JIWAJI UNIVERSITY ,GWALIOR

SCHOOL OF STUDIES IN ENGINEERING

The School of Studies in Institute Of Engineering, Jiwaji University, Gwalior came into existence in 2000.This department is approved by AICTE. Admission process is done by DTE, Bhopal .To prepare academicians and trained Engineer for professional and top position in R & D and Teaching including Industrial sector, the school is running following programmes:

B.E. (Electronics)

B.E. (Computer sc.Engineering)

B.E. (Chemical Engineering)

Programme Outcomes(POs)

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

2. **Problem analysis:** identify formulate, review research literature, and analyze complex engineering problems and reaching sustained conclusion using the principle of mathematics , natural sciences and engineering sciences

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

4. **Conduct investigations of complex problem:** Use research based knowledge and research method including design of experiments , analysis and interpretation of data and synthesis of information to provide valid conclusions

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

6. **Engineer and society:** Apply reasoning informed by contextual knowledge, to assess societal health, safety, legal and cultural issues and consequent responsibility relevant to professional engineering practices.

7. **Environment and sustainability**: Understand the impact of professional engineering solution in societal and environmental context 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 engineering practices.

9. **Individual and team work:** Function effectively as an individual and as a member or leader in diversity and multi disciplinary settings.

10. **Communications;** 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 documentations, make effective presentations and view 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 project and in multi disciplinary 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 (PSOs)

FOR B.E. (ELECTRONICS ENGINEERING)

Students will have the ability to:

PSO1 : Use logical & technical skills to model, simulate and analyse electronics components and systems.

PSO2 : Integrate the knowledge of fundamental electronics, power electronics and embedded systems for the controllability, reliability and sustainability of electrical systems.

PSO3 : Contribute for the development of communication techniques to meet the increasing demand of the society.

PSO4 : Engineer will be able to apply knowledge of Analog & Digital system to provide solution to multi -disciplinary problems.

PSO5 : Use signal processing concepts and tools to provide solutions to real time problems.

PSO6 : Use the concept of Analog and digital electronics to design and impiement VLSI circuits.

COURSE OUTCOMES (COs)

FOR B.E. (ELECTRONICS ENGINEERING)

COMMUNICATION ENGLISH

Students after studying these areas of knowledge are expected :

CO1 : Speak and express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies

CO2 : Write effectively and persuasively and produce different types of writing as creative, critical, analytical and evaluative writing

CO3 : Read different genres of texts, infer implied meanings and critically analyze and evaluate them for ideas as well as for method of presentation

CO4 : Realize the essentiality of the informal conversation

CO5 : Understand the different qualities expected in the interviews and they realize the importance of GD.

ENGINEERING MATHEMATICS

Students after studying these areas of knowledge are expected :

CO1 : Apply the mathematical knowledge of rules of differentiation to differentiate one variable Function

CO2 : Apply and understand the knowledge of differentiation to solve value of the function

CO3 : Classify and able to Identify the substitution rules

CO4 : Identify the Basic knowledge and understanding in one field of area and volume of solid materials

CO5 : Identify a basic knowledge and understanding techniques in solving differential equations

ENGINEERING PHYSICS

Students after studying these areas of knowledge are expected :

CO1 : Analyze the various elastic behaviour of materials

CO2 : Classify the different types of lasers and optical fibres and its power losses

CO3 : Explain the different thermal properties of materials

CO4 : Illustrate the time dependent and time independent wave equations

CO5 : Understand the structures and properties of crystals.

ENGINEERING CHEMISTRY

Students after studying these areas of knowledge are expected :

CO1 : Understand the water parameters; requirements of boiler feed water and different water treatment techniques

CO2 : Understand the basic concept of adsorption, theories and its mechanism

CO3 : Select the appropriate eutectic mixtures of suitable alloys

CO4 : Acquire the knowledge about the manufacture of solid, liquid and gaseous fuel to meet environmental sustainability

CO5 : Relate the principle and generation of energy in battery, Nuclear reactor , Solar cells, Wind mill and fuel cell for future.

ENGINEERING GRAPHICS

Students after studying these areas of knowledge are expected :

CO1 : Graphically construct and understand the importance of conical curves and orthographical projections in engineering applications

CO2 : Draw the basic views related to projections of Lines, Planes

CO3 : Draw the projections of solids

CO4 : Sectioned and develop the surface of geometrical objects

CO5 : Interpret Isometric and Perspective views of object.

CIRCUIT ANALYSIS

Students after studying these areas of knowledge are expected :

CO1 : Determination of electric circuits and its analysis

CO2 : Impact knowledge on solving circuits using network theorem

CO3 : Analysis of three phase circuits and phasor diagram

CO4 : Obtain the transient respond of circuit

CO5 : Find the phenomenon of resonance of coupled circuit

ELECTRONICS DEVICES AND CIRCUITS

Students after studying these areas of knowledge are expected :

CO1 : Discuss the various biasing methods of BJT & FET circuits

CO2 : Analyze the small signal equivalent circuits of BJT amplifiers.

CO3 : Apply small signal model for JFET & MOSFET amplifiers to analyze the various configurations

CO4 : Design BJT and JET amplifiers under high frequency model

CO5 : Understand the different stages of power supply modules

DATA STRUCTURE

Students after studying these areas of knowledge are expected :

CO1: Implement linear and non-linear data structure operations using C

CO2 : Suggest appropriate linear / non-linear data structure for any given data set.

