Course outcomes of Chemical Engineering

Semester-I

Course Code	BTEC101
Course Name	Basics of Electrical and Electronics
	CO
CO1	Understand the basics of Electrical Engineering
CO2	Understand the applications of electrical components
CO3	Analyze the use and importance of electrical machines in industries
CO4	Understand how industries are working with electrical machines
CO5	Apply test equipment's in electrical projects.
Course Code	BTMA103
Course Name	Mathematics-I
	CO
CO1	Apply the concepts of limits, continuity and derivatives to solving problems.
CO2	Determine convergence or divergence of sequences and series
CO3	Use Taylor and MacLaurin series to represent functions. Solve application problems
CO4	Understand functions of several variables, limits, continuity, partial derivatives.
CO5	To deal with functions of several variables that is essential in most branches of engineering. The essential tool of matrices and linear algebra in a comprehensive manner.
Course Code	BTCS104
Course Name	Computer Programming-I
	CO
CO1	Understanding of basic components of programming language
CO2	Understand any other programming language with the knowledge of array and string.
CO3	Apply function concepts in real time application.
CO4	Analyze working of structure in c or otherprogramming language programs.
CO5	Develop applications using C programming

Course Code	BTPY105
Course Name	Engineering Physics
	CO
CO1	Familiarize with basics of Noise, Vibrations and Oscillations
CO2	Inculcate fundamental knowledge of Electromagnetism and its engineering applications
CO3	Develop basic understanding for different applications of optical phenomena
CO4	Embrace optical technologies and understand their functioning
CO5	Familiarize with introductory quantum physics and its importance
Course Code	BTFS108
Course Name	Fundamentals in Fire & Environment, Health, Safety
	CO
CO1	Understand concept of industrial safety
CO2	Evaluate the risk by qualitative risk assessment
CO3	Understand environmental pollution and control measures
CO4	Understand principles of fire
CO5	Understand advanced firefighting system
Course Code	AECC101
Course Name	Fundamentals of English
	CO
CO1	To emphasize the development of listening and reading skills among learners
CO2	To equip them with writing skills needed for academic as well as workplace context
CO3	To enable learners of Engineering and Technology develop their basic communication skills in English
CO4	To strengthen the fundamentals in English Language.
CO5	To build up the confidence to communicate with the world.

Course Code	BTME106
Course Name	ENGINEERING WORKSHOP PRACTICES
	CO
CO1	To give basic training on fitting, carpentry, sheet metal, machine shop, and black smithy.
CO2	To enable students to understand and practice joining techniques
CO3	To train students to handle various machine tools.
CO4	To enable students to understand basic mechanical engineering concepts.
CO5	To enable students to fabricate components with their own hands.

Semester-II

Course Code	BTEC201
Course Name	Engineering Fundamentals
	CO
CO1	CO1:To provide Basic knowledge of Engineering Material
CO2	CO2:To provide Basic knowledge of Thermodynamics, heat engines
CO3	CO3:To provide Basic knowledge of Engineering equipment
CO4	CO4:To provide Basic knowledge of Measurement
CO5	CO5:To provide Basic knowledge of Production
Course Code	BTME202
Course Name	Engineering Graphics
	CO
CO1	CO1 - Understand the fundamentals of engineering graphics and remember the basic rules of dimensioning and labelling
CO2	CO2 - Develop the ability to learn fundamental of CAD software and its use to solve engineering problems
CO3	CO3 - Comprehend the concept of projection and use it to represent the views on reference planes.
CO4	CO4 - Apply the technical communication skill for 3-dimensional geometries in the form of 3D models using isometric projection
CO5	CO5 - Analyze the orientation of geometrical bodies with respect to re

