variables & amp; Complex integration, Special functions, Statistical methods and Probability distributions & amp; sampling theory in modelling various physical and engineering phenomena.
		CO4	Relate the concepts of Complex variables & amp; Complex integration, Special functions, Statistical methods and Probability distributions & amp; sampling



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			Theory in various engineering problems related to the Bio-Technology and allied engineering branches.
PYTHON PROGRAMMING + LAB	21BT42	CO1	Read and write simple Python programs.
		CO2	Define Python functions and call them.
		CO3	Apply Python data structures for creating lists, tuples, and dictionaries.
		CO4	Develop Python programs with conditionals and loops.
CELL BIOLOGY & CELL CULTURE TECHNIQUES + LAB	21BT43	CO1	Outline the structure and functions of cellular organelles and cell cycles
		CO2	Apply the concepts of cell- cell signaling, transport mechanisms and programmed and/or non-programmed cell death mechanisms in cells
		CO3	Categorize the exocytosis and endocytosis pathways with examples
		CO4	Implement plant tissue culture techniques in agriculture, food and medicine.
		CO5	Analyze the principles of animal cell culture in drug and toxicity testing.
MOLECULAR BIOLOGY & GENETIC ENGINEERING	21BT44	CO1	Summarize the concepts and importance of central dogma of molecular biology and tools of genetic engineering with focus on their applications.
		CO2	Sketch the mechanism of prokaryotic and eukaryotic replication, transcription and translation and mode of action of enzymes in genetic engineering
		CO3	Correlate the genetic information flow pathway in biological systems in replication, transcription, translation, and its proteomics.
		CO4	Differentiate between the physical, chemical, and biological methods of gene transfer
BIOLOGY FOR ENGINEERS	21BT45	CO1	Interdisciplinary applications of biomolecules by exploiting its molecular properties.
		CO2	Compare the working human organs to known equipment's/machineries.
		CO3	Relate various technologies on the principles of biomechanics.
		CO4	Evaluate the design of bioengineering used in solution of contemporary problems.
MOLECULAR BIOLOGY & GENETIC ENGINEERING LAB	21BTL46	CO1	Comprehend the basic genetic engineering and molecular biology techniques in vitro.
		CO2	Conduct the experiments to isolate/quantify genetic material from the given source. 2
		CO3	Analyze and interpret the effects of physio-chemical factors/enzymes/ on genetic
		CO4	materials/cells in vitro
		CO5	Apply the skills of Isolation, identification and quantification of genetic material for genetic



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			engineering applications
HYDROPONICS, AQUAPONICS AND AEROPONICS	21BT481	CO1	Interdisciplinary applications of Hydro/aero/aquaponics in farming with emphasis to revenue generation and entrepreneurial process
		CO2	Evaluate the requirements of traditional and innovative farming in terms of resources
		CO3	Demonstrate various practices to maintain personal hygiene, cleanliness, and safety at the workplace.
		CO4	Lab-scale Design of setting up and maintaining the hydroponic system and plants/ crop
UNIVERSAL HUMAN VALUES	21UH49	CO1	Understand oneself in a holistic way
		CO2	Apply principles of happiness and harmony to one's various aspects of life
		CO3	Analyse preconditionings and its effects on one's behaviour
INTER/INTRA INSTITUTIONAL INTERNSHIP	21INT49	CO1	Demonstrate Sound technical Knowledge in the chosen domain through Skill up gradation
		CO2	Correlate the knowledge gained for different applications scenarios
		CO3	Work as individual or as good team player in an organization
		CO4	Communicate technical content effectively through written and oral presentations
BIOKINETICS & BIOREACTION ENGINEERING	21BT51	CO1	Describe the theories of reaction rate based on temperature dependency , rate equation by integral and differential analysis for constant volume system
		CO2	Interpret the design equation for batch, stirred and tubular reactors in the design of parallel and series reactors
		CO3	Interpret on enzyme and its classification; initial velocity studies to obtain Michelis menton equation, Lineweaver Burk and Eadie Hofstee equation
		CO4	Interpret on the kinetics of batch growth, factors affecting the microbial growth, monod growth kinetics, thermal death kinetics of micro organisms
		CO5	Interpret on degree of reduction, yield co efficient, media requirements and media formulation for optimal growth and product formation, batch and continuous sterilization
IMMUNOTECHNO LOGY+ LAB	21BT52	CO1	Outline the molecular and cellular mechanisms involved in the development and regulation of the immune response
		CO2	Illustrate the cause, challenges and treatment for Immune System Pathologies and Dysfunctions
		CO3	Apply the major immunological laboratory techniques and their application to both clinical analysis and