CO3 : Apply hashing concepts for a given problem

CO4 : Modify or suggest new data structure for an application

CO5 : Find the graph traversal, breadth first search, depth first search

SIGNAL AND SYSTEM

Students after studying these areas of knowledge are expected :

CO1 : Understand the classification of Continuous time and Discrete time signals and systems

CO2 : Apply Fourier series, Laplace and Fourier transform to analysis Continuous time signals

CO3 : Apply Fourier and Laplace transform to analysis continuous time systems

CO4 : Apply Discrete Time Fourier Transform and Z-transform to analysis Discrete time signals

CO5 : Apply Discrete Time Fourier Transform and Z-transform to analysis Discrete time systems

DIGITAL ELECTRONICS

Students after studying these areas of knowledge are expected :

CO1 : Understand digital electronics in the present contemporary world

CO2 : Design various combinational digital circuits using logic gates

CO3 : Design and Implement sequential circuits

CO4 : Understand the semiconductor memories and related technology

CONTROL ENGINEERING

Students after studying these areas of knowledge are expected :

CO1 : Identify the various control system components and their representations

CO2 : Analyze the various time domain parameters

CO3 : Analysis the various frequency response plots and its system.

CO4 : Apply the concepts of various system stability criterions.

CO5 : Design various transfer functions of digital control system using state variable models.

ANALOG AND DIGITAL CIRCUIT

Students after studying these areas of knowledge are expected :

CO1 : Differentiate cascade and cascade amplifier.

CO2 : Analyze the limitation in bandwidth of single stage and multi stage amplifier.

CO3 : Simulate amplifiers using Spice.

CO4 : Measure CMRR in differential amplifier.

CO5 : Calculate the code convertor using logic gates.

COMMUNICATION SKILLS

Students after studying these areas of knowledge are expected :

CO1 : Provide guidance and practice in specific academic speaking activities

CO2 : Analyse the given topic and develop conversation

CO3 : Make effective presentation in a group

CO4 : Apply contextual strategies for presentation and business interactive communication

COMMUNICATION THEORY

Students after studying these areas of knowledge are expected :

CO1 : Comprehend and appreciate the significance and role of this course in the present contemporary world

CO2 : Apply analog and digital communication techniques

CO3 : Use data and pulse communication techniques

CO4 : Analyse Source and Error control coding

CO5 : Analyse spread spectrum and multiple access techniques

ELECTROMAGNETIC THEORY

Students after studying these areas of knowledge are expected :

CO1 : Analyze field potentials due to static changes and static magnetic fields

CO2 : Explain how materials affect electric and magnetic fields

CO3 : Analyze the relation between the fields under time varying situations

CO4 : Discuss the principles of propagation of uniform plane waves

CO5 : Apply the application of Waves in different medium

INTEGRATED CIRCUIT

Students after studying these areas of knowledge are expected :

CO1 : Design linear and non-linear applications of OP – AMPS

CO2 :Design applications using analog multiplier and PLL

CO3 : Design ADC and DAC using OP – AMPS

CO4 : Generate waveforms using OP – AMP Circuits

CO5 : Analyze special function IC's

ENVIRONMENTAL ENGINEERING

Students after studying these areas of knowledge are expected :

CO1 : Solve environmental pollution or problems cannot be solved by mere laws.

CO2 : Public participation is an important aspect which serves the environmental Protection.

CO3 : Public awareness of environmental is at infant stage.

CO4 : Ignorance and incomplete knowledge has led to misconceptions

CO5 : Development and improvement in std. of living has led to serious environmental disasters

DIGITAL COMMUNICATION

Students after studying these areas of knowledge are expected :

CO1 : Discuss about information theory and compute the Huffman and Shannon-fano encoding methods

CO2 : Discuss about DPCM, DM, ADPCM and ADM techniques.

CO3 : Design and implement base band transmission schemes

CO4 : Design and Analyze the spectral characteristics of band pass signaling schemes and their noise performance

CO5 : Apply error control coding techniques in digital communication system..

DIGITAL SIGNAL PROCESSING

Students after studying these areas of knowledge are expected :

CO1 : Apply Discrete Fourier Transform (DFT) for the analysis of digital signals & systems

CO2 : Design an analog to digital Infinite Impulse Response (IIR) filters and its realization.

CO3 : Design of digital Finite Impulse Response (FIR) filters using the windowing technique & frequency sampling method and to realize their structure.

CO4 : Illustrate the finite word length effects on filters.

CO5 : Demonstrate the fundamentals of DSP Processor Architecture and its programming.

DATA NETWORK

Students after studying these areas of knowledge are expected :

CO1 : Identify the components required to build different types of networks.

CO2 : Understand the required functionality at data link layer for an application.

CO3 : Discus the routing path of network.

CO4 : Analyze the solution for functionalities of transport layer protocols.

CO5 : Design a protocol in the application layer.

MICROPROCESSOR & MICROCONTROLLER

Students after studying these areas of knowledge are expected :

CO1 : To understand the Architecture of 8086 microprocessor

CO2 : To learn the design aspects of I/O and Memory Interfacing circuits

CO3 : To interface microprocessors with supporting chips

CO4 : To study the Architecture of 8051 microcontroller.

CO5 :To design a microcontroller based system

VLSI SYSTEM

Students after studying these areas of knowledge are expected :

Students after studying these areas of knowledge are expected :

CO1 : Realize the concepts of digital building blocks using MOS transistor.

CO2 : Design combinational MOS circuits and power strategies

CO3 : Design and construct Sequential Circuits and Timing systems

CO4 : Design arithmetic building blocks and memory subsystems.

CO5 : Apply and implement FPGA design flow and testing.

WIRELESS COMMUNICATION

Students after studying these areas of knowledge are expected :

CO1 : Discuss the characterization of a wireless channel and evolve the system design specifications.

CO2 : Describe a cellular system based on resource availability and traffic demands.

CO3 : Analyze the various signaling for the wireless channels and systems..

CO4 : Compare multipath mitigation techniques for the wireless channel and system under consideration.

CO5 : Analyze Multiuser Systems, CDMA, WCDMA network planning and OFDM Concepts.

PRINCIPLES OF MANAGEMENT

Students after studying these areas of knowledge are expected :

CO1 : Explain the purpose of management & managerial roles in local and global organization.

