

DEPARTMENT OF BIOTECHNOLOGY AND BIOCHEMICAL ENGINEERING

Course outcomes

SEMESTER - 1 & 2

Course code	Course Name	Course outcomes	Program Outcomes (POs)												
			1	2	3	4	5	6	7	8	9	10	11	12	
MAT 101	LINEAR ALGEBRA AND CALCULUS	CO 1	solve systems of linear equations, diagonalize matrices and characterise quadratic forms	3	3	3	3	2	1			1	2		2
		CO 2	compute the partial and total derivatives and maxima and minima of multivariable functions	3	3	3	3	2	1			1	2		2
		CO 3	compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas	3	3	3	3	2	1			1	2		2
		CO 4	perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent	3	2	3	2	1	1			1	2		2
		CO 5	determine the Taylor and Fourier series expansion of functions and learn their applications.	3	3	3	3	2	1			1	2		2
PHT 110	ENGINEERING PHYSICS B (FOR NON-CIRCUIT BRANCHES)	CO 1	Compute the quantitative aspects of waves and oscillations in engineering systems.	3	2							1	2		1
		CO 2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments	3	2							1	2		1
		CO 3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.	3	2							1	2		1
		CO 4	Apply the knowledge of ultrasonics in non-destructive testing and use the principles of acoustics to explain the nature and characterization of acoustic design and to provide a safe and healthy environment	3								1	2		1
		CO 5	Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications	3	2							1	2		1

		CO 9	Describe the working of hydraulic machines	3	2														
		CO 10	Explain the working of power transmission elements	3	1														
		CO 11	Describe the basic manufacturing, metal joining and machining processes	3															
EST 130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO 1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits	3	1												2		
		CO 2	Develop and solve models of magnetic circuits	3	1													2	
		CO 3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state	3	1														2
		CO 4	Describe working of a voltage amplifier	2															
		CO 5	Outline the principle of an electronic instrumentation system	2															2
		CO 6	Explain the principle of radio and cellular communication	2															
		CO 1	Define and Identify different life skills required in personal and professional life							2		1	2	2	1		3		
		CO 2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.										3				2		
		CO 3	Explain the basic mechanics of effective communication and demonstrate these through presentations.							1			1	3					

HUN 101	LIFE SKILLS	CO 4	Take part in group discussions											3		1	
		CO 5	Use appropriate thinking and problem solving techniques to solve new problems		3		2	1									
		CO 6	Understand the basics of teamwork and leadership						1				3				
MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	CO 1	Compute the derivatives and line integrals of vector functions and learn their applications	3	3	3	3	2	1				1	2		2	
		CO 2	Evaluate surface and volume integrals and learn their inter-relations and applications	3	3	3	3	2	1				1	2		2	
		CO 3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients	3	3	3	3	2	1				1	2		2	
		CO 4	Compute Laplace transform and apply them to solve ODEs arising in engineering	3	3	3	3	2	1				1	2		2	
		CO 5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering	3	3	3	3	2	1				1	2		2	
HUN 102	PROFESSIONAL COMMUNICATION	CO 1	Develop vocabulary and language skills relevant to engineering as a profession											3		2	
		CO 2	Analyze, interpret and effectively summarize a variety of textual content											1		3	
		CO 3	Create effective technical presentations						1				1	3			
		CO 4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus											3		1	

		CO 5	Identify drawbacks in listening patterns and apply listening techniques for specific needs		1							2	3				
		CO 6	Create professional and technical documents that are clear and adhering to all the necessary conventions	1					1			1	3				
EST 102	PROGRAMING IN C	CO 1	Analyze a computational problem and develop an algorithm/flowchart to find its solution	*	*	*		*					*	*	*		
		CO 2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.	*	*	*	*							*		*	
		CO 3	Write readable C programs with arrays, structure or union for storing the data to be processed	*	*	*	*								*		*
		CO 4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem	*	*	*	*								*	*	*
		CO 5	Write readable C programs which use pointers for array processing and parameter passing	*	*		*								*		*
		CO 6	Develop readable C programs with files for reading input and storing output	*	*		*								*		*
PHL 120	ENGINEERING PHYSICS LAB	CO 1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories	3				3			1	2			1		
		CO 2	Understand the need for precise measurement practices for data recording	3				3			1	2				1	
		CO 3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations	3				3			1	2					1
		CO 4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics	3				3			1	2					1