Course Code	BTMA203
Course Name	MATHEMATICS-II
	CO
CO1	Knowledge of Identifying and solve some ordinary differential equations
CO2	To evaluate some experiments, form ordinary differential equation
CO3	Analyse and solve engineering problems using Statistics
CO4	Apply the multiple integration in the area of engineering.
CO5	Evaluate vector valued function in the area of vector calculus.
Course Code	BTME204
Course Name	Engineering Mechanics
	CO
CO1	Apply systematic engineering synthesis and design processes
CO2	Understand theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
CO3	Understand specialist bodies of knowledge within the engineering discipline.
CO4	Apply established engineering methods to complex engineering problem solving.
CO5	Evaluate the beam related problems
Course Code	BTCY205
Course Name	Engineering Chemistry
	CO
CO1	To understand hardness of water, its analysis and treatment along with its calculation
CO2	To understand various types of corrosion and its prevention techniques
CO3	To understand about fuels, its analysis, combustion and calculation of calorific value
CO4	To apply knowledge about various types of lubricants and its property determination
CO5	To understand the instrumental techniques for chemical analysis

Course Code	AECC201
Course Name	Communication Skills in English
	CO
CO1	To enable learners develop their basic communication skills in English.
CO2	To make them understand with writing skills needed for academic as well as workplace context.
CO3	To apply the subject knowledge for professional communication at world level.
CO4	To create corporate communicational attitude in students
CO5	To apply digital communication using technological modules and expertise.
Course Code	BTCS206
Course Name	COMPUTER PROGRAMMING-II
	CO
CO1	Identify/characterize/define a problem.
CO2	Design a program to solve the problem.
CO3	Create executable code.
CO4	Read most Python code and apply it.
CO5	Apply knowledge of the subject to write basic unit tests
Course Code	BTME207
Course Name	AutoCAD
	CO
CO1	Understand the basic commands of AutoCAD software.
CO2	Understand the concept of Computer Aided Drafting using AutoCAD software.
CO3	Apply basic concepts to develop construction (drawing) techniques
CO4	Apply basic concepts of the AutoCAD software
CO5	Understand and demonstrate dimensioning concepts and techniques

Semester-III

Course Code	BTMA301
Course Name	Mathematics-III
	CO
CO1	Understand functions involving complex numbers.
CO2	Compute some real improper integrals using techniques of complex functions.
CO3	Solve some most important partial differential equations occurring in engineering applications
CO4	Expand one variable functions in Fourier series.
CO5	Aplication of Laplace transform to find solution of initial values probles for linear ODE
Course Code	BTCH302
Course Name	Fluid Flow Operations
	CO
CO1	Understand the fundamentals of fluid flow phenomena.
CO2	Design of pipeline systems, Centrifugal pump and mixing systems.
CO3	Knowledge of metering devices.
CO4	Knowledge of fluidization.
CO5	Knowledge of compressible systems.
Course Code	BTCH303
Course Name	Applied Chemistry
	CO
CO1	Understand the various aspects of physical chemistry
CO2	Learning about electrochemistry
CO3	Students will learn about nuclear chemistry, nuclear reactor and its application in various power generation field
CO4	Understand about the green chemistry and the importance of it in various fields
CO5	Learn the various analytical methods used to determine property and quality of the material

Course Code	BTCH305
Course Name	Mechanical Operations
	CO
CO1	Understanding of various fundamental operations,Transportation and properties of solid particles
CO2	Application of operations include size reduction, and enlargement.
CO3	Design aspects of screening device and its understanding of its types.
CO4	Understanding of various separation operations and application of it.
CO5	Understanding of filteration operation and application of suitable filtration operation in process.
Course Code	AECC301
Course Name	Entrepreneurship Development
	CO
CO1	Develop skills for evaluating, articulating, refining, and pitching a new product or service offering.
CO2	Analyze the elements of success of entrepreneurial ventures.
CO3	Analyze Feasibility of the project (Financial and Non-Financial) and interpret business plan.
CO4	Develop present successful work, collaboration and division of tasks in a multidisciplinary and multicultural team.
CO5	understand the application of the tools necessary to create sustainable and viable Businesses.

Course Code	BTCH304
Course Name	Process Calculations
	CO
CO1	To list different system of units and dimensions with conversion
CO2	To describe concepts for expressing compositions and behavior of different gases and solutions
CO3	Students can able to sketch block diagrams of various chemical process and can solve material balance problems.
CO4	Students can use fundamentals of thermodynamics and can solve energy balance problems.
CO5	Student can use material balance and examine and solve complex problems of industries related.