CO2 : Describe the purpose of planning, decision making and their processes

CO3 : Demonstrate the various organizational structures and staff selection procedure.

CO4 : Classify the motivational theories and communication process.

CO5 : Apply the scope of control and role of computer, IT in management control

OPTICAL COMMUNICATION

Students after studying these areas of knowledge are expected :

CO1 : Realize basic elements in optical fibers, different modes and configurations

CO2 : Analyze the transmission characteristics associated with dispersion and polarization techniques.

CO3 : Design optical sources and detectors with their use in optical communication system.

CO4 : Construct fiber optic receiver systems, measurements and coupling techniques.

CO5 : Design optical communication systems and its networks.

MICROWAVE ENGINEERING

Students after studying these areas of knowledge are expected :

CO1 : Apply the basic principles and evaluate antenna parameters and link power budgets

CO2 : Explain about various types of antennas and its radiation mechanism

CO3 : Design and assess the performance of various antennas

CO4 : Discuss various microwave components and its process.

CO5 : Design a microwave system given the application specifications

ANTENNA & WAVE PROPAGATION

Students after studying these areas of knowledge are expected :

CO1 : Apply the basic principles and evaluate antenna parameters and link power budgets

CO2 : Explain about various types of antennas and its radiation mechanism

CO3 : Design and assess the performance of various antennas

CO4 : Discuss various microwave components and its process.

CO5 : Design a microwave system given the application specifications

EMBADDED SYSTEM

Students after studying these areas of knowledge are expected :

CO1 : Outline the concepts of embedded systems..

CO2 : Describe the architecture and programming of ARM processor

CO3 : Explain the basic concepts of embedded programming

CO4 : Explain the basic concepts of real time operating system design

CO5 : Model real-time applications using embedded-system concepts.

ADVANCED COMMUNICATION SYSTEM

Students after studying these areas of knowledge are expected :

CO1 : To analyze the performance of simple optical link by measurement of losses and analyzing the mode characteristics of fiber.

CO2 : To analyze the Eye Pattern, Pulse broadening of optical fiber and the impact on BER

CO3 : To estimate the Wireless Channel Characteristics and Analyze the performance of Wireless Communication System.

CO4 : To understand the characteristics of active and passive microwave devices.

CO5 : To Understand the intricacies in Microwave System design.

SATELLITE COMMUNICATION

Students after studying these areas of knowledge are expected :

CO1 : Describe about satellite orbits

CO2 : Discuss the satellite segment and earth segment.

CO3 : Describes the concepts satellite access.

CO4 : Explains the applications of satellite.

CO5 : Apply the concept to satellite network.

PROJECT WORK

Students after studying these areas of knowledge are expected :

CO1 : Identify challenging practical problems, solutions to cope up with present scenario of Electronics and Communication Engineering field.

CO2 : Analyze the various methodologies and technologies and discuss with team for solving the problem.

CO3 : Apply technical knowledge and project management skills for solving the problem.

CO4 : Design and develop hardware and/or software for their project specific problem

CO5 : Prepare the project reports and give proper explanation during the presentation and demonstration.

Programme Specific Objectives (PSOs)

FOR B.E. (CHEMICAL ENGINEERING)

PSO1 To produce graduates who pursue careers as practicing chemical engineers in the field of chemical and allied industries.

PSO2 Integrate the Knowledge of design systems, components or processes within realistic constraint such as economic, social, ethical, environmental, health and safety.

PSO3 To develop students' understanding of the core scientific, mathematical and engineering principles conceive and design processes to produce, transform and transport materials (chemical products) — beginning with experimentation in the laboratory and followed by implementation of technologies in full-scale production.

PSO4 Prepare students with high scholastic attainment to enter graduate programs leading to advanced degrees in chemical engineering or in related professional, scientific, and engineering fields.

COURSE OUTCOMES (COs)

FOR B.E. (CHEMICAL ENGINEERING)

CHEMICAL ENGG THERMODYNAMICS

ENGINEERING MATHEMATICS- II

Students after studying these areas of knowledge are expected.

CO1 : To apply the concept of Fourier series, its properties and sine cosine transform

CO2 : Write effectively Laplace transform of various systems and apply them to solve ordinary differential equation

CO3 : Read different methods to solve linear differential equation and apply them for ideas as well as for solution of problems

CO4 : Solve partial differential equation and apply them for heat and wave equation interpretation

CO5 : Understand the geometrical meaning of gradient, vector calculus

CHEMICAL ENGG THERMODYNAMICS

Students after studying these areas of knowledge are expected

CO1 : To revise Zeroth and first law of thermodynamics, concept of work and heat.

C02: To get aware of phase change rule with respect to critical properties.

C03: To get knowledge of ideal cycle like Carnot and apply them in refrigeration, vapour compression.

C04: To apply third law of thermodynamics and understand about specific heat and its dependence on pressure, temperature

C05: To understand multiple stage requirements & efficiency along with effect

CHEMICAL INSTRUMENTATION

Students after studying these areas of knowledge are expected

C01: To get Introduction of chemical process instrumentation, process variables, static and dynamic characteristics of instruments

C02: To learn about elements of measuring systems & their functions

C03: To learn about recording of process variables like pressure, humidity and composition.

C04: To get aware of principles of transducers

C05: To acquire knowledge of Process instrumentation diagram and symbols,

MATERIAL & ENERGY BALANCE

Students after studying these areas of knowledge are expected

C01: To learn about basic calculation of conservation of mass conservation of energy

C02: To learn behaviour of ideal gas and application of humidity chart

C03: To apply component balance solving material balance, with and without simultaneous equation

C04: To apply energy balance and different form of energies like latent heat, sensible heat.

C05: To learn some basic unit operations like distillation.

ADVANCED ENGINEERING CHEMISTRY

Students after studying these areas of knowledge are expected

C01: To learn about Chemical properties of molecules, hyper conjugation and steric effects.