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			experimental research
		CO4	Analyze the immunological conditions, disorders and its diagnostics.
		CO5	Demonstrate various Immunodiagnostic techniques like agglutination, precipitation and various Ag-Ab reaction etc
		CO6	Analyse and Interpret test result of various Ag-Abreaction
STRUCTURAL BIOLOGY & ANALYTICAL TECHNIQUES	21BT53	CO1	Describe the structural aspects of macromolecules like proteins, nucleic acids and bio-membranes.
		CO2	Demonstrate their structure function hypothesis via suitable techniques.
		CO3	Apply the specific biophysical, spectroscopic, chromatographic techniques for various case studies.
		CO4	Operation and working procedure of spectroscopic and chromatographic technique
GENOMICS, PROTEOMICS AND BIOINFORMATICS	21BT54	CO1	Define structural, comparative and functional genomics and its uses in various research fields
		CO2	Outline various methods and techniques of Genomics, expression profiling, and its applications.
		CO3	Illustrate the different proteome analysis technologies
		CO4	Compare the various data types and databases and their applicability in bioinformatics
		CO5	Analyse the methods of processing biological data to infer useful information
BIOINFORMATICS LAB	21BTL55	CO1	Understand fundamental concepts of bioinformatics with classification and availability of biological databases
		CO2	Apply online resource tools such as BLAST and access biological data from NCBI and UNIPROT
		CO3	Solve sequence alignment problems using EMBOSS Needle and water for global and local alignment
		CO4	Design primers for selected genome sequences to give targeted PCR products
EXTRACTION METHODS AND HERBAL PRODUCTS	21BT582	CO1	Demonstrate the techniques to select suitable herbs
		CO2	Apply the principles of extraction to retrieve bioactive compounds.
		CO3	Conduct experiments to increase the yield and Analyze the activity of bioactive compounds.
BIOBUSINESS MANAGEMENT AND ENTREPRENEURS HIP	21BT61	CO1	Distinguish between the various types of entrepreneurships and market studies
		CO2	Understand the Business opportunities in Biotechnology field
		CO3	Explore the various case studies of the biotech start ups in India.
		CO4	Describe the importance of bioethics, biosafety and IPR



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		CO5	Analyze a project report related to the proposal for obtaining funding.
BIOPROCESS PRINCIPLES, CONTROL & AUTOMATION + LAB	21BT62	CO1	Describe the classification of instrumentation used in controlling the process.
		CO2	Describe the principles and working of elements in the control system
		CO3	Solve the equations of transfer function in the determination of out put
		CO4	Differentiate the equations related to the criteria of stability using Routh test, Bode diagram, and Nyquist plot in the design of control system.
		CO5	Demonstrate skill in safe operation of the laboratory experiment
ENZYME TECHNOLOGY	21BT63	CO1	Define enzymes and its catalytic action, mechanism & kinetics with few examples.
		CO2	Explain the various techniques involved in the extraction and utilization of enzymes in biotransformation.
		CO3	Estimate the enzyme activity measuring its kinetics
		CO4	Analyze suitability of various techniques for making novel enzymes for various applications
		CO5	Infer the various applicability of enzymes in other industries
STEM CELL TECHNOLOGY	21BT644	CO1	Explain the various types of stem cells in eukaryotes and ethical issues in retrieving them
		CO2	Identify the media and factors responsible for regeneration of stem cells
		CO3	Analyze the need for stem cells in biomedical applications
		CO4	Infer the biological engineering knowledge to relate to case studies
FOOD, NUTRITION AND HEALTH	21BT652	CO1	Display a solid foundation in understanding the biochemical, nutritional, physiological and safety aspect of food and their relationship with health.
		CO2	Articulate the balanced diet for various age and health groups.
		CO3	Correlate causes and prevention for nutritional diseases
		CO4	Demonstrate the techniques of food processing, preservation and novel food product development.
		CO5	Detail the need of regulations and operations of a food industry.
ENZYME TECHNOLOGY LAB	21BT66	CO1	Perform experiments related to enzyme isolation and purification.
		CO2	Perform experiments on different kinetic parameters and stability studies.



