Vision:

To create centre of excellence for Chemical Engineering

Mission:

M1 To provide quality education in Chemical Engineering

M2 To study innovative applications to meet challenges of industries

M3 To encourage entrepreneurship and leadership to serve the society

Programme Educational Objectives (PEO's)

PEO 1: Inculcate the skills of teamwork, leadership and soft skills in Chemical Engineering Profession.

PEO 2: Create research culture, pursue higher education and inculcate entrepreneurship qualities.

PEO 3: Identify and solve problems by applying the knowledge of Chemical Engineering.

Program Outcomes (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO):

PSO 1: Gain and apply knowledge of mathematics, physics, chemistry and basic Chemical engineering courses for the benefit of society.

PSO 2: Acquire the skills to design analyze innovative physiochemical, biological processes, including the hazards associated with these processes.

PSO 3: Control and operate chemical processes within permissible standards.

SE Chemical

Mathematics III

Course Outcomes (COs)

Course Outcome	After successful completion of course student is able to
CO207004.1	Do mathematical modeling of systems using differential equations and solve the differential equations using appropriate method.
CO207004.2	Find Fourier, Inverse Fourier and Z transforms, use Z transforms to solve first and second order difference equation.
CO207004.3	Understand the different numerical methods and solve the problems choosing the most suitable method.
CO207004.4	Recognize nature of vector fields, use vector differential operators and evaluate vector integrals and its Applications.
CO207004.5	Analyze functions of complex variables in terms of continuity, differentiability and analyticity.

Chemistry –I

Course Outcomes (COs)

Course Outcome	After successful completion of course students are able to
CO 209341.1	Analyze the type of forces and synthesize the materials based on their properties
CO 209341.2	Estimate the kinetics of reaction and analyze the factors controlling the rate of reactions.
CO 209341.3	Analyze the given chemical substance by different Instrumentation techniques
CO 209341.4	Estimate the quantity of solute and synthesize the solution based on the properties.
CO 209341.5	Evaluate the mechanism of reactions and apply proper factor for increasing the yield of the desired product and Apply the basic concepts of dyes and synthesize industrially important dyes

Fluid Mechanics

Course Outcomes (COs)

Course Outcome	After successful completion of course students will able to
CO209342.1	Gain the basic concepts of fluid mechanics and their applications in Chemical Engineering.
CO209342.2	Recognize fluid statics and its applications related to pressure measuring devices in chemical industry.
CO209342.3	Analyze basic equations of fluid flow and their applications to determine fluid flow rate by different devices.
CO209342.4	Formulate mathematical equations for flow of fluid through different systems and determine different energy losses occurring in pipelines and develop relationships among process or system variables using dimensional analysis.
CO209342.5	Evaluate and study applications of different valves and pumps for transportation of fluid through pipelines.

Engineering Material

Course Outcomes (COs)

Course Outcome	After successful completion of course Students will be able to
CO209343.1	Execute the basic concepts of material science.
CO209343.2	Select materials based on properties for various applications.
CO209343.3	Differentiate methods for testing of materials and Experimental techniques.
CO209343.4	Implement applications of advance materials like Nano-materials and typical Engineering Materials.

Process calculation

Course Outcomes (COs)

Course Outcome	After successful completion of course student will able to-
CO209344.1	Evaluate the ideas in dimensional analysis and to be familiar with different unit systems and conversion from one set of system to another.
CO209344.2	Differentiate fundamentals of stoichiometry and apply the material balance concept and precisely to identify the amount of materials required to carry out the suitable unit operation or process.
CO209344.3	Evaluate the energy balance equation and to slove the energy requirements for the unit operation and process involved.
CO209344.4	Identify and solve stiochiometry aspects of unit operation and humidification and Combustion.

Introduction to chemical engineering

Course Outcomes (COs)

Course Outcome	After successful completion of course
CO 209345.1	Analyze the scope of Chemical engineering
CO 209345.2	Evaluation of differnt unit operations unit processes in Chemical industry.
CO 209345.3	Solve basic chemical calculations and Understand basic concept of chemical processes.
CO 209345.4	Evaluate process instrumentation and safety

Soft Skill

Course Outcomes (COs)

Course Outcome	After successful completion of course Students will be able to
CO209346 .1	Communicate, interact and present his ideas to the other professionals.
CO209346 .2	Aware of importance, role and contents of soft skills through instructions, knowledge acquisition, demonstration and practice.
CO209346 .3	Develop self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals.
CO209346 .4	Assess the requirements of a task, identifying the strengths within the team, utilizing the diverse skills of the group to achieve the set objective .