		CO 5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results	3				3			1	2			1	
CYL 120	ENGINEERING CHEMISTRY LAB	CO 1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses	3				2							3	
		CO 2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs	3				3							3	
		CO 3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds	3				3							3	
		CO 4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis	3				3							3	
		CO 5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments	3				1							3	
		CO 6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum	3				1							3	
ESL 120	CIVIL & MECHANICAL WORKSHOP	CO 1	Name different devices and tools used for civil engineering measurements	1				1	1			2	2			
		CO 2	Explain the use of various tools and devices for various field measurements	1				1	1			2	2			
		CO 3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work	1				1	1			2	2	2	1	
		CO 4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.	1				1	1			2	2	2	1	1
		CO 5	Compare different techniques and devices used in civil engineering measurements	1				1	1				2	2		1

		CO 6	Identify Basic Mechanical workshop operations in accordance with the material and objects	1																
		CO 7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades	2																
		CO 8	Apply appropriate safety measures with respect to the mechanical workshop trades	2																
ESL 130	ELECTRICAL & ELECTRONICS WORKSHOP	CO 1	Demonstrate safety measures against electric shocks							3								1		
		CO 2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	2														1		
		CO 3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings	2			1		1			1		2		2			2	
		CO 4	Identify and test various electronic components	3																2
		CO 5	Draw circuit schematics with EDA tools	3					2											2
		CO 6	Assemble and test electronic circuits on boards	3					2											1
		CO 7	Work in a team with good interpersonal skills													3		2		2
SEMESTER - 3																				
Course code	Course Name	Course outcomes			Program Outcomes (POs)															
					1	2	3	4	5	6	7	8	9	10	11	12				
		CO 1	Understand the concept and the solution of partial differential equation.	3	3	3	3	2	1									2		2

MAT201	PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS	CO 2	Analyse and solve one dimensional wave equation and heat equation.	3	3	3	3	2	1				2		2	
		CO 3	Understand complex functions, its continuity differentiability with the use of CauchyRiemann equations.	3	3	3	3	2	1					2		2
		CO 4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function	3	3	3	3	2	1					2		2
		CO 5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals.	3	3	3	3	2	1					2		2
BTT201	BIOPROCESS CALCULATIONS	CO 1	problem solving.	2	3		-	-	-	-	-	1	-	-	1	
		CO 2	Solve the material balance and energy balance equations for unit operations and unit processes in bioprocess engineering	2	3	1	-	-	-	-	-	2	-	-	-	2
		CO 3	Formulate growth medium based on stoichiometry and elemental balances.	2	3	1	-	-	-	-	-	-	-	-	-	-
		CO 4	Calculate heat of reaction for microbial growth and product formation	2	3	1	-	-	-	-	-	-	-	-	-	-
BTT203	MICROBIOLOGY	CO 1	microorganisms	-	-	2	2	-	2	2	-	-	-	-	-	
		CO 2	Describe the diversity of microorganisms and methods to control their growth	-	-	2	2	-	2	2	-	-	-	-	-	
		CO 3	Demonstrate that microorganisms have a vital role in the environment	-	-	2	2	-	3	3	-	-	-	-	-	

