DEPARTMENT OF CHEMICAL ENGINEERING

PROGRAMME: B.TECH. CHEMICAL ENGINEERING

VISION

- To be a centre of excellence for development and dissemination of knowledge in Chemical Engineering for the nation.

MISSION

- To impart knowledge to students at all levels through a vibrant, dynamic and state of art intellectual delivery to ensure the creation of a complete Chemical Engineer with a high sense of social responsibility and professional ethics.
- Synergize the efforts of the students and faculty to evolve innovative Engineering practices and teaching methodologies

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- To inculcate conceptual knowledge in the fields of Chemical Engineering.
- To impart problem solving, analytical skills in the contemporary processes.
- To expedite state of art laboratory facility to offer practical Knowledge.
- To design and develop eco-friendly sustainable technologies with the aid of computational skills
- To facilitate the ability to learn, innovate and communicate technical developments for the benefit of humanity
- To disseminate the knowledge related to intellectual property ownership rights, ethics, professionalism, entrepreneurship, and their societal impact.

PROGRAM OUTCOMES (POs)

- Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 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.

- 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.
- Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 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.
- 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.
- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 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.
- 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.
- 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 (PSOs)

- Graduates will have a strong foundation in engineering, science and current Chemical Engineering practices and will have experience in solving structured and unstructured problems using conventional and innovative solutions.
- Graduates will be able to effectively describe the Chemical Engineering problem, analyze the data, develop potential solutions, evaluate these solutions, and present the results using their oral, written and electronic media skills.

- Graduates will have an understanding of ethical and professional responsibilities of an engineer and the impact of engineering solutions on society and the global environment.

COURSE OUTCOMES (COs)

Regulation	2017
Sem	01
Subject Code	**HS8151**
Subject Name	**Communicative English**
Course Outcome	• Read articles of a general kind in magazines and newspapers. • Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English. • Comprehend conversations and short talks delivered in English. • Write short essays of a general kind and personal letters and emails in English.

Regulation	2017
Sem	01
Subject Code	**MA8151**
Subject Name	**Engineering Mathematics – I**
Course Outcome	• Use both the limit definition and rules of differentiation to differentiate functions. • Apply differentiation to solve maxima and minima problems. • Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus. • Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

	• Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts. • Determine convergence/divergence of improper integrals and evaluate convergent improper integrals. • Apply various techniques in solving differential equations.

Regulation	2017
Sem	01
Subject Code	**PH8151**
Subject Name	**Engineering Physics**
Course Outcome	• The students will gain knowledge on the basics of properties of matter and its applications. • The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics. • The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers. • The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes. • The students will understand the basics of crystals, their structures and different crystal growth techniques.

Regulation	2017
Sem	01
Subject Code	**CY8151**
Subject Name	**Engineering Chemistry**
Course Outcome	• The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

Regulation	2017
Sem	01
Subject Code	**GE8151**
Subject Name	**Problem Solving and Python Programming**
Course Outcome	• Develop algorithmic solutions to simple computational problems. • Read, write, execute by hand simple Python programs. • Structure simple Python programs for solving problems. • Decompose a Python program into functions. • Represent compound data using Python lists, tuples, dictionaries. • Read and write data from/to files in Python Programs.

Regulation	2017
Sem	01
Subject Code	**GE8152**
Subject Name	**Engineering Graphics**
Course Outcome	• Familiarize with the fundamentals and standards of Engineering graphics. • Perform freehand sketching of basic geometrical constructions and multiple views of objects. • Project orthographic projections of lines and plane surfaces. • Draw projections and solids and development of surfaces. • Visualize and to project isometric and perspective sections of simple solids.

Regulation	2017
Sem	01
Subject Code	**GE8161**
Subject Name	**Problem Solving And Python Programming Laboratory**
Course Outcome	• Write, test, and debug simple Python programs.

	• Implement Python programs with conditionals and loops. • Develop Python programs step-wise by defining functions and calling them. • Use Python lists, tuples, dictionaries for representing compound data. • Read and write data from/to files in Python.