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2018 SCHEME COURSE OUTCOMES

Course Name	Course Code	CO. No.	Course Outcomes
BIOSTATISTICS	18BT31	CO1	Describe The Numerical Techniques, Special Functions, Complex Variables, Probability, Sampling Theory And Stochastic Process
		CO2	Determine The Solutions Using Numerical Techniques, Solve Special Functions Problems In Complex Domain; Solve Problems On Probability, Sampling Theory And Stochastic Process
		CO3	Draw The Conclusions From Numerical Techniques, Special Functions, Complex Variables, Probability, Sampling Theory And Stochastic Process.
MICROBIOLOGY	18BT32	CO1	Describe Various Types Of Microbes And Their Classification
		CO2	Understand The Growth , Metabolism, Mode Of Infection, Causes And Effects Of Microbes
		CO3	Analyze And Identify Various Microorganisms Through Staining And Their Organelles
		CO4	Apply The Knowledge Of Microbial Identification To Classify The Microbes In Air, Water And Soil Into Essential And Harmful Microbes For Medical, Environmental And Industrial Use
UNIT OPERATIONS	18BT33	CO1	Understand The Classification Of Fluids, Basic Equation Of Fluid Flow, Flow Measuring Devices, Crushing Laws, Modes Of Heat Transfer And Rate Of Diffusion
		CO2	Understand The Principles Fluid Mechanics, Mechanical Operations, Modes Of Heat Transfer, Steady-State Conduction And Convection, Working Of Heat Transfer Exchanger And Concepts Of Mass Transfer.
		CO3	Apply The Equations Of Flow, Crushing Laws, Steady State Equations Of Conduction And Convection In Solving Problems
		CO4	Apply The Equations Of Diffusivity And Mc Cabe Thiele's Method In Solving Problems
INTRODUCTION TO BIOMOLECULES	18BT34	CO1	Classify Biomolecules Based On Structure, Number And Function
		CO2	Understand The Fundamentals Of Biochemical Principles Such As Structure, Function, Organization/Stabilization Of Biomolecules
		CO3	Sketch The Energy Flow Cycle/Metabolic Pathways With Energy Balance Sheet
		CO4	Analyze The Transport Mechanism Across The



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			Biological Membrane
CELL BIOLOGY AND GENETICS	18BT35	CO1	Outline The Structure And Function Of Cell Organelles, Organs Of Heredity And Appraise Their Physiological Roles.
		CO2	Appraise The Possible Origin Of Cell Organelles, Compartmentalization, Ageing Process And The Hereditary Molecular Components.
		CO3	Explicit The Basics Of Mendelian Genetics And Gene Interactions, Their Inheritance And Expression In Nature.
		CO4	Analysis Of Inherited Disorders With Pedigree Analysis And Conceptual Numericals.
PYTHON PROGRAMMI NG	18BT36	CO1	Understand Python Language With Updated Tool Usage
		CO2	Apply The Basic Concepts Of Python For Biological Data Handling
		CO3	Use The Software With Special Reference To Biotechnological Applications
MICROBILOG Y LABORATOR Y	18BTL37	CO1	Understand And Use Different Laboratory Equipment And Instruments Such As Microscope, Laminar Air Flow Station, Autoclave, Oven, Incubators.
		CO2	Prepare Suitable Media For The Cultivation Of The Microorganisms.
		CO3	Analyze And Interpret The Role Of Microbes By Applying The Knowledge Obtained For The Isolation, Identification And Characterization Of Microorganisms
		CO4	Classify/Justify The Presence Of Beneficial And Harmful Microorganisms Based On Their Function In A Given Habitat.
UNIT OPERATION LABORATOR Y	18BTL38	CO1	Identify The Engineering Principles Of Each Unit Operation And Tabulate The Reading
		CO2	Demonstrate The Skill And Knowledge Required For The Safe Operation Of Laboratory Experiment For The Given Specification
		CO3	Conduct The Unit Operation Process And Obtain The Parametric Values As Per The Principles
		CO4	Record And Examine The Results /Data With Interpretation
STOICHIOME TRY	18BT41	CO1	Understand Fundamentals Of The Chemical Principles Related To The Composition Of Matter And The Concept Of Molecular Identity
		CO2	Estimate The Behaviours Of Liquid And Gases By The Relationships Between Gas Temperature, Pressure, Amount, And Volume
		CO3	Interpret The Relationships Between Chemical Changes And Thermal Energy
		CO4	Analyse The Substances Involved In Chemical