		CO 4	Cite examples of the vital role of microorganisms in the industries important to human well being.	-	-	2	2	-	3	3	-	-	-	-	-
BTT205	FLUID FLOW AND PARTICLE TECHNOLOGY	CO 1	Compute the fluid properties associated with principles of fluid statics and dynamics of fluid flow.	3	3	-	-	-	2	-	-	-	-	-	2
		CO 2	Use basic momentum and energy balance equations in specific domains of frictional flow/boundary layer flow of incompressible fluids in pipe flow.	3	3	2	-	-	2	-	-	-	-	-	-
		CO 3	Explore the fluid moving machineries and principles of flow measurement in different flow metering equipments	3	3	2	-	-	2	-	-	-	-	-	2
		CO 4	Examine the equipments for size reduction of solids, particle size analysis methods and solid liquid separation processes	3	3	-	-	-	2	-	-	-	-	-	2
EST 200	DESIGN AND ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering.	2	1					1			1		
		CO 2	Apply design thinking while learning and practicing engineering.		2				1		1				2
		CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.			2			1	1		2	2		1
HUT 200	PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.								2			2	
		CO 2	Adopt a good character and follow an ethical life.								2			2	
		CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.								3			2	

		CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.								3			2			
		CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.								3			2			
MCN201	SUSTAINABLE ENGINEERING	CO 1	Understand the relevance and the concept of sustainability and the global initiatives in this direction						2	3					2		
		CO 2	Explain the different types of environmental pollution problems and their sustainable solutions						2	3						2	
		CO 3	Discuss the environmental regulations and standards							2	3						2
		CO 4	Outline the concepts related to conventional and non-conventional energy							2	3						2
		CO 5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles							2	3						2
BTL201	MICROBIOLOGY LAB	CO 1	Demonstrate proper usage, identify the parts/functions of a bright field microscope and visually recognize the microscopic characteristics of bacteria	-	-	2	2	-	1	1	-	3	2	-	-		
		CO 2	Apply appropriate laboratory techniques and methodology for isolation, characterization, propagation and enumeration of microorganisms in a given sample	-	-	2	2	-	2	2	-	3	2	-	-		
		CO 3	Demonstrate an understanding and appreciation of the impact of microorganisms on agriculture, environment, ecosystem, energy, and human health	-	-	2	2	-	3	3	-	3	2	-	-		
		CO 4	Apply appropriate microbiology laboratory techniques, methodologies, instruments and equipment in accordance with current laboratory safety protocol	-	-	-	-	-	1	1	-	3	2	-	-		

BTL203	FLUID FLOW AND PARTICLE TECHNOLOGY LAB	CO 1	Determine fluid properties, particle size, characterize flows, measure pressure, calibrate flow measuring equipment, and analyze frictional flows by performing experiments in the laboratory.	3	3	-	3	2	-	-	2	2	2	-	-	
		CO 2	Design experiments and analyze/interpret data collected from experimental investigation in fluid statics and kinematics.	3	3	-	3	-	-	-	-	-	-	-	-	-
		CO 3	Use modern computing tools necessary for analysis of the experimental data in fluid statics and kinematics	3	3	-	3	2	-	-	-	-	-	-	-	-
		CO 4	Exhibit ethical principles in the engineering profession by practicing ethical approaches in experimental investigation, collection and reporting of data and adhering to the relevant safety practices in the laboratory.	3	3	-	3	-	-	-	2	-	-	-	-	-
SEMESTER - 4																
Course code	Course Name	Course outcomes	Program Outcomes (POs)													
			1	2	3	4	5	6	7	8	9	10	11	12		
MAT 202	PROBABILITY, STATISTICS AND NUMERICAL METHODS	CO 1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.	3	2	2	2	2						2	1	
		CO 2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena	3	2	2	2	2						2	1	
		CO 3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population	3	2	2	2	2						2	1	
		CO 4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques	3	2	2	2	2						2	1	
		CO 5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.	3	2	2	2	2						2	1	