Regulation	2017
Sem	01
Subject Code	**BS8161**
Subject Name	**Physics And Chemistry Laboratory**
Course Outcome	• Apply principles of elasticity, optics and thermal properties for engineering applications. • The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

Regulation	2017
Sem	02
Subject Code	**HS8251**
Subject Name	**Technical English**
Course Outcome	• Read technical texts and write area- specific texts effortlessly. • Listen and comprehend lectures and talks in their area of specialization successfully. • Speak appropriately and effectively in varied formal and informal contexts. • Write reports and winning job applications.

Regulation	2017
Sem	02
Subject Code	**MA8251**
Subject Name	**Engineering Mathematics – II**

Course Outcome	• Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices. • Gradient, divergence and curl of a vector point function and related identities. • Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification. • Analytic functions, conformal mapping and complex integration. • Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

Regulation	2017
Sem	02
Subject Code	**PH8254**
Subject Name	**Physics of Materials**
Course Outcome	• Gain knowledge on phase diagrams and various material processing methods. • Acquire knowledge on basics of conducting materials, superconductors and their applications. • Get knowledge on the functioning of semiconducting materials and their applications in LED and solar cells. • Understand the functioning of various dielectric and magnetic materials, have the necessary understanding on various advanced materials.

Regulation	2017
Sem	02
Subject Code	**BE8256**
Subject Name	**Basic Mechanical Engineering**

Course Outcome	• Students should learn thermodynamics and thermal engineering to understand the principles behind the operation of thermal equipments like IC engines and turbines etc., • Students should be able to appreciate the theory behind operation of machinery and be able to design simple mechanisms.

Regulation	2017
Sem	02
Subject Code	**CH8201**
Subject Name	**Principles of Chemical Engineering**
Course Outcome	• On completion of the course, students will attain knowledge in fluid behavior and solid properties, • Understand the concept of chemical engineering principles

Regulation	2017
Sem	02
Subject Code	**CY8292**
Subject Name	**Chemistry for Technologists**
Course Outcome	• Students are able to understand the various concepts of unit operations and unit processes and current scenario of chemical synthesis in industries • Students are able to understand the various types of reactions and the chemical activity of nucleophiles and electrophiles • Students are able to understand the chemical analysis of oil, fat, lubricants and soap • Students are able to understand the chemicals and auxiliaries • Students are able to understand the Theory of color and constitution

Regulation	2017
Sem	02
Subject Code	**GE8261**
Subject Name	**Engineering Practices Laboratory**
Course Outcome	• Fabricate carpentry components and pipe connections including plumbing works. • Use welding equipments to join the structures. • Carry out the basic machining operations. • Make the models using sheet metal works. • Illustrate on centrifugal pump, air conditioner, operations of smithy, foundary and fittings. • Carry out basic home electrical works and appliances. • Measure the electrical quantities. • Elaborate on the components, gates, soldering practices.

Regulation	2017
Sem	02
Subject Code	**CH8281**
Subject Name	**Chemical Analysis Laboratory**
Course Outcome	• Familiarization with equipment like viscometers, flash and fire point apparatus etc • Familiarization of methods for determining COD • Familiarization of a few simple synthetic techniques for soap

Regulation	2017
Sem	03
Subject Code	**MA8391**
Subject Name	**Probability and Statistics**
Course Outcome	• Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon. • Understand the basic concepts of one and two dimensional random variables and apply in engineering applications. • Apply the concept of testing of hypothesis for small and large

	samples in real life problems. • Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control. • Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

Regulation	2017
Sem	03
Subject Code	**CH8351**
Subject Name	**Process Calculations**
Course Outcome	• Understand the fundamentals of units and stoichiometric equations. • Write material balance for different chemical process. • Understand the fundamentals of ideal gas behavior and phase equilbria. Write energy balance for different chemical process.