C02: To learn about Properties of simple monomers

C03: To learn about oi and fats and their types

C04: To learn fundamentals of chemical kinetics

C05: To learn fundamentals of electrochemistry

C06: To learn and understand concept of phase rule

ENGINEERING MATHEMATICS- III

Students after studying these areas of knowledge are expected

CO1 : To learn complex variables and their application

C02: To learn Errors & Approximations, Solution of Algebraic & Trancedental Equations

C03: To learn about Difference Operators and Interpolation

C04: To solve Solution of Ordinary Differential Equations by various methods

C05: To explore the Concept of Probability

MATERIAL SCIENCE AND TECHNOLOGY

Students after studying these areas of knowledge are expected

CO1 : To learn the concept of Mechanical, Thermal & Electrical properties of Materials

C02: To get detailed knowledge of Atomic Structure

C03: To learn different theories of failure of material and Single phase metal deformation

C04: To learn about corrosion and Theories of Corrosion

C05: To learn about Theories of Composite material and their properties

FUEL TECHNOLOGY

Students after studying these areas of knowledge are expected

CO1 : To introduce with different types of Solid fuels

CO2: To understand various types of coal and concept of Coal Carbonization

CO3: To introduce with different types of Liquid fuels

CO4: Petroleum product and their utilization

CO5: To introduce with different types of Gaseous fuels

FLUID PARTICLE MECHANICS

Students after studying these areas of knowledge are expected

CO1 : To learn about Particulate Solid, their properties and application

CO2 : To learn about various size reduction equipments

CO3: To learn about Mixing properties and equipments

CO4: To learn about Separation Principles of Separation techniques

CO5: To lean about Transportation and Handling of solids using pumps, valves\

FLUID MECHANICS

Students after studying these areas of knowledge are expected

CO1 : To get introduction and review of fluid properties. Describe fluid pressure, its measurement and calculate forces on submerged bodies.

CO2: Understand the flow visualization, boundary layer and momentum correction factor, state the Newton‘s law of viscosity and Reynolds number. Analyze fluid flow problems with the application of the continuity and momentum equation

CO3: Learn the concepts, rule and application of Dynamics of Flow

CO4: Analyze the general equation for internal flow meters and Determine and analyze the performance aspects of fluid machinery.

CO5: To understand the concept given by Reynolds about laminar flow and friction factor & pipe loss of head

ADVANCED CHEMICAL ENGG. THERMODYNAMICS

Students after studying these areas of knowledge are expected

CO1 : To get familiar with Thermodynamic properties of homogeneous mixtures

CO2: To effectively apply heat effects in mixing

CO3: To build, develop and utilize various thermo dynamical cycles like Refrigeration, ideal reversed Carnot cycle,

CO4: To understand Solution Thermodynamics Chemical potential & its physical significance,

CO5: To get expertise on statistical interpretation of work & heat.

INORGANIC PROCESS TECHNOLGY

Students after studying these areas of knowledge are expected

CO1: To get familiar with caustic industry

CO2: To get in detailed study of acid industry like Hydrochloric acid, Sulphur and sulfuric acid,

CO3: To get aware of major chemical engineering problems of nitrogen based industries

CO4: To effectively understand the process of Cement industries,

CO5: To get the process details of Inorganic chemicals namely Bromine, Iodine and Fluorine,

COMPUTATIONAL METHODS IN CHEMICAL ENGINEERING

Students after studying these areas of knowledge are expected

CO1: To apply the methodologies of Treatment of engineering data by Graphical representation and Empirical equations,

CO2: To Interpret Engineering Data and calculate errors

CO3: To apply mass conservation using Ordinary Differential Equations

CO4: To solve Ordinary Different Equations by numerical method

CO5: To form partial Different Equations and apply it to chemical processes.

CM- 504 – MASS TRANSFER-I

Students after studying these areas of knowledge are expected

CO1: To understand the analogy in transfer process and apply the concept of mass transfer coefficient in various columns

CO2: To define Diffusion phenomenon on various basis like Molecular and eddy diffusion in gases, liquids and solids

CO3: To get detailed knowledge of Distillation and its types

CO4: To acquire the concept of reflux and graphical calculation of number of stages in a distillation column

CO5: To be able to differentiate packed and plate column using calculations of NTU and HTU, concept of HETP

HEAT TRANSFER

Students after studying these areas of knowledge are expected

CO1: To understand heat transfer in solids by conduction and its importance in different geometry

CO2: To understand heat transfer in solids by convection and its types

CO3: To understand heat transfer by radiation and its importance

CO4: To apply heat transfer under phase change conditions, as well to design and perform calculation of Evaporator

CO5: To design and perform calculation of Heat Exchange equipment

PROCESS EQUIPMENT DESIGN – I

Students after studying these areas of knowledge are expected :

CO1: To have detailed understanding of Stress- Strain relationships necessary for design of Design of shell, bottom plates, self-supported, and column supported roofs.

CO2: To be able to design Unfired pressure vessel with proper selection and design of flat plate, tor-spherical, ellipsoidal, and conical closures, compensations of openings.

CO3: To be able to design and perform calculation of Tall vertical & horizontal vessels and vessel supports

CO4: To be able to design and perform calculation of various types of Flanges, and gaskets.

ORGANIC PROCESS TECHNOLOGY

Students after studying these areas of knowledge are expected

CO1: To have knowledge of process description of Soaps and detergents, Pulp and paper.

CO2: To have knowledge of process description of Agro based alcohol industries

CO3: To have knowledge of process description of Intermediates for petrochemical from petroleum based stocks

CO4: To have knowledge of process description of Dyes and Dye intermediates, insecticides and pesticides, nitration and nitrating agents.