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			Reactions Quantitatively And Its Stoichiometric Conditions
MOLECULAR BIOLOGY	18BT42	CO1	Gain In Depth Knowledge In The General Principles Of Molecular Biology In Both Prokaryotic And Eukaryotic Organisms
		CO2	Demonstrate An Understanding Of Various Mechanisms Of Nucleic Acids, Synthesis And Their Functions.
		CO3	Describe The General Principles Of Molecular Biology And The Implications Such As Recombination, Cancer, Transposition
		CO4	Infer Information On The General Principles Of Proteins And Its Synthesis In Both Prokaryotic And Eukaryotic Organisms Which Will Help In Genetic Engineering
IMMUNOTECHNOLOGY	18BT43	CO1	Understand The Basic Concepts And Components Of Immune System
		CO2	Comprehend The Diversified Roles, Functions And Dysfunctions Of Immune System
		CO3	Apply Immunological Techniques/ Processes In The Field Of Medicine, Healthcare And Diagnostics
		CO4	Analyze The Reasons For Graft Rejection And Auto Immune Disorders.
CELL CULTURE TECHNIQUES	18BT44	CO1	Comprehend The Characteristics Of Modified Media For Cellular Studies
		CO2	Analyze The Cell Culture Conditions For A Laboratory Scale
		CO3	Analyse/Differentiate The Process/Equipment Needed To Culture Cells From Various Sources Like Animals, Plants And Microbes
		CO4	Apply The Techniques Of Tissue/Cell Culture To Retrieve Commercially Viable Products
BIOCHEMICAL THERMODYNAMICS	18BT45	CO1	Describe The Terminologies Of Thermodynamics, Concept Of Heat, Work
		CO2	Understand The Laws Of Thermodynamics, Entropy, Ideal And Real Gases, Properties Of Pure Substances And Biochemical Reaction Equilibrium
		CO3	Apply The Laws Of Thermodynamics, Equation Of State, Gibbs- Duhem Equation , Maxwell Equation To Identify The System Conditions
		CO4	Analyze The Importance Of Thermodynamics For Reversible And Irreversible Systems, Molar Properties Of The Solutions.
CLINICAL BIOCHEMISTRY	18BT46	CO1	Explain The Acid-Base Balance And The Regulatory Mechanisms Within The Body To Include The Analyte, Physiology Involved, And Clinical Significance



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		CO2	Compare And Contrast The Basic Differences Between Abnormalities Associated Metabolism With Biomolecules.
		CO3	Apply The Theoretical Concepts In Biochemistry With A Focus On, Hormones And Biosignaling, Metabolism And Clinical Biochemistry.
		CO4	Analyze And Interpret The Data From Case Scenarios.
BIOCHEMISTRY LABORATORY	18BTL47	CO1	Demonstrate The Basic Laboratory Mathematics Necessary To Perform Tests, Make Dilutions, And Prepare Buffer Solutions.
		CO2	Demonstrate The Basic Chemistry And Biochemistry Application In The Field Of Medical Diagnosis, Treatment And Management.
		CO3	Compare/Contrast Qualitative And Quantitative Analysis Of Various Biomolecules.
IMMUNOTECHNOLOGY LABORATORY	18BTL48	CO1	Understand Various Theoretical Concepts Of Immunodiagnostic Techniques And Genetic Engineering Techniques
		CO2	Apply The Immunodiagnostic Techniques And Genetic Engineering Techniques
		CO3	Analyse And Infer The Experimental Outcome
BIO-BUSINESS AND INTREPRENEURSHIP	18BT51	CO1	Understand The Business Opportunities In Biotechnology Field
		CO2	Describe The Importance Of Bioethics, Biosafety And IPR
		CO3	Apply Concepts Of Project Management To Write Project Proposals And Project Reports.
		CO4	Analyze A Project Report Related To The Proposal For Obtaining Funding
CHEMICAL REACTION ENGINEERING	18BT52	CO1	Identify The Reaction Order And Specific Reaction Rate From Theoretical Data.
		CO2	Compare The Performance Of Ideal And Non-Ideal Reactors Using E- And F-Curves
		CO3	Determine Internal And Overall Effectiveness Factors For The Order Reactions
		CO4	Analyse Kinetics Of Biochemical Reactions Carried Out In Reactor
ENZYME TECHNOLOGY AND BIOTRANSFORMATION	18BT53	CO1	Able To Design Novel Enzymes Using Design Templates & Improve The Existing Methods Of Enzyme Immobilization
		CO2	Evaluate The Different Strategies Used In Purification, Characterization Of Enzymes & Enzyme- Catalyzed Reactions
		CO3	Examine Kinetics Of Enzyme- Catalyzed Reactions & Their Applications In Various Industries
		CO4	Develop Ways In Improving The Sensitivity Of Enzyme