Regulation	2017
Sem	03
Subject Code	**CH8301**
Subject Name	**Fluid Mechanics for Chemical Engineers**
Course Outcome	• Understand the fundamental properties of fluids and its characteristics under static conditions. • Develop empirical correlation using dimensionless analysis. • Analyze flow of fluid through pipe and over the of solid, • Understand and select flow meter(s), characteristics of pumps used in Chemical Process Industries

Regulation	2017
Sem	03
Subject Code	**CH8302**
Subject Name	**Solid Mechanics for Technologists**
Course Outcome	• Solve the problems related to the structural components under various loading conditions

Regulation	2017
Sem	03
Subject Code	**EE8352**
Subject Name	**Principles of Electrical and Electronics Engineering**
Course Outcome	• Understand electric circuits and working principles of electrical machines • Understand the concepts of various electronic devices • Choose appropriate instruments for electrical measurement for a specific application

Regulation	2017
Sem	03
Subject Code	**CY8291**
Subject Name	**Organic Chemistry**
Course Outcome	• At the end of the course students will have knowledge on various reaction mechanism, preparation of organic compounds and their properties.

Regulation	2017
Sem	03
Subject Code	**EE8361**
Subject Name	**Electrical Engineering Laboratory**
Course Outcome	• Ability to perform speed characteristic of different electrical machine

Regulation	2017
Sem	03
Subject Code	**ME8362**
Subject Name	**Mechanical Engineering Laboratory**
Course Outcome	• Students will be able to understand Power-generating units such as engines and operate IC engines and conduct tests. They will be able to appreciate the theory behind the functioning of engines. Material properties, their behavior

	under different kinds of loading and testing can be visualized.

Regulation	2017
Sem	04
Subject Code	**MA8491**
Subject Name	**Numerical Methods**
Course Outcome	• Understand the basic concepts and techniques of solving algebraic and transcendental equations. • Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations. • Apply the numerical techniques of differentiation and integration for engineering problems. • Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations. • Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

Regulation	2017
Sem	04
Subject Code	**GE8291**
Subject Name	**Environmental Science and Engineering**
Course Outcome	• Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. • Public awareness of environmental is at infant stage. • Ignorance and incomplete knowledge has lead to misconceptions • Development and improvement in std. of living has lead to serious environmental disasters.

Regulation	2017
Sem	04

Subject Code	**CH8491**
Subject Name	**Instrumental Methods of Analysis**
Course Outcome	• To have thorough understanding of theory, instrumentation and applications of analytical Equipments used in industries for testing quality of raw materials, intermediates and finished products. To know the importance of analytical instrumentation during the purification, compounding and formulating the finished product.

Regulation	2017
Sem	04
Subject Code	**CH8401**
Subject Name	**Chemical Engineering Thermodynamics I**
Course Outcome	• Understand the fundamental concepts of thermodynamics • Apply second law and analyze the feasibility of systems/devices; understand the real gas behaviour • Understand thermodynamic formulations and the working of compressors and expanders

Regulation	2017
Sem	04
Subject Code	**CH8402**
Subject Name	**Physical Chemistry**
Course Outcome	• Students gain knowledge in the field of physical chemistry for different applications.

Regulation	2017
Sem	04
Subject Code	**CH8451**
Subject Name	**Mechanical Operations**
Course Outcome	• At the end of this course, the students will be able to understand the overview of equipment used to perform various mechanical operations and problems associated during the implementation and applications.

Regulation	2017
Sem	04
Subject Code	**CH8461**
Subject Name	**Fluid Mechanics Laboratory**
Course Outcome	• Use variable area flow meters and variable head flow meters • Analyze the flow of fluids through closed conduits, open channels and flow past immersed bodies • Select pumps for the transportation of fluids based on process conditions/requirements and fluid properties

Regulation	2017
Sem	04
Subject Code	**CY8281**
Subject Name	**Organic Chemistry Laboratory**
Course Outcome	• The student is able to identify what distinguishes a strong and weak nucleophile and recall the rules of reactions. The student shows their mastery of nomenclature since ethyl bromide is not drawn out. The student analyzes a list of compounds and determines their reactivity.

Regulation	2017
Sem	05
Subject Code	**CH8501**
Subject Name	**Chemical Process Industries**
Course Outcome	• At the end of this course, the student can classify the chemical process industry into industrial categories of base, intermediate end-products and specialty chemicals manufacturers.