CO5: To have knowledge of process description of Man-made fibers

MASS TRANSFER - II

Students after studying these areas of knowledge are expected

CO1: To learn about Adsorption and its calculations

CO2: To understand Humidification and Dehumidification: Humidification

CO3: To be able to design various dryers like tray driers, Drum dryers, spray and tunnel dryers.

CO4: To be able to perform calculation of Leaching and Crystallization

CO5: To explore the concept of Liquid –Liquid extraction

CHEMICAL PROCESS CONTROL

Students after studying these areas of knowledge are expected

CO1: To perform Laplace Transform and explore the concept of Dynamic response ofvarious system.

CO2: To get in-depth of Second order system and their transient response

CO3: To be able to construct final control elements such as Proportional, Integral, PD, PID controllers, pneumatic control valve

CO4: To apply Stability methods like Routh stability, Nyquist's stability, Root locus technique,

CO5: To draw and apply Process instrumentation diagrams and symbols in chemical engineering flow sheets

CHEMICAL REACTION ENGINEERING – I

Students after studying these areas of knowledge are expected

CO1: To classify reactions, reaction rate and study about variables affecting the rate of reactions like series, parallel

CO2: To be able to interpret kinetic data using Integral and differential method of analysis

CO3: To classify reactors based on ideal conditions and develop their performance equation.

CO4: To carry out Multiple Reactions in Batch, continuous stirred tank and Plug flow reactors

CO5: To explore Non ideal reaction and their models like RTD dispersion model, Tank and series model

PETROLEUM PROCESSING TECHNOLOGY

Students after studying these areas of knowledge are expected

CO1: To learn about origin and occurrence of petroleum crude, its composition and classification

CO2: To get knowledge of Crude oil distillation process its pretreatment and secondary conversion process

CO3: To learn about Heavy residue up-gradation technologies like hydro-cracking, hydro-treating, vis-breaking and delayed coking.

CO4: To get knowledge of process like de-waxing and de-oiling, de-asphalting, lube hydro-finishing, bitumen air blowing, sweetening and desulphurization.

CO5: To learn about refinery gas utilization.

SAFETY ENGG AND HAZARD MANAGEMENT

Students after studying these areas of knowledge are expected

CO1: To get acquired with Laws Codes, Case Histories, Properties of Chemical, Health, hazards of industrial substances.

CO2: To learn about Toxicology, Threshold value and its definitions, material safety data sheets, industrial hygiene evaluation.

CO3: To get aware of Fire & Explosion, Flammability, characteristics of chemical, fire and explosion hazard.

CO4: To know about Other Energy Hazards: Electrical hazards, noise hazards, radiation hazard in process operations

CO5: To carry out Risk Analysis using HAZOP and HAZON, event and consequence analysis

CO6: To carry out Hazard Assessment, modelling for safety, safety training, emergency planning and disaster management.

PHARMACEUTICAL TECHNOLOGY

Students after studying these areas of knowledge are expected

CO1: To apply the concept of heat transfer. Mass transfer and reaction engineering in practice of unit operation in pharmaceutical industries

CO2: To formulate, develop sterile dosage forms

CO3: To learn about Types of tablets and its manufacturing

CO4: To learn about Capsules and its manufacturing

CO5: To get knowledge of Cosmetics and Toiletries

CO6: To learn abou**t** Pharmaceutical packing and its components

ENERGY RESOURCES AND UTILIZATION

Students after studying these areas of knowledge are expected

CO1: To be aware of Energy Scenario Indian and global, energy crisis,

CO2: To be aware of Alternative Sources of Energy Fuel cell, Solar Energy, Bio energy,

CO3: To learn about Hydroelectric potential, Geothermal energy its utilization & production

CO4: To get knowledge of Fossil and Processed Fuel Coal its origin and formation

CO5: To have detailed idea of Petroleum crude and its types.

TRANSPORT PHENOMENON

Students after studying these areas of knowledge are expected

CO1: To learn about Similarity in momentum, heat and mass-transport and a review of these three topics

CO2: To apply Shell balance approach for developing equations of change for momentum, heat and mass transport

CO3: To develop equations for turbulent fluxes, velocity, temperature and concentration profiles for laminar and turbulent flow conditions

CO4: To perform Macroscopic momentum and heat balance equation

POLYMER TECHNOLOGY

Students after studying these areas of knowledge are expected

CO1: To learn about Polymerization Chemistry: Chain, step and miscellaneous polymerization reactions and polymerization technique.

CO2: To get acquire about Polymerization Processes: Bulk solution, emulsion and suspension polymerization

CO3: To get details of Polymer reactions: Hydrolysis, acidolysis, aminolysis, hydrogenation, addition and substitution reactions

CO4: To learn about manufacturing processes of important polymers

CO5: **To learn about** Composite materials - Ceramic and other fiber reinforced plastics and Polymer degradation

NOVEL SEPARATION TECHNIQUES

Students after studying these areas of knowledge are expected

CO1: To get introduced about novel separation processes.

CO2: To get in depth of membrane separation process

CO3: To get knowledge about Reverse Osmosis and ultrafiltration, membrane characteristics and applications

CO4: To get knowledge of Foam and bubble separation, principle, classification, foam and surfactants

CO5: To learn about Zone melting and Zone refining, electrophoresis, desalting by freezing, centrifugation.

CO6: To learn about Parametric pumping, thermal parametric pumping, batch, continuous and semicontinuous pumping

OPTIMIZATION TECHNIQUES IN CHEMICAL ENGINEERING

Students after studying these areas of knowledge are expected

CO1: To learn analytical Methods for optimum in single and multivariable unconstrained and constrained problems.

CO2: To develop solutions of Unconstrained One Dimensional Search Newton, Quasi-Newton and Secant method for unidimensional search

CO3: To learn about Linear Programming through graphical method

CO4: To learn Finite difference approximation, Dynamic Programming, Principle of optimality.