Chemistry II

Course Outcomes (COs)

Course Outcome	After successful completion of course students will be able to
CO 209347.1	Analyze the type of forces and synthesize the materials based on their properties
CO 209347.2	Estimate the kinetics of reaction and analyze the factors controlling the rate of reactions.
CO 209347.3	Analyze the given chemical substance by different Instrumentation techniques
CO 209347.4	Estimate the quantity of solute and synthesize the solution based on the properties.
CO 209347.5	Evaluate the mechanism of reactions and apply proper factor for increasing the yield of the desired product and apply the kinetics, thermodynamics and mechanism of useful compounds.

Chemical Engineering Thermodynamics I

Course Outcomes (COs)

Course Outcome	After successful completion of course Students will be able to
CO309345.1	Ability to apply fundamental concepts to engineering application and to estimate thermodynamic properties of substance in gas and liquid states.
CO309345.2	Determine the heat effects of industrial reactions, standard heat of formation, combustion.
CO309345.3	Apply the concept of second law of thermodynamic and entropy.
CO309345.4	Apply the criteria for chemical equilibrium and develop the power and refrigeration cycles.

Heat Transfer

Course Outcomes (COs)

Course Outcome	After successful completion of course student will able to
CO 209349.1	Get acquainted three modes of heat transfer such as conduction, convection and radiation.
CO 209349.2	Distinguish the concept of natural and forced convection with and without phase change of the fluids and their application in the process industries.
CO 209349.3	Identify the mechanism, industrial applications and design of heat exchangers.
CO 209349.4	Classify the types of evaporators with their principles and design the evaporators.

Mechanical Operation

Course Outcomes (COs)

Course Outcome	After successful completion of course student will able to
CO 209351.1	Differentiate of size reduction equipment and understand different crushing laws and Get acquainted to properties of particles and the separation technique and
CO 209351.2	Examine fluid-solid system type of thickeners and clarifiers.
CO 209351.3	Categorize types of mixing equipment's. and explain mixing and agitation of process fluid.
CO 209351.4	**Analyze** the basic concepts of filtration operation and Categorize types of filtration operations.

Principles of design

Course Outcomes (COs)

Course Outcome	After successful completion of course students will be able to
CO209349 .1	Apply various basic design concepts such as stress, strain, Young's modulus, Properties of materials under thermal, impact stresses.
CO209349 .2	Differentiate Design Preliminaries such as Shear force, bending, torsional moment, deflection, compound stresses, principal planes, theories of failure.
CO209349 .3	Design of shafts, keys coupling considering the different loads, stresses acting on them.
CO209349 .4	Design of thin and thick walled pressure vessels subjected to internal and external pressure, design of heads, closures flanges, nozzles associated with them.

TE Chemical

Mass Transfer I

Course Outcomes (COs)

Course Outcome	After successful completion of course
CO309342 .1	Students are able to understand the General principles of Mass Transfer and theories of mass transfer operations
CO309342.2	Students are able to understand mass transfer coefficient and theories of mass transfer
CO309342. 3	Students are able to understand the Gas Absorption operation and various gas liqu contact equipments
CO309342, 4	Student are able to know Humidification, Dehumidification and drying

Industrial organization and supervisory management

Course Outcomes (COs)

Course Outcome	After successful completion of course students will be able to
CO309343.1	Apply theories to improve the practice of management and understand scope of industrial management, principles of management, production planning, specifications and requirements.
CO 309343.2	Apply high ethical standards in the practice of engineering, including the responsibilities of the engineering profession towards people and the environment.
CO309343.3	Analyze the role of Motivation and Job satisfaction, stress management, Organizational culture, Leadership & group dynamics
CO309343.4	Apply the concept and various methods used in quality control management.
CO309343.5	Create models used for inventory control.