Regulation	2017
Sem	05
Subject Code	**CH8591**
Subject Name	**Heat Transfer**

Course Outcome	• The students would have knowledge in various heat transfer methodology in process engineering. • To design heat transfer equipments such as furnace, boilers, heat exchangers evaporation

Regulation	2017
Sem	05
Subject Code	**CH8551**
Subject Name	**Mass Transfer I**
Course Outcome	• Students would have knowledge in diffusion and its application in laminar and turbulent conditions. • Students would apply the mass transfer concepts in the design of humidification columns, dryers and crystallizers.

Regulation	2017
Sem	05
Subject Code	**CH8502**
Subject Name	**Chemical Reaction Engineering I**
Course Outcome	• At the end of this course, the students would gain knowledge on the selection of reactor for the required reaction.

Regulation	2017
Sem	05
Subject Code	**CH8075 / Professional Elective I**
Subject Name	**Petroleum Refining and Petrochemicals**
Course Outcome	• Understand the classification, composition and testing methods of crude petroleum / product to develop innovative refining process and develop quality control and assurance techniques. • Apply the knowledge of treatment processes to develop the manufacture of petroleum products.

Regulation	2017
Sem	05
Subject Code	**ORO551**
Subject Name	**Renewable Energy Sources/** Open Elective* I
Course Outcome	• Understanding the physics of solar radiation. • Ability to classify the solar energy collectors and methodologies of storing solar energy. • Knowledge in applying solar energy in a useful way. • Knowledge in wind energy and biomass with its economic aspects. • Knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies.

Regulation	2017
Sem	05
Subject Code	**CH8581**
Subject Name	**Mechanical Operations Laboratory**
Course Outcome	• Students would gain the practical knowledge and hands on various separation techniques like filtration, sedimentation, screening, elutriation, and centrifugation.

Regulation	2017
Sem	05
Subject Code	**CH8561**
Subject Name	**Heat Transfer Laboratory**
Course Outcome	• Student would be able to calculate heat transfer by conduction, different types of convection using classical models for these phenomena.

Regulation	2017
Sem	05
Subject Code	**HS8581**
Subject Name	**Professional Communication**
Course Outcome	• Make effective presentations • Participate confidently in Group Discussions.

	• Attend job interviews and be successful in them. • Develop adequate Soft Skills required for the workplace

Regulation	2017
Sem	06
Subject Code	**CH8601**
Subject Name	**Chemical Reaction Engineering II**
Course Outcome	• Students would gain the ability to determine experimentally the kinetics and rate constants of reactions in different types of reactors. These studies have wide applications in various process industries.

Regulation	2017
Sem	06
Subject Code	**CH8651**
Subject Name	**Mass Transfer II**
Course Outcome	• Design absorber and stripper, distillation column. • Design extraction, leaching equipments and adsorber.

Regulation	2017
Sem	06
Subject Code	**CH8602**
Subject Name	**Chemical Engineering Thermodynamics II**
Course Outcome	• Students will be able to apply mass, energy and entropy balances to flow processes.

Regulation	2017
Sem	06
Subject Code	**CH8652**
Subject Name	**Process Engineering Economics**
Course Outcome	• Students will be able to understand the theory behind Inventory Control, Organization Types and PPC.

	• Provides the student with an ability to integrate knowledge about financial statements, Depreciation Accounting and other areas.

Regulation	2017
Sem	06
Subject Code	**CH8653**
Subject Name	**Process Instrumentation, Dynamics and Control**
Course Outcome	• Students will understand and discuss the importance of process control in process operation and the role of process control engineers They also understand and design the modern hardware and instrumentation needed to implement process control.

Regulation	2017
Sem	06
Subject Code	**GE8076**
Subject Name	**Professional Ethics in Engineering/ Professional Elective II**
Course Outcome	• Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

Regulation	2017
Sem	06
Subject Code	**CH8611**
Subject Name	**Computational Programming Laboratory for Chemical Engineers**
Course Outcome	• Students will be equipped with the software applications and the numerical solutions of chemical engineering problems.