PROCESS EQUIPMENT DESIGN-II

Students after studying these areas of knowledge are expected

CO1: To understand Scale up criteria and scale up of process equipment

CO2: To be able to design a new system having one or more units in series

CO3: To perform Process design calculations for mass exchange equipment plate

CO4: To get detailed process and mechanical design of Flash drum , Kettle reloerler, condenser, cooling tower rotary drier.

CHEMICAL REACTION ENGINEERING –II

Students after studying these areas of knowledge are expected

CO1: To learn about catalysis and adsorption and general mechanism of catalytic reactions surface area

CO2: To learn about External transport processes and their effects on heterogeneous reactions yield and selectivity

CO3: To Design catalytic reactors, Isothermal, nonisothermal and adiabatic fixed bad reactor staged adiabatic reactors,

CO4: To Models fluid - solid non-catalytic reactions

CO5: To get knowledge of Gas-liquid reactions and liquid-liquid reaction

ENVIRONMENTAL ENGINEERING

Students after studying these areas of knowledge are expected

CO1: To learn about Environmental Management, National environmental policies, environmental guidelines for process industries, environmental pollution control through planned industrial development

CO2: To get knowledge of Air Pollution sources and effect of air pollution, classification and equipments used to prevent it.

CO3: To get knowledge of Water Pollution sources and effect of air pollution, classification and equipments used to prevent it.

CO4: To get knowledge of Solid waste pollution sources and effect of air pollution, classification and equipments used to prevent it.

CO5: To learn about Case study with respect to air, water and solid waste.

PROCESS PIPING DESIGN

Students after studying these areas of knowledge are expected

CO1: To learn about classification of pipes and tubes IS & BS codes for pipes used in chemical process industries and utilities.

CO2: To learn about pipes for Newtonian and non-Newtonian fluids, sudden expansion and contraction effects

CO3: To be able to calculate Pressure drop for flow of Newtonian and non-Newtonian fluids through pipes

CO4: To learn about Pipes of circular and non-circular cross section-velocity distribution, average velocity and volumetric rate of flow

CO5: To get knowledge of Non-Newtonian fluid flow through process pipes

CO6: To learn about Pipe line design and power losses in compressible fluid flow

CRYOGENIC ENGINEERING

Students after studying these areas of knowledge are expected

CO1: To learn about cryogenics and cryogenic systems, thermodynamic principles of cryogenic systems

CO2: To get details of Properties of cryogenic fluids

CO3: To learn about Production of low temperature, refrigeration and liquefaction,

CO4: To acquire knowledge of Cryogenic Environment

CO5: To avail Cryogenic Instrumentation and Measurements, optimization of tank designs,

ENERGY MANAGEMENT IN PROCESSES

Students after studying these areas of knowledge are expected

CO1: To learn about Energy Management & Audit, need and types of energy audit.

CO2: To learn about Energy Monitoring and Targeting, techniques of energy consumption, production

CO3: To learn about Steam System: Properties of steam, assessment of steam distribution losses, steam leakages,

CO4: To learn aboutWaste Heat Recovery its Classification, advantages and applications, and other utilities

CO5: To learn about Heat Exchanger Networks

INDUSTRIAL POLLUTION ABATEMENT & WASTE MANAGEMENT

Students after studying these areas of knowledge are expected

CO1: To learn about Environment and environmental pollution from chemical process industries

CO2: To get knowledge of Pollution Prevention like Process modification, alternative raw material, recovery of by co-product from industrial emission effluents

CO3: To learn about Air Pollution Contro and Water Pollution Control

CO4: To learn about Anaerobic and aerobic treatment biochemical kinetics, trickling filter, activated sludge and lagoons.

CO5: To learn about Characterization of wastes-hazardous and non-hazardous wastes and waste management

ENTREPRENEURSHIP MANAGEMENT AND ECONOMICS

Students after studying these areas of knowledge are expected

CO1: To learn about System and subsystem in process engineering and flow-sheeting.

CO2: To get knowledge of Management like its Importance, definition and functions

CO3: To learn about Plant Economics and Interaction between design and cost equations for optimal design of equipments

CO4: To get knowledge of Finance: Nature and scope, forms of business ownerships, balance sheet, profit and loss account,

CO5: To get acquire with Entrepreneurship: Definition and concepts, characteristics, comparison with manager, classification, theories of entrepreneur.

BIO-PROCESS TECHNOLOGY

Students after studying these areas of knowledge are expected

CO1: To get knowledge of Bio-Chemical Engineering in terms of Aspects of microbiology,

CO2: To learn about Metabolism and Energetic, enzyme reactions in heterogeneous systems.

CO3: To learn about Growth cycle, phases for Batch cultivation, mathematical modeling of batch growth

CO4: To get in depth of Unit Operations in Biochemical Process like filtration and drying.

CO5: To be able to Design and Analyse Bio-Reactors.

PROCESS MODELING & SIMULATION

Students after studying these areas of knowledge are expected

CO1: To learn about the role of analysis in chemical engineering problems, dimensional consistency in mathematical descriptions

CO2: To learn about modelling of non- reacting and reacting liquid system

CO3: To get knowledge of applying Treatment of experimental data into modelling

Programme Specific Outcomes (PSOs)
For B.E.(COMPUTER SCIENCE ENGINEERING)

PO1: The graduates are expected to develop an ability to apply knowledge of mathematics, science and engineering appropriate to the discipline.

PO2: The graduates are expected to apply mathematical foundations, algorithmic principles and computer science theory in modeling, design and conduct of experiments as well as data interpretation and analysis.

PO3: The graduates are expected to develop an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability

PO4: The graduates are expected to develop an ability to identify, formulate and solve real engineering problems and understand the global impact of engineering solutions.

PO5: The graduates are expected to develop an ability to function effectively on multidisciplinary teams to accomplish a common goal.

PO6: The graduates are expected to develop an understanding of professional, ethical, legal, security and social issues as well as responsibilities.