Chemical Process Technology

Course Outcomes (COs)

Course Outcome	After successful completion of course Students will be able to
CO309344.1	Recognize basics of **production process** for chemical compound.
CO 309344.2	Analyze Nitro- Phosphorous & Sulphur Industry and associated major engineering problems.
CO309344.3	Interlink detailed **production process** of Natural Chemicals, Sugar- Starch, Paper – Pulp and Fermentation industries with their major engineering problems.
CO309344.4	Delve of petroleum and petrochemical industry.

Chemical Engineering Thermodynamics II

Course Outcomes (COs)

Course Outcome	After successful completion of course will be able to
CO309345.1	Apply the terminology associated with engineering thermodynamic and have knowledge of contemporary issues related to chemical engineering thermodynamic
CO309345.2	Estimate the thermodynamic properties, such as enthalpies, entropies, Gibbs energies, fugacity coefficients, and activity coefficients of pure fluids as well as fluid mixtures
CO309345.3	Apply the concept of phase equilibria in two and multi component system
CO309345.4	Analyze the PVT behaviors of fluids and Ideal gas processes and predict intermolecular potential and excess property behavior of multicomponent system

Computer Aided chemical engineering I

Course Outcomes (COs)

Course Outcome	After successful completion of course
CO309346.1	**Apply the concepts of mathematics to find** different types of errors and roots of equations by using computer programming methods.
CO309346.2	**Create and program to solve** Linear Algebraic Equation to solve problems in Process Calculation, Heat Transfer and Fluid flow operation in chemical engineering.
CO309346.3	Get **acquainted** to analyze and evaluate the different ways to solve problems on regression analysis and interpolation on computer.
CO309346.4	**To predict the different ways by applying** knowledge of Ordinary Differential Equation and Finite Difference Method and optimization to solve problems of Process Calculation, Heat Transfer and Fluid flow operation in chemical engineering.

Chemical Engineering Mathematics

Course Outcomes (COs)

Course Outcome	After successful completion of course Student will be able to
CO309341.1	**Differentiate and evaluate** different types of errors and to find roots of equations by using various methods.
CO309341.2	**Analyze** and apply the knowledge of Linear Algebraic Equation to solve problems of Process Calculation, Heat Transfer and Fluid flow operation in chemical engineering.
CO309341.3	Get **acquainted** to solve problems on regression analysis and interpolation.
CO309341.4	**Application of** the knowledge of Ordinary Differential Equation and Finite Difference Method to solve problems of Process Calculation, Heat Transfer and Fluid flow operation in chemical engineering.
CO309341.5	**Understand** the basic concepts of optimization and its applications.

Chemical Reaction Engineering

Course Outcomes (COs)

Course Outcome	After successful completion of course student will be able to
CO309348.1	Experiment various types of reactions, kinetics and able to propose mechanism for given reaction.
CO309348.2	Implement rate equation and performance equation for reactions of different orders.
CO309348.3	Design reactors for different type of homogeneous reactions occurring.
CO309348.4	Relate different parameters on reaction kinetics and deviation from ideal reactors.

Transport Phenomenon

Course Outcomes (COs)

Course Outcome	After successful completion of course student will be able to
CO309349.1	Application of momentum balance equation to determine velocity distribution for different types of fluids flowing through various systems and solve momentum transfer problems by applying equation of change.
CO309349.2	Application of energy balance equation to determine temperature distribution for different systems and use basic equations to solve heat transfer problems.
CO309349.3	Application of mass balance equation to determine concentration distribution for different systems and use basic equations to solve mass transfer problems.
CO309349.4	Evaluate energy losses for macroscopic systems, apply equation of change and understand interphase transport and different analogies.

Chemical Engineering Design I

Course Outcomes (COs)

Course Outcome	After successful completion of course
CO309350.1	Students will able to classify and design storage vessels and supporting structures.
CO309350.2	Students are able to design tall vertical vessel along with different vessel supports.
CO309350.3	Students are able to design different types of heat exchangers required in chemical industry.
CO309350.4	Students are able to design reaction vessels including jackets, agitators, and Auxilary vessels

Mass Transfer II

Course Outcomes (COs)

Course Outcome	After successful completion of course student will be able to
CO309351.1	Relate different types of separation techniques and their applications for separation of different types of components.
CO309351.2	Evaluate the number of theoretical stages required for all the separation techniques.
CO309351.3	Implement the basic principles of Extraction Operation.
CO309351.4	Relate the single stage and multistage operations for separation of various components.