BTT202	CHEMICAL AND BIOLOGICAL REACTION ENGINEERING	CO 1	Estimate the kinetics for chemical and biological reactions	3	2	3	-	2	2	1	-	-	-	-	-
		CO 2	Analyze the performance of Batch and Continuous reactors and recommend modifications for improvement	3	2	2	1	-	3	3	-	-	-	-	-
		CO 3	Predict the conversion for ideal and non-ideal reactors	3	2	2	2	-	2	2	-	-	-	-	-
		CO 4	Explain the nature of catalytic reactions with regard to the multiple steps of mass transfer and surface reaction and the concept of rate limiting step	3	2	1	1	-	3	3	-	-	-	-	-
BTT204	PRINCIPLES OF BIOCHEMISTRY	CO 1	Describe the role of cellular chemicals and their functions.	3	-	3	2	-	3	-	-	-	-	-	2
		CO 2	Describe biosynthetic pathways and understand the key aspects of metabolism.	3	-	3	2	-	3	-	-	-	-	-	2
		CO 3	Explain cellular energy requirements and how energy is utilized by a cell.	3	-	3	2	-	2	-	-	-	-	-	2
		CO 4	Understand the behaviour of enzymes and their kinetics.	3	-	3	2	-	2	-	-	-	-	-	2
BTT206	BIOPROCESS ENGINEERING	CO 1	Illustrate the isolation and preservation of microorganism and development of inoculums.	-	-	3	-	-	-	3	-	-	3	-	3
		CO 2	Summarize medium and air sterilization methods	-	-	3	-	-	-	-	2	-	3	-	3
		CO 3	Elucidate the mass transfer effects in bioreactors	-	-	-	-	-	-	-	-	-	3	-	-

		CO 4	Outline bioreactor scale up and scale down procedures	3	-	3	-	-	-	-	-	-	3	-	3	
EST 200	DESIGN AND ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering.	2	1					1			1			
		CO 2	Apply design thinking while learning and practicing engineering		2				1		1					2
		CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.			2			1	1		2	2			1
HUT 200	PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.									2			2	
		CO 2	Adopt a good character and follow an ethical life.								2				2	
		CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.									3				2
		CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.									3				2
		CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.									3				2
		CO 1	Explain the background of the present constitution of India and features						2	2	2			2		
		CO 2	Utilize the fundamental rights and duties.						3	3	3			3		

BTT305	MOLECULAR BIOLOGY	CO 3	Understand the basic mechanisms involved in mutagenesis	2	3	2	3	-	-	-	-	-	-	-	-	
		CO 4	Articulate the role of gene organization and gene regulation in prokaryotes and eukaryotes	3	2	2	2	-	-	-	-	-	-	-	-	-
BTT307	THERMODYNAMICS AND HEATTRANSFER	CO 1	Apply the laws of thermodynamics on biochemical reactions	3	2	2	2	-	2	2	-	-	-	-	-	
		CO 2	Comprehend the basic principles involved in the mechanism of heat transfer	3	2	2	2	-	2	2	-	-	-	-	-	
		CO 3	Evaluate the rate of heat transfer and area of heat transfer	3	3	2	3	-	3	2	-	-	-	-	-	
		CO 4	Analyze the performance of heat exchange equipments	3	3	2	3	-	3	3	-	-	-	-	-	
MCN 301	DISASTER MANAGEMENT	CO 1	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle (Cognitive knowledge level)		2				2				2		2	
		CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level)	2	3	2		2	2	3				3		2
		CO 3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level)	2	3	2	2	2	2	3				3		2
		CO 4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community (Cognitive knowledge level)	3	3	3		2	2	3						2
		CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level:	3	3			2	2	3						2

		CO 6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level)	3					2	3	3				2	
HUT 310	MANAGEMENT OF ENGINEERS	CO 1	Explain the characteristics of management in the contemporary context	2				1	2	2	2		2	1	1	
		CO 2	Describe the functions of management	2				1	1		2	1	2	1	1	
		CO 3	Demonstrate ability in decision making process and productivity analysis	2	2	2	2	1								
		CO 4	Illustrate project management technique and develop a project schedule	2	2	2	2	1						2	1	
		CO 5	Summarize the functional areas of management	2					1	1			1	2	1	
		CO 6	Comprehend the concept of entrepreneurship and create business plans		2	2	2	1	1	1	1	1	1	1	1	1
BTL331	BIOPROCESS ENGINEERING LAB	CO 1	Development of an ability to design and conduct bioprocess experiments as well as to analyze and interpret data.	3	3	-	3	2	-	-	3	3	3	3	-	
		CO 2	Calculate the kinetic parameters of enzymatic reactions as well as microbial growth	3	3	-	3	-	-	-	-	-	-	-	-	-
		CO 3	Development of research attitude and technical skills to secure a job in bioprocess labs.	3	3	-	3	2	-	-	3	3	3	3	-	3
		CO 4	Exhibit ethical principles in the engineering profession by practicing ethical approaches in experimental investigation, collection and reporting of data and adhering to the relevant safety practices in the laboratory.	3	3	-	3	-	-	-	3	-	-	3	-	-

