

Chemical Engineering

COURSE OUTCOME

IInd Year

Course Name: Applied Mathematics

Course Outcomes:

CO1	Students' expertise in solving numerical methods, Laplace transforms, Fourier Transform & Z-transform.
CO2	Probability & probability Distribution and statistics are very useful.
CO3	Complex functions & vector calculus are backbone of future academics.
CO4	Applications of Numerical Analysis in further academics.
CO5	Laplace transform can be applied to further academics.
CO6	Mathematical abilities help to solve chemical engineering numericals.

Course Name: Process Instrumentation

Course Outcomes:

CO1	Students will get the knowledge about the instrumentation field.
CO2	Understands the operating principles, construction & working of temperature, pressure, level and flow measuring devices.
CO3	Student will get the knowledge about static & dynamic characteristics of instrument.
CO4	Student will get the basic knowledge of method of measurements.
CO5	Ability of selecting the most suitable measuring device based on its performance characteristics.
CO6	Ability of calibrating and maintaining measuring device elements.

Course Name: Strength of Materials

Course Outcomes:

CO1	Ability to understand the mechanical properties of materials.
CO2	Student will get the knowledge of different forces acting and bending theory on materials.
CO3	Ability to understand torsion and shear stress distribution on beam.
CO4	Ability to understand the strength of materials subjected to internal pressures.
CO5	Get the knowledge of strain energy and principal stresses.
CO6	Get the knowledge of deflection of the beams.

Course Name: Chemical Engineering Thermodynamics-I

Course Outcomes:

CO1	Ability to apply fundamental concepts of thermodynamics to engineering applications.
CO2	Ability to estimate thermodynamic properties of substances in gas and liquid states.
CO3	Capability to determine thermodynamic efficiency of various energy related processes.
CO4	Applied to design the chemical engineering equipments in processes.
CO5	Ability of application of thermodynamics to phase equilibria and reaction equilibria.
CO6	Applies thermodynamics to conversion devices.

Course Name: Process calculations**Course Outcomes:**

CO1	Ability to make material balances on unit operations and processes.
CO2	Ability to perform simultaneous material and energy balances.
CO3	To understand the degrees of freedom analysis and its significance.
CO4	To understand the concept of humidity and usage of psychrometric chart.
CO5	Develops the systematic problem solving skills.
CO6	Develops the capability of application of laws to different proportions.

Course Name: Fluid Flow Operation**Course Outcomes:**

CO1	Knowledge of basic principles of fluid mechanics.
CO2	Ability to analyze fluid flow problems with the application of the momentum and energy equations.
CO3	Capability to analyze pipe flows as well as fluid machinery.
CO4	Understands the working & principle of different flow meters.
CO5	Understands the working & principle of different pumps.
CO6	Understands the concepts of two-phase flow.

Course Name: Chemical Engineering Thermodynamics-II**Course Outcomes:**

CO1	Ability to apply fundamental concepts of thermodynamics to engineering applications.
CO2	Ability of application of thermodynamics to phase equilibria and reaction equilibria.
CO3	Applies thermodynamics to conversion devices.
CO4	Applied to design the chemical engineering equipments in processes.
CO5	Capability to determine thermodynamic efficiency of various energy related processes.
CO6	Ability to estimate thermodynamic properties of substances in gas and liquid states.

Course Name: Machine design and Drawing**Course Outcomes:**

CO1	Student will be able to identify & calculate different forces & stresses induced in the machine parts like gears, I C engine parts, couplings, pr vessels etc.
CO2	Student will be able to choose appropriate functions for different service conditions.
CO3	Student will be able to explain and formulate different optimization techniques
CO4	Student will be able to design various mechanical components e.g. belt, rope, chain, gears, C engine parts, couplings, pressure vessels etc.
CO5	Student will be able to understand the different types of joints.
CO6	Student will get knowledge of the machine design & drawing.