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			Assays In Disease Diagnosis Wrt Cancer & Therapy
		CO5	Explain The Various Types Of Enzyme Purification Techniques, Mechanism Of Enzyme Catalyzed Reactions & Applications Of Industrially Important Enzymes
GENOMICS AND PROTEOMICS	18BT54	CO1	Define Structural, Comparative And Functional Genomics And Proteomics And Its Uses In Various Research Fields
		CO2	Outline Various Methods And Techniques Of Genomics, Expression Profiling, Proteome Analysis, And Its Applications
		CO3	Illustrate The Different High Throughput DNA Sequencing Technologies
		CO4	Apply Various Tools Of Analysis For Proteome Expression
BIOANALYTICAL TECHNIQUES	18BT55	CO1	Understand About The Different Pre-Treatment Steps Involved In Bioproduct Analysis, Methods Of Analytical Techniques.
		CO2	Understand The Working Of Bioanalytical Instruments Used In The Biomolecular Analysis
		CO3	Predict The Chromatographic, Electrophoretic Techniques For Identification And Quantification Of Bioanalytical Product
		CO4	Analyze The Macromolecular Structure By NMR, X-Ray Diffraction Methods And Electrochemical Characterization Techniques
BIOKINETICS AND ENZYME TECHNOLOGY LABORATORY	18BTL57	CO1	State And Define The Nature Of The Reaction, Rate Of The Reaction, Rate Constant And Enzyme Activity.
		CO2	To Understand The Mechanism Of Enzyme Action, Purification Of Enzymes, Catalytic Action Of Enzymes, Kinetics Of Enzyme Catalyzed Reactions
		CO3	To Determine The Optimum Ph, Temperature And Concentration Of An Enzyme's Catalytic Power, Its Substrate Affinity And Inhibitor Role
		CO4	Compose The Reaction Data To Identify The Standard Parameter For Efficient Functioning Of Enzymes
GENETIC ENGINEERING AND CELL CULTURE LABORATORY	18BTL58	CO1	Comprehend The Basic Genetic Engineering And Cell Culture Techniques In Vitro.
		CO2	Conduct The Experiments To Quantify Genetic Material And Secondary Metabolites From The Given Source.
		CO3	Analyze And Interpret The Effects Of Physio-Chemical Factors, Growth Hormones On Development Of Cell Cultures In Vitro
		CO4	Apply The Skills Of Isolation, Identification And Quantification Of Genetic Material For Genetic Engineering Applications



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ENVIRONMENTAL STUDIES	18CIV59	CO1	Understand The Environmental Science In Context Of Engineering
		CO2	Analyse Contemporary Environmental Problems In The Modern Era
PROCESS CONTROL AND AUTOMATION	18BT61	CO1	Identify Suitable Process Instrumentation For Monitoring And Control Of Bioreactors
		CO2	Determine The Performance Of A Closed Loop Control Approach
		CO3	Analyse Process Stability, Dynamic Responses, Frequency Analysis Of Biochemical Processes
		CO4	Develop Mathematical Models For Dynamic Processes
BIOPROCESS EQUIPMENT DESIGN AND CAED	18BT62	CO1	Understand The Working Of Process Equipment Double Pipe Heat Exchanger, Shell & Tube Heat Exchanger, Condenser, Fermentor, Packed Column Distillation
		CO2	Apply The Material Balance , Heat Transfer Co-Efficient Equations For The Design Of Heat Transfer Equipments
		CO3	Analyze The Heat Transfer Calculations Based On The Relationship Between Dimensionless Groups & VLE Data For The Process Equipments
		CO4	Evaluate The Pressure Drop Calculations For The Heat Exchangers, Condenser, Fermentor , Height And Diameter Of Packed Bed Distillation Column
BIOINFORMATICS	18BT63	CO1	Define Biological Data Bases, Its Types And Its Uses In Various Research Fields
		CO2	Describe Various Methods And Techniques Of Bioinformatics Tools To Search Nucleotides And Amino Acid Sequences And Its Alignment And Arrangement Into Primers And Restriction Maps And Model Small Molecules And Peptide Chains.
		CO3	Analyze The Best Method To Predict The Functional Aspects Of A Genome And Structure Of A Protein.
		CO4	Utilize Various Bioinformatics Tools Required To Handle Biological Data
FOOD PROCESS ENGINEERING	18BT64X	CO1	Display A Solid Foundation In Understanding The Biochemical, Nutritional, Physiological, Ethical And Safety Aspect Of Food
		CO2	Articulate The Different Factors Influencing Microbial Growth, Its Intoxication And Diagnostic System Used In Food Industry To Detect The Microbial Spoilage.
		CO3	Appraise The Different Processing, Fermenting, Preserving Techniques To Enhance The Shelf Life Of Food By Using Biotechnological Approach.
		CO4	Analyse The Food Sample For Nutritional Content And Diagnose It For Various Microbial Contamination.
BIOLOGY	18BT65X	CO1	Display A Solid Foundation In Understanding The Cell