Semester-IV

Course Code	BTCH401
Course Name	Chemical Engineering Thermodynamics - I
	CO
CO1	To understand the basic concepts of thermodynamics in chemical engineering so that students can solve chemical engineering problems
CO2	To analyse the energy balances for steady state and unsteady state processesT
CO3	To examine the solve energy transformation problems
CO4	To evaluate the thermodynamic properties of real gases using various PVT relationships and heat capacities data T
CO5	To apply knowledge of liquefaction and refrigeration using different power cycles
Course Code	BTCH401
Course Name	Heat Transfer Operations
	CO
CO1	Understand practical importance of heat transfer in industries
CO2	Able to identify applications of different heat exchanger in chemical industries.
CO3	Relating heat transfer concepts with heat transfer equipment used in industries
CO4	Students would be able to solve the problems in the engineering field related to chemical aspects.
CO5	Applications of different dimensionless numbers pertaining to heat transfer

Course Code	BTCH403
Course Name	Process Technology
	CO
CO1	Knowledge of Production methods of industrial acids, Base and Gases. Effect of process conditions on conversion and economics od the plant, various problems and troubleshooting of the process
CO2	Understanding of Production methods of Cement,glass and soaps.
CO3	Knowledge of Production methods of Pulp, paper sugar and indusrial alcohol, Material of construction and its application.
CO4	Understanding of production mothods and various problems and trouble shooting of the process associated with paint and dyes industries.
CO5	To Undestand Various types of fertilizers and their production methods.
Course Code	BTCH404
Course Name	Numerical Methods in Engineering
	CO
CO1	Understanding of common numerical methods and how they are used to obtain approximate solutions to non linear equations
CO2	Apply numerical methods to obtain approximate solutions to solve system of linear equations problems.
CO3	Analyse and evaluate the interpolation techniques.
CO4	Evaluate differential equations using numerical methods .
CO5	Derive least squares curve fitting procedures for linear and non linear curves.
Course Code	BTCH405
Course Name	Materials Science & Engineering
	CO
CO1	Understanding of various NDT techniques.
CO2	Interpret microstructures of ferrous – nonferrous metals.

CO3	Analyze different corrosion control techniques.
CO4	Select different material testing methods
CO5	Understanding of different composite materials.
Course Code	BTCH406
Course Name	Industrial Pollution Control
	CO
CO1	To list the types of the pollution and their sources with global effects on the environment.
CO2	To interpret the various environmental regulatory legislations.
CO3	To determine water quality through various tests to prevent water pollution.
CO4	To examine air quality though various advance equipment to prevent air pollution.
CO5	To analyze the characteristics of solid waste and its treatment & management.

Semester-V

Course Code	BTCH501
Course Name	Mass Transfer Operations-I
	CO
CO1	Understand practical importance of mass transfer in industries.
CO2	Able to identify applications of different separation techniques in chemical industries
CO3	Learn designing of mass transfer equipment used in industries.
CO4	Learn equilibrium condition for various systems.
CO5	Learn importance of Distillation and Gas absorption in industry.
Course Code	BTCH502
Course Name	Chemical Reaction Engineering-I
	CO
CO1	Understand kinetics of reactions and their influence on product yield and selectivity
CO2	Ability to perform the kinetic analysis for designing of ideal reactors

CO3	Analyze the size and performance on isothermal plug, mixed, and batch
CO4	Apply concept for designing of non isothermal reactor
CO5	Learn the non-ideality in the reactors
Course Code	BTCH503
Course Name	Chemical Engineering Thermodynamics-II
	CO
CO1	Understand the concept of estimating thermodynamic properties from the network of equations
CO2	Estimation and learning the impact of properties/partial properties affecting the solutions.
CO3	Understand chemical reaction equilibrium and various parameters affecting on it
CO4	Understand the fundamentals of phase equilibria and estimating VLE data for various systems.
CO5	Understand the LLE for binary system using LLE diagrams and the concept of SLE.
Course Code	BTCH504
Course Name	Instrumentation & Process Control
	CO
CO1	To enhance basic knowledge of process control mechanisms.
CO2	To describe the transfer functions for control system for various unit operations and processes (reactor, distillation column, etc.).
CO3	Student can able to interprit overall transfer function for a process and test its stability.
CO4	Select such a controller to reduce error in short times and stabilize the system in short time.
CO5	Understand working principles of basic various instruments available for flow, pressure, level and temperature measurement.