BTL333	MOLECULAR BIOLOGY LAB	CO 1	Demonstrate knowledge and understanding of the principles behind the important techniques in molecular biology.	3	3	-	3	2	-	-	-	3	3	-	-
		CO 2	Apply the knowledge in understanding the applications of the techniques in molecular biology.	3	3	-	3	2	-	-	-	3	3	-	-
		CO 3	Analyze and interpret the results of the laboratory experiments performed.	-	-	-	2	-	-	-	-	3	3	3	2
		CO 4	Exhibit the awareness of the hazardous chemicals and safety precautions in case of emergency.	-	-	-	3	-	3	3	2	3	3	-	-
SEMESTER - 6															
Course code	Course Name	Course outcomes	Program Outcomes (POs)												
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BTT302	BIOINFORMATICS	CO 1	Differentiate various biological databases.	-	-	-		3	-	-	-	-	-	-	-
		CO 2	Infer the terminologies and concepts in the field.	-	-	2	2	2	-	-	-	-	-	2	2
		CO 3	Generate and interpret the sequence alignment and implement the scoring matrices.	-	-	2	2	2	-	-	-	-	-	2	-
		CO 4	Articulate the different bioinformatics tools.	-	-	2	2	3	2	-	-	-	-	2	2
		CO 1	Describe the principles that underlie major unit operations used in downstream processing of biotechnological and biopharmaceuticals	-	-	3	2	-	2	-	-	-	-	-	
		CO 2	Define and carry out separation and purification of fermentation products	-	-	2	2	-	2	-	-	-	-	-	

BTT304	DOWNSTREAM PROCESSING	CO 3	Integrate biological and engineering principles involved in the production and recovery of commercial products.	-	-	3	2	-	2	-	-	-	-	2	-
		CO 4	Design and formulate effective strategies of downstream processing based on characteristics of biomolecules	-	-	3	3	3	2	-	-	-	-	2	-
		CO5	Analyse the quality and characteristics of the purified product	-	-	2	2	-	2	-	-	-	-	-	-
		CO6	Demonstrate the suitable downstream approaches comprising of new concepts and emerging technologies	-	-	3	3	3	2	-	-	-	-	-	-
BTT306	BIOREACTOR CONTROL AND INSTRUMENTATION	CO 1	Elucidate all relevant terms related to conventional process control	3	2	2	2	-	-	-	-	-	-	-	-
		CO 2	Model simple systems and solve the mathematical equations using Laplace transforms	3	2	2	2	-	-	-	-	-	-	-	-
		CO 3	Explain the various sensors in bioreactors	3	3	-	-	-	-	-	-	-	-	-	-
		CO 4	Analyze the stability of open loop and closed loop systems and tune the controller	3	3	2	3	-	-	-	-	-	-	-	-
BTT312	PROGRAM ELECTIVE I ANIMAL & PLANT CELL TECHNOLOGY	CO 1	Disseminate and inculcate knowledge of various plant and animal tissue culture techniques.	-	-	-	-	-	2	3	2	-	-	-	3
		CO 2	Analyse different medias for cell culture.	-	-	-	-	-	2	3	2	-	-	-	3
		CO 3	Integrate biological and engineering principles in gene transfer methods	-	-	-	-	-	2	3	2	-	-	-	3