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FOR ENGINEERS			Biology And Biomolecules
		CO2	Articulate The Factors Influencing Biomolecules And Biomaterials .
		CO3	Apply The Knowledge To Relate Organs To An Engineered Device.
		CO4	To Analyze Various Physio-Chemical Factors Affecting Biomolecules When Subjected To Any Physical And Chemical Change.
PROCESS CONTROL AND AUTOMATION LABORATORY	18BT66	CO1	Identify The Principle Of Experimental Study And Tabulate The Reading
		CO2	Demonstrate The Skill And Knowledge Required For The Safe Operation Of Laboratory Experiment For The Given Specification
		CO3	Conduct The Experimental Study And Obtain The Parametric Values As Per The Principles
		CO4	Record And Examine The Results / Data With Interpretation
BIOINFORMATICS LABORATORY	18BT67	CO1	Understand Fundamental Concepts Of Bioinformatics
		CO2	Apply Online Resource Tools
		CO3	Solve Sequence Alignment Problems
		CO4	Design Primers And Peptide Sequences
MINIPROJECT	18BTMP68	CO1	Identify The Research Problem And Frame Objectives Based On The Review Of Literature
		CO2	Apply Relevant Methodologies For Addressing Afore Mentioned Objectives.
		CO3	Analyze And Evaluate The Experimental Results And Propose Suitable Modifications To Achieve Expected Outcomes.
BIOPROCESS ENGINEERING	18BT71	CO1	Discuss The Control Strategy For A Process Involving Multiple Variables And Constraints
		CO2	Describe The Main Stages Of Downstream Processing Operations
		CO3	Relate The Separation Techniques Based On The Characteristics Of The Biomolecules
		CO4	Distinguish The Different Types Of Chromatography Techniques For Purifying Proteins
CLINICAL AND PHARMACEUTICAL BIOTECHNOLOGY	18BT72	CO1	Understand The Basic Concepts Of Drug Discovery Cycle, Formulations Along With Pharmacokinetics And Pharmacodynamics Studies.
		CO2	Comprehend The Proficiency Of Clinical Research In Industry/Research For Obtaining And Improving The Quality Of Natural/Biopharmaceutical Products.
		CO3	Implement The Clinical Significance And Therapeutic Aspects Of Drugs, Proteins And Enzymes.
		CO4	Analyze The Case Studies Related To Pharmacotherapy And Biotherapeutics.