Course Name: Applied Physical Chemistry**Course Outcomes:**

CO1	Student gets knowledge of the thermodynamic properties of ideal and real solutions for the determination of the ions.
CO2	Ability to understand kinetic theory of the gases.
CO3	Ability to understand radiation chemistry and spectroscopy.
CO4	Ability to understand surface phenomena and catalysis.
CO5	Ability to understand chemical equilibrium and kinetics.
CO6	Ability to understand laws of thermodynamics

Course Name: Chemical Engineering Operation-I (Mechanical Operation)**Course Outcomes:**

CO1	Ability to understand fluid particle systems and equipment
CO2	Ability to select suitable size reduction equipment, solid-solid separation method and conveying system.
CO3	Ability to understand physical properties used for purification.
CO4	Understanding of fluid flow through packed and fluidized beds
CO5	Ability to select different solid fluid separation equipments.
CO6	Ability to analyze mixing processes using different types of mixers.

IIIrd Year Chemical Engineering**Course Name: C301 Heat Transfer Operations****Course Outcomes:**

CO1	Understands the concepts of heat transfer.
CO2	Understands mechanisms of conduction, convection and radiation.
CO3	Able to understand heat transfer in parallel & counter current flow.
CO4	Analyzes the performance of heat exchange equipments & evaporators.
CO5	Able to understand effect of heat transfer in boiling and evaporators.
CO6	To study components subjected to thermal loading.

Course Name: C302 Chemical Engineering Process-I**Course Outcomes:**

CO1	Study importance and components of chemical engineering.
CO2	Concepts of unit operations and unit processes.
CO3	Knows current scenario of chemical & allied process industries.
CO4	Understands the manufacturing of various inorganic chemicals.
CO5	Understands the process flow diagram and various process parameters.
CO6	Identifies and solve engineering problems during production.

Course Name: C303 Economics & Management**Course Outcomes:**

CO1	Understands the happenings in the field of economics & preliminary idea about management.
CO2	Performs & evaluate of present worth, future worth & annual worth analyses on one

	or more economic alternatives.
CO3	Performs & evaluate payback period & capitalized cost on one or more economic alternatives.
CO4	Carries out & evaluates benefit/cost, life cycle & break even analyses on one or more economic alternatives.
CO5	Makes economic analyses in the decision making process to justify or reject alternative/projects on economic basis.
CO6	Social awareness & Marketing strategy related to economics is evaluated.

Course Name: Material Science and Engineering

Course Outcomes:

CO1	Understands the atomic, molecular, crystalline & microscopic structures of engineering materials.
CO2	Predicts and controls material properties.
CO3	Develops the techniques, skills, and modern engineering tools necessary for engineering practice.
CO4	Understands the different corrosion types and properties.
CO5	To select the polymeric materials for equipments.
CO6	Understand the basic issues involved in polymer blends, composites and nanocomposites.

Course Name: Air Pollution Control

Course Outcomes:

CO1	Knows the sources, characteristics & effects of air pollution on living and non-living things.
CO2	Understand the atmospheric dispersion of air pollutants.
CO3	Meteorological factors affecting the air pollution.
CO4	Theory and development of pollution control devices
CO5	Understand environmental regulatory legislations and standards.
CO6	Principles & standards of air sampling.

Course Name: Chemical Engineering operation- II (Mass Transfer-I)

Course Outcomes:

CO1	Students will able to learn about the diffusional mass transfer
CO2	Students will able to understand interphase and different analogies of mass transfer
CO3	Student will be able to understand the mechanism of crystallization and absorption.
CO4	Student will be able to understand operation of drying .
CO5	Design and operation of the equipments can be understood.
CO6	To study recent developments in mass transfer operation.

Course Name: C307 Chemical Engineering Processes-II

Course Outcomes:

CO1	Students will able to study importance and components of chemical engineering.
CO2	Concepts of unit operations and unit processes.
CO3	Understands the manufacturing of various organic chemicals.
CO4	Understands the process flow diagram and various process parameters.

CO5	Identifies and solve engineering problems during production.
CO6	Knows current scenario of chemical & allied process industries.

Course Name: Computer Programming and Applications

Course Outcomes:

CO1	Finds the numerical solution of first order differential equation.
CO2	Finds the solutions to linear equations using different methods.
CO3	Finds the roots of the equation by Newton-Raphson method.
CO4	Designs algorithm for regression.
CO5	Understands the elements of optimization techniques.
CO6	Design programs involving decision structures, loops and functions.