PO7: The graduates should have good knowledge of contemporary issues and are expected to communicate effectively with a range of audiences**.**

PO8: The graduates should be able to recognize the need for lifelong learning and are expected to apply the techniques, skills and modern engineering tools necessary for engineering practice**.**

Course Outcomes (COs)

For B.E.(COMPUTER SCIENCE Engineering)

MATHEMATICS II

Students after studying these areas of knowledge are expected:

CO1 :Develops skill of higher derivative, expansion of functions in ascending power of variable & value of the function in neighbored of some points.

CO2: Able to determine limits of indeterminate function. Applicable to already word problems & Engineering Problems.

CO3: Gain the knowledge to solve differential equation arising in different

CO4: Engineering branch and able to form mathematical & physical interpretation of its solution which place important role in all branches of Engineering.

CO5: Learn the evaluation policy of some special function like gamma & Beta function. & their relation which is helpful to evaluate some definite integral arising in various branch of Engineering.

DISCRETE STRUCTURE

Students after studying these areas of knowledge are expected:

CO1: Be able to construct simple mathematical proofs and possess the ability to verify them .

CO2: Have substantial experience to comprehend formal logical arguments

CO3: Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic.

CO4: Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess .

CO5: Acquire ability to describe computer programs (e.g. recursive functions) in a formal mathematical manner.

CO6: Be able to apply basic counting techniques to solve combinatorial problems .

ELEECTRONICS CIRCUITS DEVICES

Students after studying these areas of knowledge are expected:

CO1. Understand the current voltage characteristics of semiconductor devices.

CO2: Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation.

CO3. Design and analyze of electronic circuits, 4. Evaluate frequency response to understand behavior of Electronics circuits.

DIGITAL CONTROL SYSTEM

Students after studying these areas of knowledge are expected

CO1:The students should be able to (i) use ordinary differential equations and Laplace transformation to model physical systems, (ii) obtain dynamic responses of linear systems and determine their stability, (iii) construct root-locus and Bode plots, and apply Nyquist criterion in the context of controller design, (iv) obtain and manipulate state-space representation of dynamical systems using linear algebra, and (v) become fluent in digital control systems design.

CO2:The students should be able to translate a set of performance specifications given in words to a formal description of a design problem, and then design a suitable feedback-controller using design tools, followed by simulation and verification using software tools.

CO3 :The students should know the techniques for relaxing the constraints or redesigning the controller for achieving closed-loop specifications either in the time-domain or in the frequency domain. They should also know how constraints in the time domain affect the frequency response of the system and vice versa and how to apply these concepts to design.

CO4: Students should know how to debug their controller design, which requires them to iterate on their initial design.

DATA STRUCTURE

Students after studying these areas of knowledge are expected:

CO1:Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms .

CO2: Describe common applications for arrays, records, linked structures, stacks, queues, trees,

and graphs .

CO3: Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs.

CO4:Demonstrate different methods for traversing trees.

CO5: Compare alternative implementations of data structures with respect to performance.

CO6: Compare and contrast the benefits of dynamic and static data structures implementations.

CO7: Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack.

MATHEMATICS III

Students after studying these areas of knowledge are expected:

CO1 : Students will demonstrate knowledge of the basic concepts of Euclidean geometry.

CO2 : Students will do basic geometrical constructions with a straight edge and ruler.

CO 3: Students will construct simple geometric proofs.

CO4: Students will use percentages to solve real estate problems.

CO5 : Students will compute taxes and commissions on a property sale.

COMPUTER SYSTEM ORGANIZATION

Students after studying these areas of knowledge are expected:

CO1:Classify and compute the performance of machine.

CO2:Understand how to implement **memory** chips, boards, modules and caches.

CO3 :Relate to arithmetic for ALU implementation.

CO4: Understand the basics of hardwired and micro-programmed control of the CPU.

CO5:Learn about various **I/O** devices and the **I/O** interface.

OBJECT ORIENTED TECHNOLOGY

Students after studying these areas of knowledge are expected:

CO1. Choose appropriate data structures to represent data items in real world problems.

CO2. Analyze the time and space complexities of algorithms **.**

CO3. Design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.

CO4. Analyze and implement various kinds of searching and sorting techniques.

ANALYSIS DESIGN & ALOGORITHM

Students after studying these areas of knowledge are expected:

CO1 :Explain what systems are and how they are developed.

CO2:Identify and describe the phases of the systems development life cycle.

CO3:Follow the analysis portion of the Systems Development Life Cycle in a disciplined manner.

CO4:Develop and evaluate system requirements.

CO5:Work effectively in a team environment.

CO6:Describe the role and responsibilities of the systems analyst in the development and management of systems.

DATA COMMUNICATION

Students after studying these areas of knowledge are expected:
CO1:Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.

CO2:.Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices (routing).

CO3:.Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems.

CO4: Able to evaluate the performance of a single link, logical process-to-process (end-to-end) channel, and a network as a whole (latency, bandwidth, throughput).

CO5:Able to differentiate among and discuss the four levels of addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols.

OPERATING SYSTEM

Students after studying these areas of knowledge are expected:

CO1: Describe the important computer system resources and the role of operating system in their management policies and algorithms.

CO2: Understand the process management policies and scheduling of processes by CPU.

CO3 :Evaluate the requirement for process synchronization and coordination handled by operating system.

CO4: Describe and analyze the memory management and its allocation policies.

CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.

DATABASE MANAGEMENT SYSTEM

Students after studying these areas of knowledge are expected:

CO1: Explain the features of database management systems and Relational database.

CO2 :Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.

CO3 :Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.

CO4 Retrieve any type of information from a data base by formulating complex queries in SQL.

CO5: Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.

COMPUTER GRAPHICS & MULTIMEDIA

Students after studying these areas of knowledge are expected:

CO1: To list the basic concepts used in computer graphics.

CO2: To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.