Process Instrumentation and Control

Course Outcomes (COs)

Course Outcome	After successful completion of course Student will be able to
CO309352 .1	Demonstrate Importance of Instrumentation, type of instruments, working elements, classification, characteristics of Instruments.
CO309352 .2	Differentiate principal, working and construction of Temperature, Pressure and Strain Measuring Instruments.
CO309352 .3	Distinguish Principal, working and construction of Level and Flow Measuring Instruments.
CO309352 .4	Analyze instrumental methods for chemical analysis like GC, AAS, UV, IR, HPLC etc.

BE Chemical

Process Dynamics and Control

Course Outcomes (COs)

Course Outcome	After successful completion of course students are able to
CO409341.1	Analyze dynamic behavior of different first order and second order systems for a given input.
CO409341.2	Apply different types of controllers to analyze different feedback systems.
CO409341.3	Evaluate controller parameters to determine stability of a feedback control systems by root locus and Bode method
CO409341.4	Analyze and design of control systems with multiple loops and application of computer in process control.

Chemical Reaction Engineering II

Course Outcomes (COs)

Course Outcome	After successful completion of course Student will be able to
CO409342.1	Differentiate concepts of heterogeneous reactions.
CO409342.2	Implement the knowledge of fluid – fluid heterogeneous reactions for design of suitable reactors.
CO409342.3	Investigate the phenomenon of adsorption and diffusion in application of solid catalyzed reactions.
CO409342.4	Develop the process of design of heterogeneous- catalyzed reactors.

Chemical Engineering Design II

Course Outcomes (COs)

Course Outcome	After successful completion of course Student will be able to
CO409343.1	Develop the process and mechanical design of the plate and packed bed distillation column.
CO409343.2	Apply basic concepts, design calculations and materials of construction of the piping system.

CO409343.3	Differentiate the types and applications of the plant utilities required in the process industries.
CO409343.4	Apply details of the types of the maintenance and the process safety measures to be taken in the design and operation of the project.

Elective I : Environmental Engineering

Course Outcomes (COs)

Course Outcome	**After successful completion of course, students should be able to**
CO409350.1	Get acquitted with various types of pollutions, pollution laws and standards
CO409350.2	Understand air Pollution- Sources, Effects and Measurement Control Methods and Equipment
CO409350.3	Students are able to know Water Pollution & to develop methods to minimize it
CO409350.4	Recognize Tertiary Water Treatment and Solid Waste Management and know about Land Pollution.

Elective I : Petroleum Refining

Course Outcomes (COs)

Course Outcome	**After successful completion of course students are able to**
CO409344.1	Distinguish Petroleum composition, specifications of petroleum.
CO409344.2	Describe various Pre- refining operations, and recent trends in petroleum industries.
CO409344.3	Demonstrate Refining methods of petroleum products.
CO409344.4	Operate conversion units such as, Reforming, Catalytic-Cracking, Hydro-cracking and coking.

Elective : Advanced separation processes

Course Outcomes (COs)

Course Outcome	**After successful completion of course the students should be able**
CO409345.1	To built advanced concepts of separation techniques used in chemical industries.

CO409345.2	To investigate the principles and functioning advanced separation techniques.
CO409345.3	To utilize the advanced separation technique in problem solving where conventional techniques are not fruitful and require replacement.
CO409345.4	To Identify the applications of advanced separation techniques as per industrial requirement and To recognize the selection criteria between advanced separation techniques and conventional separation techniques.

Chemical Process Synthesis

Course Outcomes (COs)

Course Outcome	**After successful completion of course Student will be able to**
CO409345/1.1	Get **acquainted** to approach to process development, development of new process, different considerations, development of particular process, overall process design, hierarchy of process design etc.
CO409345/1.2	Differentiate types of reactions, kinetics, reaction paths, reactors and Separation techniques.
CO409345/1.3	Design distillation sequencing, heat integration of sequences of simple distillation columns. Also to understand Heat Exchanger Networks: Pinch Technology, problem table algorithm, Threshold problems etc.
CO409345/1.4	Execute Safety And Health Considerations, Intensification and Attenuation of Hazardous Materials, Quantitive Measures of Inherent Safety.