Course Name: Process Equipment Design and Drawing

CO1	Knowledge of basics of process equipment design and important parameters of equipment design.
CO2	Knowledge of process equipment accessories & support systems.
CO3	Ability to design pressure vessels subjected to internal and external pressures.
CO4	Ability to design special vessels (e.g. tall vessels) and various parts of vessels (e.g. heads).
CO5	Knowledge of equipment fabrication and testing methods.
CO6	To study design of the piping system.

Course Name: Renewable Energy Sources

CO1	To Know the energy demand of world, nation and available resources to fulfill the demand.
CO2	To know current scenario of renewable energy sources.
CO3	To know about the exploration of nonconventional energy resources and their effective tapping technologies.
CO4	Understands the basic principles, unit operations and unit processes.
CO5	Effective utilization of available renewable energy resources.
CO6	Acquires the knowledge of modern energy conversion technologies.

IVth Year Chemical Engineering

Course Name: Chemical Engineering Operation-III (Mass Transfer-II)

CO1	Students will able to study separation by liquid- liquid Extraction
CO2	Students will able to study separation by leaching
CO3	Design calculation of distillation column
CO4	Design calculation of multi component distillation column
CO5	Design and operation of the equipments can be understood.
CO6	Recent developments in mass transfer operation.

Course Name: Chemical Reaction engineering-I

CO1	Develop rate laws for homogeneous reactions.
CO2	Design of ideal reactors for single and complex reactions.
CO3	Develop skills to choose the right reactor among single, multiple, recycle reactor, etc.
CO4	Design of multiple reactor system.
CO5	Design of non-isothermal reactors.
CO6	Design of recycle reactors.

Course Name: Process Dynamics & Control

CO1	Students will be able to model a physical process.
CO2	Students will be able to acquire knowledge of various controller designs, and methods of controller tuning.
CO3	Understands the advanced control techniques.
CO4	Students will be exposed to various complex control schemes, characteristics and application of control valves.
CO5	Understands the frequency response methods.
CO6	Understands the dynamics and control of chemical equipments.

Course Name: Industrial Waste Treatment

CO1	Understand the different types of wastes generated in an industry,
CO2	Understand the different unit operations and unit processes involved in conversion of highly polluted water to potable standards.
CO3	Understand about the quantification and analysis of wastewater and treatment.
CO4	Understand the disposal of water pollutants, and operating principles of control devices.
CO5	Understand advanced waste water treatment processes.
CO6	Understand environmental regulatory legislations and standards and climate changes.

Course Name: Plant Design and Project Engineering

CO1	Understand concepts of plant design and project engineering.
CO2	Synthesize feasible and optimum flow-sheet.
CO3	Estimation of capital investment, total product costs, and profitability.
CO4	Optimum design of equipments based on economics and process considerations.
CO5	Understands the replacement and maintenance analysis.
CO6	Understands inventory control and project management.

Course Name: Transport Phenomenon

CO1	To understand transport processes.
CO2	Understands mass, momentum and energy balance equations.
CO3	Ability to analyze industrial problems along with appropriate boundary conditions.
CO4	To understand the boundary layer and its equations.
CO5	Ability to do heat, mass and momentum transfer analysis.
CO6	To understand the mass transfer analogies.

Course Name: Chemical Reaction engineering-II

CO1	Ability to distinguish between various RTD curves and predict the conversion from a non-ideal reactor using tracer information.
CO2	Develop rate laws for heterogeneous reactions.
CO3	To understand the adsorption phenomena.
CO4	Design of reactors for non-catalytic and catalytic reactions.
CO5	Design of towers for gas-liquid operations with and without chemical reaction.
CO6	Designs different reactors.

Course Name: System Modelling

CO1	Understand the important physical phenomena from the problem statement
CO2	Develop model equations for the given system
CO3	Demonstrate the model solving ability for various processes/unit operations
CO4	Demonstrate the ability to use a process simulation
CO5	Ability to solve problems by using least square analysis.
CO6	Understand Correlation and Regression

Course Name: Petroleum Processing Technology

CO1	To introduce the petroleum refinery worldwide.
CO2	Develop knowledge of different refining processes.
CO3	Develop knowledge of safety and pollution control in the refining industries.
CO4	To find the suitable refining technology for maximizing the gasoline yield
CO5	To understand various catalytic conversion processes.
CO6	Understands different finishing and lube oil manufacturing process.