Course Code	AECC501
Course Name	**Disaster Risk Management**
	CO
CO1	Remember terminologies and concept of disasters
CO2	Understand framework and concept of disaster management cycle
CO3	Understand guidelines and policies of disaster management in India
CO4	Understand role of science and technology in disaster management
CO5	Evaluate various disaster case studies

Semester-VI

Course Code	BTCH601
Course Name	Mass Transfer Operations - II
	CO
CO1	Understand the basic concepts of various mass transfer operations
CO2	To select a suitable equipment for a given mass transfer operations
CO3	Learn designing of mass transfer equipment used in industries.
CO4	Learn equilibrium conditions for various systems
CO5	Gain knowledge about cooling towers and their importance in industries.
Course Code	BTCH602
Course Name	Process Equipment Design - I
	CO
CO1	Design process equipment and modify the design of existing equipment to new process conditions or new required capacity
CO2	Build a bridge between theoretical and practical concepts used for designing the equipment in any process industry.
CO3	Create understanding of equipment design.
CO4	Review the importance of design concepts in the process industry.
CO5	Review the importance of property estimation.

Course Code	BTCH603
Course Name	Chemical Reaction Engineering - II
	CO
CO1	Develop the kinetics of fluid-fluid reactions and use the appropriate kinetics in designing of non-catalytic reactors.
CO2	Develop rate expressions for gas-solid and liquid solid reactions and use the kinetics in desgining of non-catalytic reactors
CO3	Understand the physical properties of catalyst and its importance
CO4	Analyse the catalytic reactors and its applications in industry
CO5	Apply the concept of kinetic model to desing the catalytic reactor
Course Code	BTCH604
Course Name	Advanced Separation Techniques
	CO
CO1	Understand importance of advanced separation techniques in industries.
CO2	Able to identify applications of different separation techniques in chemical industries.
CO3	To utilize the advanced separation technique in problem solving where conventional techniques are not fruitful and require replacement.
CO4	Learn advantages and disadvantages of advanced separation techniques.
CO5	To select criterias for advanced separation techniques and conventional separation techniques.
Course Code	AECC601
Course Name	Indian Constitution
	CO
CO1	Understand importance of Indian constitution
CO2	Understand powers of state and union government
CO3	Understand administration of Indian Constitution

Course Code	BTCH605 A
Course Name	Petroleum Engineering
	CO
CO1	to understand the terminology, properties and classification of petroleum
CO2	to understand various refining aspects
CO3	to understand, the modern fractionation processes
Course Code	BTCH605 B
Course Name	Polymer Science & Technology
	CO
CO1	Understand the basic concepts of monomer, polymer, degree of polymerization, and repeating units and their properties
CO2	Understand in details about the chemistry, polymerization process and rheology of polymers.
CO3	Analyse polymers by different charaterization techniques
CO4	Apply plastic waste management knowledge
CO5	Select polymers for different applications
Course Code	BTCH605 D
Course Name	Industrial Management- I
	CO
CO1	To develop a student's skills in understanding the Intra-functional linkage of respective Units concepts and activities.
CO2	To understand the importance of critical data and its analysis, used in each Unit
CO3	It provides them overview and understand the theories and principles of modern management
CO4	To enhance their skills to achieve the desired goal in a more efficient and effective way with use facts/data
CO5	To encourage and make an appreciation of these principles in relation to their own experiences and selected case studies