Computer Aided Chemical Engineering-II

Course Outcomes (COs)

Course Outcome	**After successful completion of course Student will be able to**
CO409347.1	Formulate simulation programme for solving mathematical equations.
CO 409347.2	Implement numerical methods for solving modeling equations using Programming languages.
CO409347.3	Simulate chemical processes using chemical process simulation software.

Process Modeling & Simulation

Course Outcomes (COs)

Course Outcome	After successful completion of course, students will be able to
CO309344.1	Formulate fundamental modeling equation using physico-chemical laws.
CO 309344.2	Apply fundamental laws of modeling to momentum, heat & mass transfer operations.
CO309344.3	Develop mathematical models for different reactors systems.
CO309344.4	Implement numerical techniques to design and solve chemical engineering problems.

Process Engineering Costing and Plant Design

Course Outcomes (COs)

Course Outcome	After successful completion of course Student will be able to
CO409350.1	Get acquainted with the overall aspects of the Chemical Engineering Plant Design.
CO409350.2	Implement the basic concepts and various terms of cost Engineering and make the cost estimation and cost- profit analysis of the chemical manufacturing process.
CO409350.3	Apply the Techniques for economic optimization and optimum design of the various process Equipments used in the process industry.
CO409350.4	Apply the network Techniques such as CPM and PERT for the Chemical Engineering Project management.

Elective : Chemical Process Safety

Course Outcomes (COs)

Course Outcome	After successful completion of course students will be able to
CO409350 .1	Recognize and analyses safety program and Create safety culture.
CO409350.2	Get acquainted interpret the exact causes behind different accidents in chemical history and apply the knowledge of Industrial hygiene for safety purpose.
CO409350.3	Evaluate cause of fire and explosion along its types and also create the prevention strategy
CO409350.4	Create different designs for preventing incidents and hazard management.

CO409350.5	Evaluate Hazop and risk assessment and plan for emergency.

Elective : Energy Conservation In Chemical

Course Outcomes (COs)

Course Outcome	**After successful completion of course**students are able to
CO409351.1	DescribeEnergy Scenario, energy security, energy conservation and its importance, energy strategy for the future, energy conservation act-2001 and its features. Applications of renewable energy sources.
CO409351.2	Implement & demonstrate Energy Management and Audit for industrial use
CO409351.3	Formulate Energy conservation checklist for elements of energy management program, promoting energy conservation, program planning, setting goals, setting priorities, allocation of resources, scheduling, measuring, monitoring and reporting, organization of energy conservation programs
CO409351.4	Investigate Energy loss of different chemical industries and implement solution on it. And motivate to use renewable energy sources.

Elective :Nanotechnology

Course Outcomes (COs)

Course Outcome	**After successful completion of course the students should be able**
CO409352.1	To understand the concept of Nano scale and Nanotechnology, and classify various types of Nano material. Learn the synthesis procedure of Nano material and its method of synthesis according to application
CO409352.2	Identify the suitable type of Characterization technique for Nano material. And distinguished the fundamental concept of Nano colloids and its chemistry and learn about aspects of quantum dots
CO409352.3	Identify the concept of semiconductor and its types and differentiate between intrinsic and extrinsic semiconductors and P-n junction.
CO409352.4	Identify the application of Nanotechnology in chemical Engineering and evaluate the impact of Nanotechnology on Environment and its safety aspects.

Elective: Petrochemical Engineering

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Course Outcomes (COs)

Course Outcome	After successful completion of course students will be able to
CO409350 .1	Analyze status of petrochemical industries and its necessity in India
CO409350.2	Get acquainted and interpret the first generation petrochemicals and its basic raw materials
CO409350.3	Evaluate and recognize process and methodology for separation and purification techniques in petrochemical complexes
CO409350.4	Analyze and differentiate between First generation and second generation petrochemicals and its feedstock
CO409350.5	Evaluate the different safety norms and aspects in petrochemical industry and pollution control norms and methods of elimination.