CO3: To describe the importance of viewing and projections.

CO4: To define the fundamentals of animation, virtual reality and its related technologies.

CO5: To understand a typical graphics pipeline

THEORY COMPUTATION

Students after studying these areas of knowledge are expected:

CO1: Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.

CO2: Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.

CO3: Understand, design, analyze and interpret Context Free languages, Expression and Grammars.

CO4: Design different types of Push down Automata as Simple Parser.

CO5:Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.

MICROPROCESSOR & INTERFACING

Students after studying these areas of knowledge are expected:

CO1: Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.

CO2: Identify a detailed s/w & h/w structure of the Microprocessor.

CO4: Distinguish and analyze the properties of Microprocessors & Microcontrollers.

CO5: Analyze the data transfer information through serial & parallel ports.

CO6: Train their practical knowledge through laboratory experiments.

PRINCIPLE OF PROGRAMMING LANGUAGE

Students after studying these areas of knowledge are expected:

CO1:Manipulate and generate lambda-terms, extending a system such as Church numerals; check and assign types to lambda terms.

CO2:Solve simple recursive equations by determining the limit of the Kleene fixpoint construction.

CO3:Design and extend operational and denotational definitions for basic programming language constructs.

CO4:prove properties of programs by various formal means, including structural and fixpoint induction.

CO5:demonstrate correspondences between grammars, languages and automata.

SOFTWARE ENGINEEERING &PROJECT MANAGEMENT

Students after studying these areas of knowledge are expected:

CO1: Define various software application domains and remember different process model used in software development.

CO2: Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.

CO3: Convert the requirements model into the design model and demonstrate use of software and userinterface design principles.

CO4: Distinguish among SCM and SQA and can classify different testing strategies and tactics and compare them.

CO5: Justify role of SDLC in Software Project Development and they can evaluate importance of Software Engineering in PLC.

COMPUTER NETWORKING

Students after studying these areas of knowledge are expected:

CO1: Understand and describe the layered protocol model.

CO2: Describe, analyse and evaluate a number of datalink, network, and transport layer protocols.

CO3:Program network communication services for client/server and other application layouts.

CO4:Describe, analyse and evaluate various related technical, administrative and social aspects of specific computer network protocols from standards documents and other primary materials found through research.

CO5:Design, analyse, and evaluate networks and services for homes, data centres, IoT/IoE, LANs and WANs.

ADVANCED COMPUTERB ARCHITECTURE

Students after studying these areas of knowledge are expected:
CO1: Demonstrate concepts of parallelism in hardware/software.

CO2 : Discuss memory organization and mapping techniques.

CO3 : Describe architectural features of advanced processors.

CO4 : Interpret performance of different pipelined processors.

CO5: Explain data flow in arithmetic algorithms .

COMPILER DESIGN

Students after studying these areas of knowledge are expected:
CO1: Master using lexical analyzer and parser generator tools.

CO 2: Master building symbol tables and generating intermediate code.

CO3: Master generating assembly code for a RISC machine.

CO4: Master programming in Java.

CO 5: Be familiar with compiler architecture.

DISTRIBUTED SYSTEM

Students after studying these areas of knowledge are expected:

CO1:Identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement, etc.

CO2: Design and develop distributed programs using sockets and RPC/RMI.

CO3: Differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems

.

CO4: Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constraints.

CLOUD COMPUTING

Students after studying these areas of knowledge are expected:

CO1: Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing

CO2: Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.

CO3:Explain the core issues of cloud computing such as security, privacy, and interoperability.

CO4: Choose the appropriate technologies, algorithms, and approaches for the related issues.

CO5: Identify problems, and explain, analyze, and evaluate various cloud computing solutions.

INFORMATION STORAGE & MANAGEMENT

Students after studying these areas of knowledge are expected:

CO1: Explain the concepts of Cloud Computing

CO2: Explain the technology incorporated in Cloud Computing

CO3:Explain the architecture of Cloud Computing

CO4: Explain the business processes involved in Cloud Computing

CO5: Explain the benefits of Cloud Computing through case studies

NETWORK MANAGEMENT

Students after studying these areas of knowledge are expected:

CO1: Independently understand basic computer network technology.

CO 2: Understand and explain Data Communications System and its components.

CO3:Identify the different types of network topologies and protocols.

CO4 :. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

CO5: Identify the different types of network devices and their functions within a network

SOFT COMPUTING

Students after studying these areas of knowledge are expected:

CO1: To familiarize with neural networks and learning methods for neural networks;

CO2: To introduce basics of genetic algorithms and their applications in optimization and planning;

CO3:To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system;

CO4: To introduce students tools and techniques of Soft Computing;

CO5:To develop skills thorough understanding of the theoretical and practical aspects of Soft Computing.

WEB ENGINEERING

Students after studying these areas of knowledge are expected:

CO1: Develop a web application using server side programming languages and components.

CO2: . Apply the web engineering methodologies for Web application development

CO3:. Develop a component based web solution and use UML diagrams to describe such a solution.

CO4: Identify and discuss the security risk of a Web application.

WIRELESS NETWORK

Students after studying these areas of knowledge are expected:

CO1: Understand fundamentals of wireless communications.

CO2: Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.

CO3: Demonstrate basic skills for cellular networks design.

CO4: Apply knowledge of TCP/IP extensions for mobile and wireless networking.

MANET & HIGH SPEED NETWORK

Students after studying these areas of knowledge are expected:
CO1: Demonstrate the knowledge of network planning and optimization.

CO2: Develop an in-depth understanding, in terms of architecture, protocols and applications, of major highspeed networking technologies .

CO3: Evaluate various technologies and identify the most suitable one to meet a given set of requirements for a hypothetical corporate network.

CO4: Develop necessary background to be able to manage projects involving any of the high-speed networking and fiber optics technologies.

CO5: Demonstrate the knowledge of Wireless networks