		CO 4	Appraise the aspects of various products obtained through cell culture technologies."	-	-	-	-	-	2	3	2	-	-	-	3		
HUT 300	INDUSTRIAL ECONOMICS & FOREIGN TRADE	CO 1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare	2											3		
		CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production.	2	2			2	2	3						3	
		CO 3	Determine the functional requirement of a firm under various competitive conditions.	2	2	1											3
		CO 4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.	2	2	1			1								3
		CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm	2	2	1											3
BTT308	COMPREHENSIVE COURSE WORK 1	CO1	Confidently prepare for competitive examinations in Biotechnology Engineering like GATE.	2	1				2								
		CO2	Comprehend the core principles and technologies in Biotechnology Engineering and answer multiple choice questions based on them with confidence	3	2		1		2				2			1	
		CO3	Communicate effectively with scientists and faculties in an academic environment.	2	1				2					3			
		CO4	Relate and analyze the comprehensive knowledge gained by him/her in the core courses to the field of Biotechnology Engineering	3	3		1	1	2								2
		CO1	To strengthen fundamental understanding of the unit operations involved in the separation and purification of a biological product.	-	3	-	3	2	-	-	2	2	2	-	-		

BTL332	DOWNSTREAM PROCESSING LAB	CO2	Learn various cell disruption techniques.	-	3	-	3	-	-	-	-	-	-	-	-	
		CO3	Understand techniques of bulk product / protein isolation and purification.	2	3	-	3	2	-	-	-	-	-	-	-	
		CO4	Acquire knowledge in biochemical engineering reactions along with purification of desired products		3	-	3	-	-	-	2	-	-	-	-	
BTL334	HEAT AND MASS TRANSFER LAB	CO 1	Identification of transport properties of liquids and gases	3	2	2	-	-	-	-	2	3	2	-	2	
		CO 2	Analyze the transport processes and equipment	2	2	2	-	-	-	-	2	3	3	-	2	
		CO 3	Identify suitable equipment for the given separation	2	2	2	-	-	2	-	2	3	3	-	2	
		CO 4	Analyze performance of various heat transfer equipment	2	2	2	-	-	2	-	2	3	3	-	2	
SEMESTER - 7																
Course code	Course Name	Course outcomes				Program Outcomes (POs)										
						1	2	3	4	5	6	7	8	9	10	11
BTT401	PROCESS EQUIPMENT AND PLANT DESIGN	CO 1	Illustrate the basics of process plant design, flow sheeting, P & ID and plant Safety.	2	2	2	2	1	2	2	-	-	-	-	-	
		CO 2	Calculate the different parameters associated with the process design of heat transfer equipment such as heat exchangers, evaporators and condensers.	3	3	3	2	1	-	1	-	1	-	-	-	
		CO 3	Calculate the different parameters associated with the process design of mass transfer equipment such as distillation column and absorption column.	3	3	3	2	-	-	1	-	1	-	-	-	

BTQ413	SEMINAR	CO 1	Identify the current topics of professional interest.	2	2	1	1		2	1					3						
		CO 2	Develop skill in doing literature survey, report preparation and technical presentation.	3	3	2	3		2	1						3					
		CO 3	Develop oral and written communication skill and confidence level.	3	2			3			1		2			3					
		CO 4	Apply skill in exploring the data sources.	3				2			1		3			3					
		CO 5	Demonstrate skills in participating in discussion to confidence level"CO 5 Demonstrate skills in participating in discussion to confidence level"	3	3	3	3	2	2		2		3			3					
BTD415	PROJECT PHASE I	C01	Identify and synthesize problems, and propose the methodology for their solution.	2	2	2	1	2	2	2	1	1	1	1	2						
		C02	Prepare work plan, liaison with the team and complete the task as per schedule.	2	2	2		1	3	3	1	1			1	1					
		C03	Analyze and interpret the results obtained.										3	2	2	1					
		C04	Validate the results by theoretical and experimental means.					2			3	2	2	3		2					
		C05	Communicate technical information by means of written and oral reports"	2	3	3	1	2								1					
SEMESTER 8																					
Course code	Course Name	Course outcomes								Program Outcomes (POs)											
										1	2	3	4	5	6	7	8	9	10	11	12