Course Code	BTOE01
Course Name	**PLANT UTILITIES**
	CO
CO1	Student will be able to interpret the usage of water as utility across various applications in an industry.
CO2	Knowledge of utilization of air and various form of air utilization in industry
CO3	Understanding of application and means of generation of steam in industry
CO4	Understanding of refrigeration systems and its utilization in an industry.
CO5	Knowledge of implementing a venting system and vacuum system in an industry

Semester-VII

Course Code	BTCH701
Course Name	Process Modelling Simulation & Optimization
	CO
CO1	To have an understanding of computational techniques to solve the process models.
CO2	To Use process models based on conservation principles and process data.
CO3	Use optimization as a tool in process design and operation.
CO4	Get proficient in the applications of optimization for optimizing important industrial processes
CO5	Work on professional simulation software such as ASPEN PLUS, GAMS, HYSIS, CHEMCAD and MATLAB which will make them ready for industry.
Course Code	BTCH702
Course Name	Plant Design & Economics
	CO
CO1	Understanding of the plant design and will be able to select the process.
CO2	Design different auxiliaries and utility sections of process plant.
CO3	Design the overall plant layout.
CO4	Estimate the cost of a project.
CO5	Calculate breakeven point and will be able to do scheduling of a project plan.

Course Code	BTCH703
Course Name	Process Equipment Design-II
	CO
CO1	To understand the codes/standards for designing a process equipment in mechanical aspects
CO2	to understand about properties associated with material selection for construction of pressure vessels.
CO3	design aspects of supports and other peripherals required for pressure vessels
CO4	designing of a pressure vessel.
CO5	To understand sustainability of a process in terms of design aspects.
Course Code	BTCH704
Course Name	Chemical Process Safety
	CO
CO1	To learn about alarm management system implemented in industries
CO2	To do proper Hazard and operability studies.
CO3	To do proper fire & safety audits.
CO4	Learn to design relief valve and knockout drums.
CO5	To prepare case studies of major disasters
Course Code	BTCH705
Course Name	Transport Phenomena
	CO
CO1	Students would gain the knowledge of fundamental connections between the conservation laws in heat, mass, and momentum in terms of vector and tensor fluxes.
CO2	The students would be able to understand the mechanism of fluids in motion under different conditions
CO3	Recognize and apply analogies among momentum, heat and mass transfer.
CO4	Utilize information obtained from solutions of the balance equations to obtain Engineering quantities of interest.
CO5	to understand Mechanism of fluids in motion under different conditions

Course Code	BTCH706 A
Course Name	Petroleum Refining Processes
	CO
CO1	students will be able to understand the cracking process in refineries.
CO2	Able to understand the application and selection of catalyst in catalytic cracking processes.
CO3	Able to decide the process selection for a particular operation as well as parameters for the same.
Course Code	BTCH706 B
Course Name	Polymer Processing
	CO
CO1	Understand the need of additives and flow properties of polymer during processing
CO2	Apply knowledge of additives and formulation for producing different products
CO3	Analyse polymer using various characterization techniques.
CO4	Understand the various processing techniques of polymers to produce different products
CO5	Selection of process specific equipment, various dies, their working and designing aspects.
Course Code	BTCH706 D
Course Name	Industrial Management - II
	CO
CO1	To develop a student's skills in understanding the Intra-functional linkage of respective Units concepts and activities.
CO2	To understand the importance of critical data and its analysis, used in each Unit
CO3	It provides them overview and understand the theories and principles of modern management
CO4	To enhance their skills to achieve the desired goal in a more efficient and effective way with use facts/data
CO5	To encourage and make an appreciation of these principles in relation to their own experiences and selected case studies

Semester-VIII

Course Code	BTCH801
Course Name	Project
	CO
CO1	**Identify** clear and achievable objectives and plan theproject to achieve them.
CO2	**Demonstrate** the ability to pick the right methodologyfor the project and should be able to justify it.
CO3	**Demonstrate** the personal abilities and skills requiredto produce and present an extended piece of work.
CO4	**Demonstrate** the ability for analysis of the processand outcome.
CO5	**Show** initiative, enthusiasm and commitment to thetask.