Regulation	2017
Sem	06
Subject Code	**CH8612**

Subject Name	**Chemical Reaction Engineering Laboratory**
Course Outcome	• Students would get a sound working knowledge on different types of reactors.

Regulation	2017
Sem	07
Subject Code	**CH8791**
Subject Name	**Transport Phenomena**
Course Outcome	• Students would gain the knowledge of fundamental connections between the conservation laws in heat, mass, and momentum in terms of vector and tensor fluxes. The students would be able to understand the mechanism of fluids in motion under different conditions.

Regulation	2017
Sem	07
Subject Code	**CH8701**
Subject Name	**Process Equipment Design**
Course Outcome	• Apply the skill in thermal design of heat transfer equipment like shell and tube, double pipe heat exchangers and evaporators, and assessing thermal efficiency of the above equipment in practice. Demonstrate the skills in basic design and drawing of different dryers, cooling towers and cyclone separators. • Apply the concepts involved in phase separation and design of distillation, Extraction and absorption columns. • Demonstrate the skills in mechanical design of process equipment, design considerations of pressure vessels and its auxiliary devices design the layout of process industries.

Regulation	2017
Sem	07
Subject Code	**GE8074**
Subject Name	**Human Rights/ Professional Elective III**
Course Outcome	• Engineering students will acquire the basic knowledge of human rights.

Regulation	2017
Sem	07
Subject Code	**CH8078**
Subject Name	**Process Plant Utilities/ Professional Elective IV**
Course Outcome	• At the end of this course, the students will understand the importance of health, safety and the environment in process industries. Steam, power, water, air are extensively used in process industries and their efficient operation is imperative for economic and safe operation is essential for the survival of industries.

Regulation	2017
Sem	07
Subject Code	**OME754**
Subject Name	**Industrial Safety/** Open Elective* II
Course Outcome	• Students must be able to identify and prevent chemical, environmental mechanical, fire hazard through analysis and apply proper safety techniques on safety engineering and management.

Regulation	2017
Sem	07
Subject Code	**CH8711**
Subject Name	**Process Control Laboratory**
Course Outcome	• Students would have knowledge on the development and use of right type of control dynamics for process control under different operative conditions.

Regulation	2017
Sem	07
Subject Code	**CH8781**
Subject Name	**Mass Transfer Laboratory**
Course Outcome	• Students would be able to determine important data for the design and operation of the process equipments like distillation, extraction, diffusivity and drying principles which are having wide applications in various industries.

Regulation	2017
Sem	07
Subject Code	**CH8712**
Subject Name	**Internship**
Course Outcome	• Gain Valuable work experience. • Explore a career path. • Give yourself an edge in the job market. • Develop and refine skills.

Regulation	2017
Sem	07
Subject Code	**MG8691**
Subject Name	**Industrial Management/** Professional Elective V
Course Outcome	• Students gain knowledge on the basic management principles to become management (s) professional.

Regulation	2017
Sem	07
Subject Code	**CH8092**
Subject Name	**Energy Technology/ Professional Elective VI**
Course Outcome	• Understand conventional Energy sources, Non- conventional Energy sources, biomass sources and develop design parameters for equipment to be used in Chemical process industries. Understand energy conservation in process industries.

Regulation	2017
Sem	07
Subject Code	**CH8811**
Subject Name	**Project Work**
Course Outcome	• Demonstrate a sound technical knowledge of their selected project topic. • Undertake problem identification, formulation and solution. • Design an engineering solutions to complex problems utilizing a system approach. • Demonstrate the knowledge, skills and attitudes of a

	professional engineer.

Regulation	2017
Sem	07
Subject Code	**CH8812**
Subject Name	**Seminar**
Course Outcome	• Students will develop persuasive speech, present information in a compelling, well-structured, and logical sequence, respond respectfully to opposing ideas, show depth of knowledge of complex subjects, and develop their ability to synthesize, evaluate and reflect on information.