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PROCESS EQUIPMENT AND PLANT DESIGN	18BT73X	CO1	Explain The Steps Involved In The Process Design, General Design Considerations, And Different Costs.
		CO2	Describe The Feasibility Of Capital Investment For The Process Development, Depreciation Costs For Taxes, Profitability, Financial Statements, And Reports Based On Cash Flow Diagrams
		CO3	Determine Capital Investment Based On Different Types Of Costs, Depreciation, And Taxes For The Cost Equivalence.
		CO4	Distinguish The Types Of Capital Investment, Factors Affecting Total Product Costs, And Profitability Of The Process
TISSUE ENGINEERIN G	18BT74X	CO1	Demonstrate An Understanding Of The Clinical Need For Stem Cell Therapy And Tissue Engineering In Regenerative Medicine.
		CO2	Apply The Principles Of Cellular And Tissue Engineering To Theoretically Develop Processes For The Production Of Biologics And Tissue Engineered Medical Devices.
		CO3	Analyze And Describe The Interactions Of Biomaterials With The Biological Environment – Stability, Corrosion, Histo-Cyto- And Hemo-Compatability; Explain How These Interactions Are Assessed And Influenced By Material Choice And Modification.
		CO4	Compare And Evaluate Scientific Literature To Inform Design Of Biologics And Tissue Engineered Medical Devices.
BIOTECHNOL OGY FOR SUSTAINABL E ENVIRONME NT	18BT75X	CO1	Understand The Source Of The Pollution, The Source And Reasons For The Causes Of Pollution. Outline The Techniques Used For Treating And Filtering Water To Make It Portable. Gain Knowledge On Biofuels And Understand The Importance Of Biofuels Over Conservative Fuels
		CO2	Apply The Knowledge To Choose The Right Biotechnological Process To Provide A Sustainable Environment
		CO3	Analyze And Suggest Water Treatment And Solid Waste Management Methods, The Characteristics Of Wastewater/ Solid Waste Samples And Various Filtration Techniques
		CO4	Interpret The Importance Of Biofuels And Methods To Conserve Fuels.
BIOPROCESS ENGINEERIN G LABORATOR	18BTL76	CO1	List And Describe The Basic Requirements Of Downstream Processing For Biochemical Product Recovery
		CO2	Apply The Techniques Of Separation And Isolation Of



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Y			Various Biological Compounds From Tissue Sources.
		CO3	Illustrate The Emerging Technologies That Would Benefit The Biochemical Product Recovery And Show The Likely Benefits It Would Have Over The Traditional Operations
		CO4	Analyze And Interpret The Effects Of Enzyme Catalysts In Bioprocess Experimanets
PROJECT WORK PHASE -1	18BTP77	CO1	Identify A Research Problem And Frame Objectives Based On The Review Of Literature
		CO2	Apply Relevant Methodologies For Addressing Afore Mentioned Objectives.
		CO3	Analyze And Evaluate The Experimental Results And Propose Suitable Modifications To Achieve Expected Outcomes.
		CO4	To Develop Team Building Capability And Communicate Effectively To Scientific Community.
REGULATOR Y AFFAIRS IN BIOTECH INDUSTRY	18BT81	CO1	Understand Existing Regulations To Ensure Quality On The BT Industry And The Ethical Implications
		CO2	Apply Validation Tools To Various Processes Of The BT Industry
		CO3	Analyze Risk And Conformity In Various Processes Of The BT Industry
		CO4	Implement Quality Management System For BT Industry
ENVIRONME NTAL BIOTECHNOL OGY	18BT821	CO1	Enumerate The Effects, Impacts And The Regulation Pertaining To Environmental Issues.
		CO2	Illustrate The Effect Of Microorganisms Involved In The Betterment Of Environmental Issues And Other Applications.
		CO3	Analyze The Various Processes Of Pollutions And Its Impact On Natural Resources.
		CO4	Appraise Case-Studies Representative Of Key Areas Of Environmental Biotechnology And Draw Appropriate Conclusions
PROJECT WORK PHASE-2	18BTP83	CO1	Identify The Research Problem
		CO2	Frame Objectives Based On The Review Of Literature
		CO3	Apply Relevant Methodologies For Addressing Afore Mentioned Objectives.
		CO4	Analyze And Evaluate The Experimental Results And Propose Suitable Modifications To Achieve Expected Outcomes.
		CO5	To Develop Team Building Capability And Communicate Effectively To Scientific Community.
TECHNICAL SEMINAR	18BTS84	CO1	Select Recent Advances In A Specific Field By Performing A Comprehensive Literature Survey.
		CO2	Identify The Problem, Compare The Different Solution



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			Methods For The Same.
		CO3	Discuss The Development Of Methodology, Impact On Society, And Future Scope.
		CO4	Communicate Technical Content Effectively Through Written And Oral Presentations.
INTERNSHIP	18BTI85	CO1	Demonstrate Sound Technical Knowledge In The Chosen Domain Through Skill Up Gradation.
		CO2	Correlate The Knowledge Gained For Different Applications Scenarios.
		CO3	Work As Individual Or As Good Team Player In An Organization.
		CO4	Communicate Technical Content Effectively Through Written And Oral Presentations.